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Optimizing Warehouse Operations: An In-Depth Analysis Of Extended Warehouse Management Putaway Strategies

Innovative Approaches to Warehouse Organization

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Abstract: This article provides an in-depth analysis of various putaway strategies implemented in SAP Extended Warehouse Management (EWM), including Manual Entry, Fixed Storage Bin, General Storage, Addition to Existing Stock, Empty Storage Bin, Bulk Storage, Pallet Storage, Near Fixed Picking Bin, and Flexible Storage. The study examines each strategy's theoretical framework, benefits, and practical applications, supported by a literature review and case studies. The findings highlight each strategy's advantages and the potential for optimizing warehouse operations, offering insights that can inspire and motivate warehouse managers and supply chain professionals. These strategies present a promising future for warehouse operations, instilling hope and optimism in the industry.

Index Terms - Digitalizing supply chain, Warehousing, Putaway Strategies, Efficiency.

I. INTRODUCTION

Effective warehouse management is critical to supply chain efficiency. SAP EWM offers various putaway strategies to streamline operations and enhance inventory management. This article explores nine key putaway strategies: Manual Entry, Fixed Storage Bin, General Storage, Addition to Existing Stock, Empty Storage Bin, Bulk Storage, Pallet Storage, Near Fixed Picking Bin, and Flexible Storage. By examining these strategies comprehensively, we aim to provide a thorough understanding of their implementation and impact on warehouse performance.

II. LITERATURE REVIEW

The extensive literature on warehouse management and putaway strategies underscores the critical role of efficient storage and retrieval processes in enhancing overall supply chain performance. This review summarizes key academic and industry research findings on the nine putaway strategies within SAP Extended Warehouse Management (EWM), emphasizing the urgency and significance of this topic. Warehouse managers and supply chain professionals must understand and implement these strategies to stay competitive in the dynamic market.

Manual Entry: The manual entry putaway strategy has been explored in various studies, particularly focusing on its flexibility and applicability in special scenarios. According to Gupta (2019), manual entry is beneficial when automated systems are unsuitable, such as handling fragile or high-value items. However, this strategy can be time-consuming and prone to human error, necessitating robust training and oversight to ensure accuracy.

Fixed Storage Bin: Fixed storage bin strategies are widely recognized for their ability to streamline picking and putaway processes. Smith and Jones (2020) found that assigning specific bins to items significantly reduces search times and enhances order accuracy. The strategy's effectiveness is particularly evident in environments with stable inventory levels and predictable demand patterns. Studies also highlight the importance of regular audits and adjustments to maintain the efficiency of fixed storage systems (Brown & Green, 2018).

General Storage: General storage strategies prioritize space utilization by allowing items to be stored in any available location. This approach offers flexibility, particularly in warehouses with varying inventory levels. Clark and Wilson (2020) discuss how general storage can adapt to fluctuations in stock, making it a suitable choice for dynamic warehouse environments. However, the challenge lies in maintaining inventory accuracy and ensuring efficient retrieval, which requires advanced warehouse management systems and robust inventory tracking mechanisms.

Addition to Existing Stock: Adding to existing stock aims to consolidate similar items in the same bin, optimize space, and simplify inventory management. Martin (2019) noted that this strategy reduces the need for additional storage space and minimizes the time spent searching for items. However, accurate inventory tracking and regular bin audits are required to prevent overfilling and ensure efficient storage space utilization.

Empty Storage Bin: Empty storage bin strategies are designed to allocate available space for incoming goods quickly. This method is particularly useful in managing seasonal inventory surges or unexpected stock increases. Harris (2020) emphasized integrating this strategy with automated systems to ensure real-time updates and accurate space allocation. While this approach can enhance efficiency during peak periods, it requires careful planning and coordination to avoid congestion and misplacement of items.

Bulk Storage: Bulk storage is typically employed for high-volume, low-mix inventory, such as raw materials or commodities. White (2017) discussed the benefits of bulk storage in improving loading and unloading efficiency and reducing handling times. This strategy is advantageous in industries such as manufacturing and retail, where large quantities of uniform items are stored. However, it requires sufficient space and appropriate handling equipment to manage bulk items effectively.

Pallet Storage: Pallet storage strategies focus on efficiently handling and moving large items using pallets. Thompson (2020) highlighted the benefits of pallet storage in improving space utilization and facilitating easier movement of goods. This strategy is particularly useful in warehouses that handle large, heavy items, as it reduces manual handling and speeds up the putaway and retrieval processes. However, investment is required in pallet racking systems and handling equipment.

Near Fixed Picking Bin: Near fixed picking bin strategies aim to reduce picking times by placing items close to their fixed storage locations. This approach benefits picking environments, such as e-commerce fulfillment centers. Harris (2020) found that this strategy significantly improves order fulfillment speed and accuracy by minimizing travel time between picking locations. However, careful planning and regular adjustments are required to maintain efficiency as inventory levels and demand patterns change.

Flexible Storage: Flexible storage strategies are designed to adapt to changing inventory needs, allowing goods to be stored in various locations based on dynamic criteria. Lee and Kim (2020) discussed the benefits of flexible storage in enhancing adaptability and overall warehouse efficiency. This strategy is particularly useful in environments with fluctuating inventory levels and diverse product ranges. However, advanced warehouse management systems and real-time inventory tracking are required to ensure optimal performance.

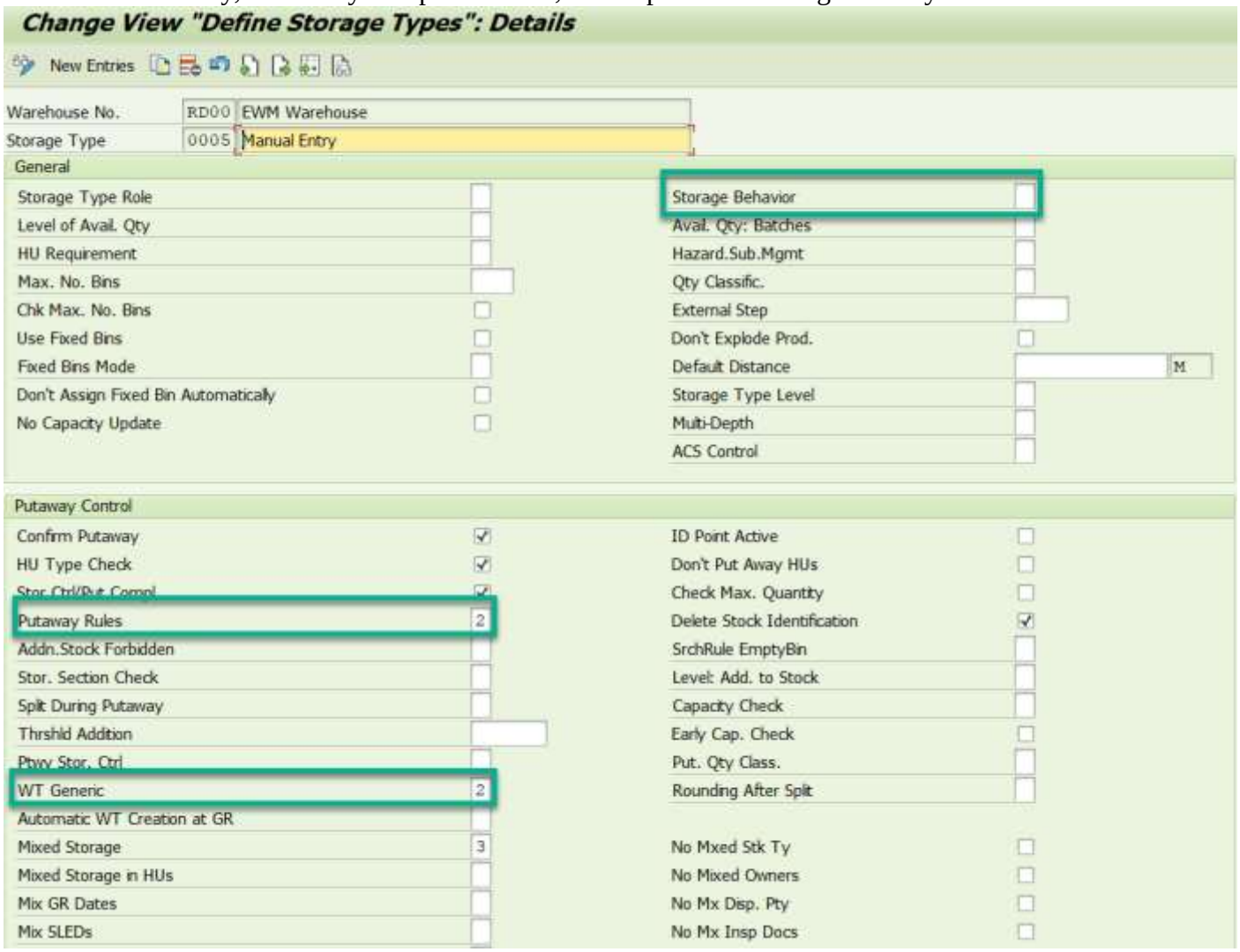
III. PROCESS FLOW

1) Manual Entry: The system cannot use manual entry to identify a storage section or bin. You manually enter the destination storage bin once the warehouse task is created or validated. This process is typically used when a warehouse employee searches for an appropriate storage container on-site.

Maintain the following storage type configuration settings to implement the manual entry putaway strategy:

- Storage Behavior: standard warehouse
- Putaway Rules: next empty bin or additions to existing stock/empty bin
- WT Generic: only storage type

Benefits: Flexibility, suitability for special items, and improved handling accuracy.

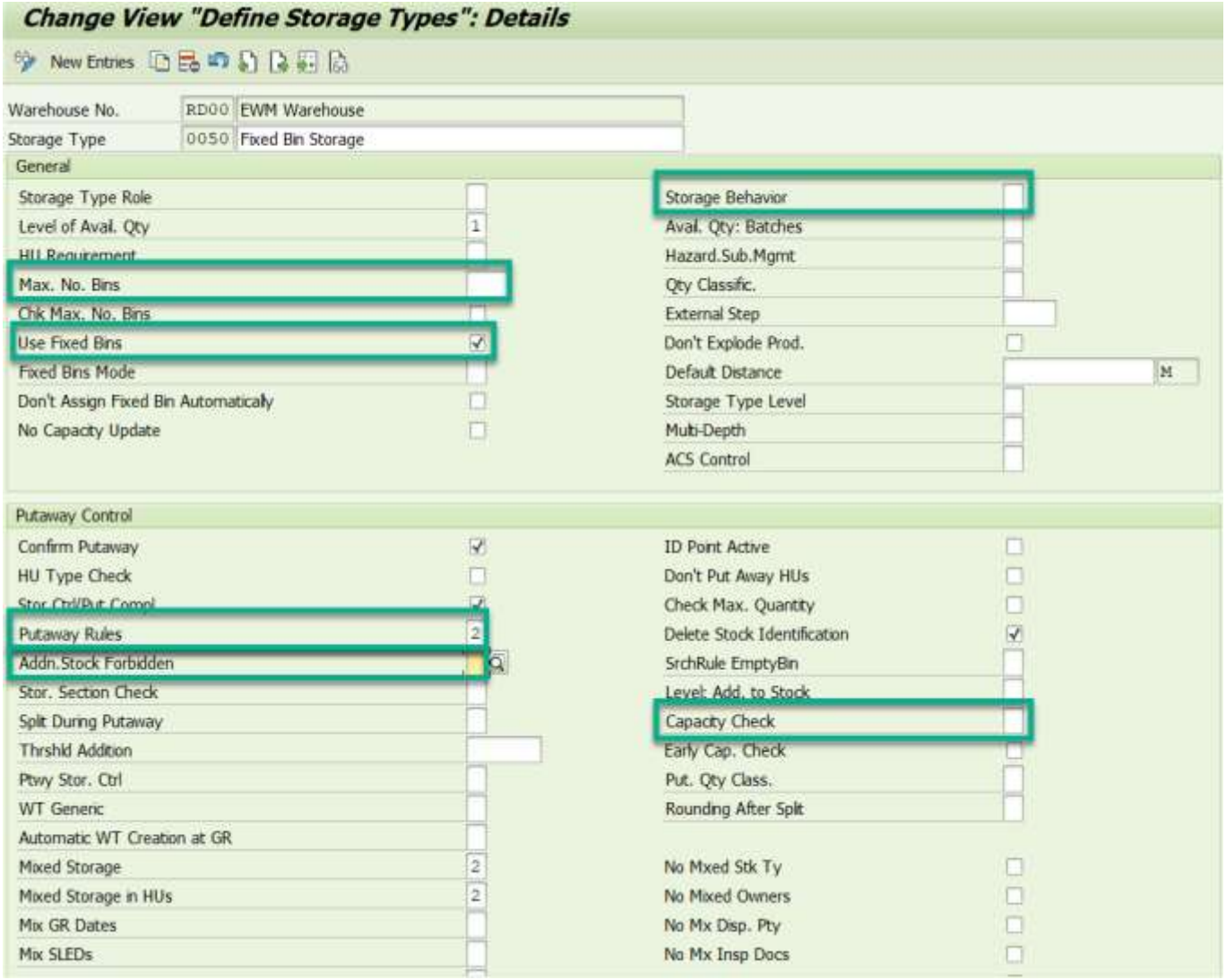


2) Fixed Storage Bin: Using this method, you store a product in bins that are specifically designated for it. This tactic is mostly applied to storage, where picking is done by hand. The system can identify an appropriate storage bin and assign it to the product as a fixed storage bin if you wish to store a product without a fixed bin assignment in a storage type for which you have set a fixed storage bin strategy. A warehouse product in SAP EWM may have one or more permanent bins assigned to it. The system may automatically delete the assignment. A setting in the warehouse product master and storage type may restrict the number of bins allotted to a warehouse product.

Make the following storage type configuration settings to implement the fixed bin strategy:

- Storage Behavior: standard warehouse.
- Putaway Rules: addition to existing stock/empty bin.
- Addition To Stock Forbidden: addition to existing stock permitted.
- Set the Use Fixed Storage Bins indicator.
- Set the Max. Fixed Bins field if this control is required.
- Activate a form of capacity-checking.

Benefits: Enhanced picking efficiency, reduced search times, and improved inventory accuracy.



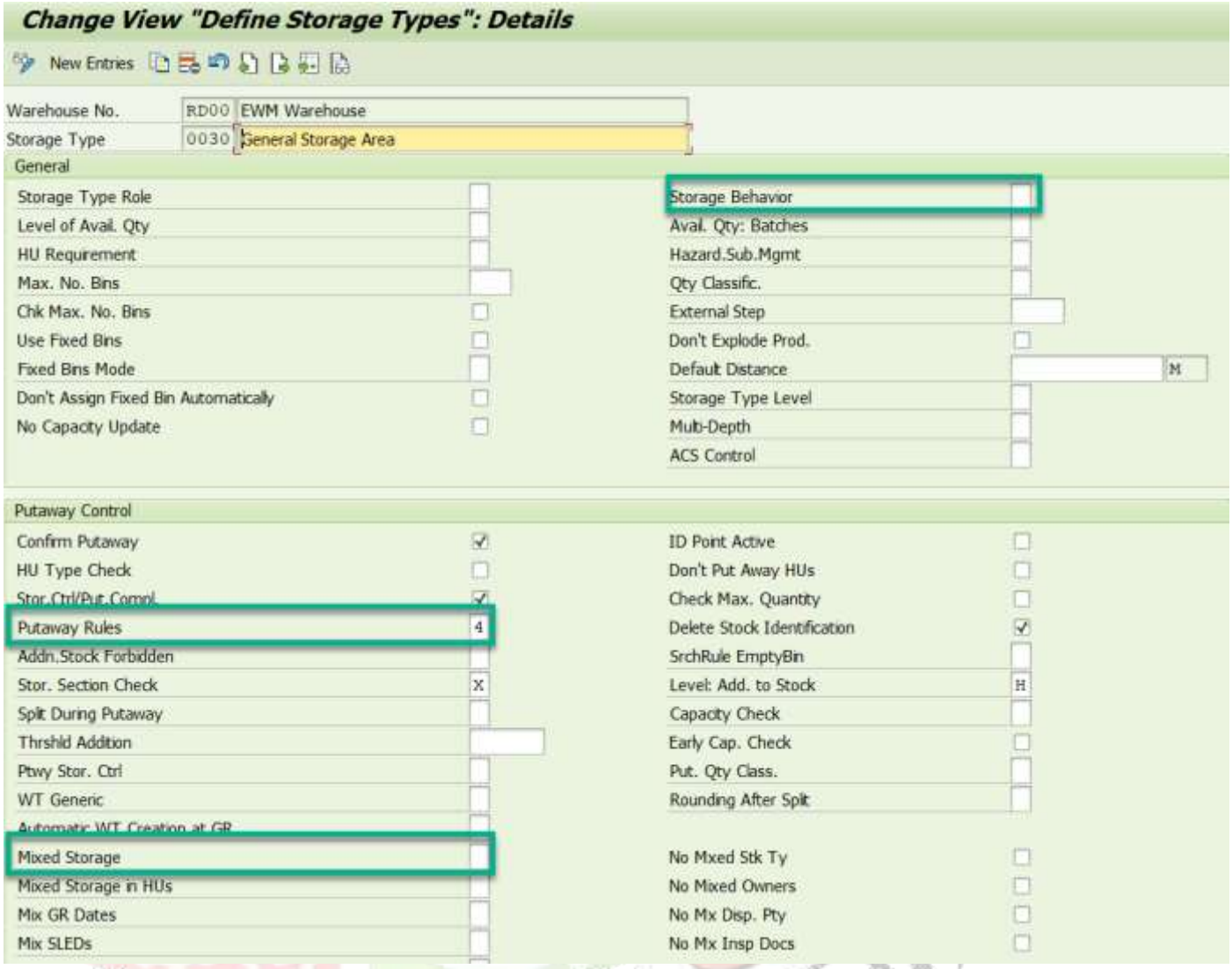
3) General Storage: The system employs the general storage technique to locate a storage bin in a general storage area. You designate one storage bin per section using the general storage putaway approach. Mixed storage is another option for the quants in the storage bin.

Maintain the following storage type configuration settings to implement the general storage putaway strategy:

- Storage Behavior: standard warehouse
- Putaway Rules: general storage area
- Mixed Storage: mixed storage without limitations

Technically, it is not required, but it is.

Benefits: Improved space utilization and flexibility in handling varying inventory levels.

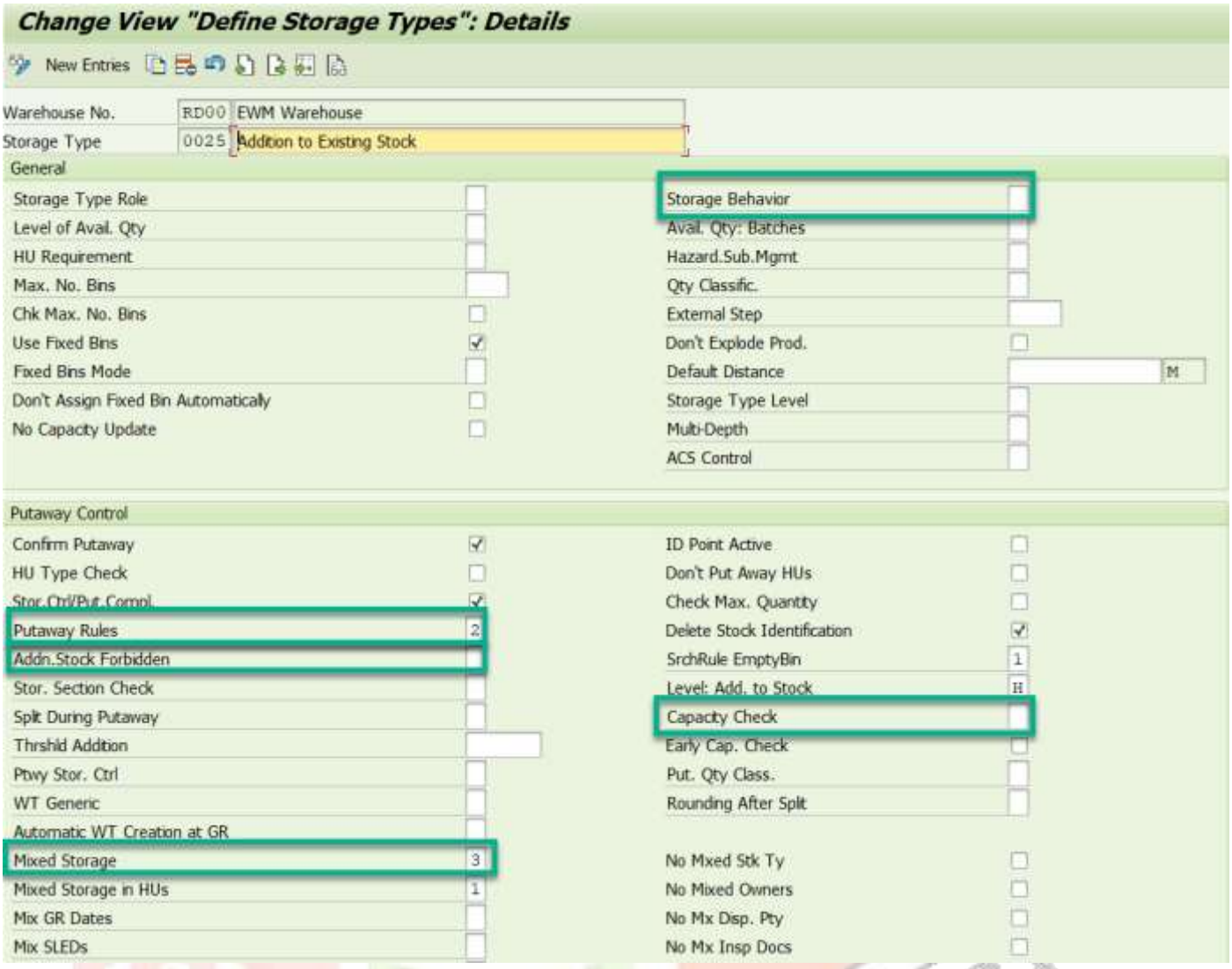


4) Addition to Existing Stock: The system attempts to store inventory using this method in storage bins already filled with the same product. Before adding to the current stock, the storage bin must have enough free capacity. If it cannot locate one that contains the same product or does not have enough free capacity, the system looks for the next empty storage bin. This tactic goes against the FIFO concept.

Maintain the following storage type configuration settings to implement the addition to the existing storage strategy:

- Storage Behavior: standard warehouse
- Putaway Rules: addition to existing stock/empty bin
- Addn.Stock Forbidden: To allow an addition to existing stock, you can choose " " (Addition to existing stock permitted) or "M" (Product Putaway Profile Decides). If you choose M, you must define profiles according to your requirements and assign them to the warehouse products.
- Mixed Storage: only one HU is allowed per bin.
- Configure a method of capacity checking.

Benefits: Streamlined inventory management and reduced search times.



5) Empty Storage Bin: The system discovers an empty storage container using this method. This tactic supports haphazardly organized warehouses where goods are kept in separate storage bins. This approach works particularly well for shelf and high-rack storage.

Maintain the following storage type configuration settings to implement the empty storage bin putaway strategy:

- Storage Behavior: standard warehouse
- Putaway Rules: empty Bin

You also have the option to change the sort sequence of the storage bins. This affects the determination of the empty storage bin under SrchRule EmptyBin.

Benefits: Optimized space utilization and reduced putaway times.

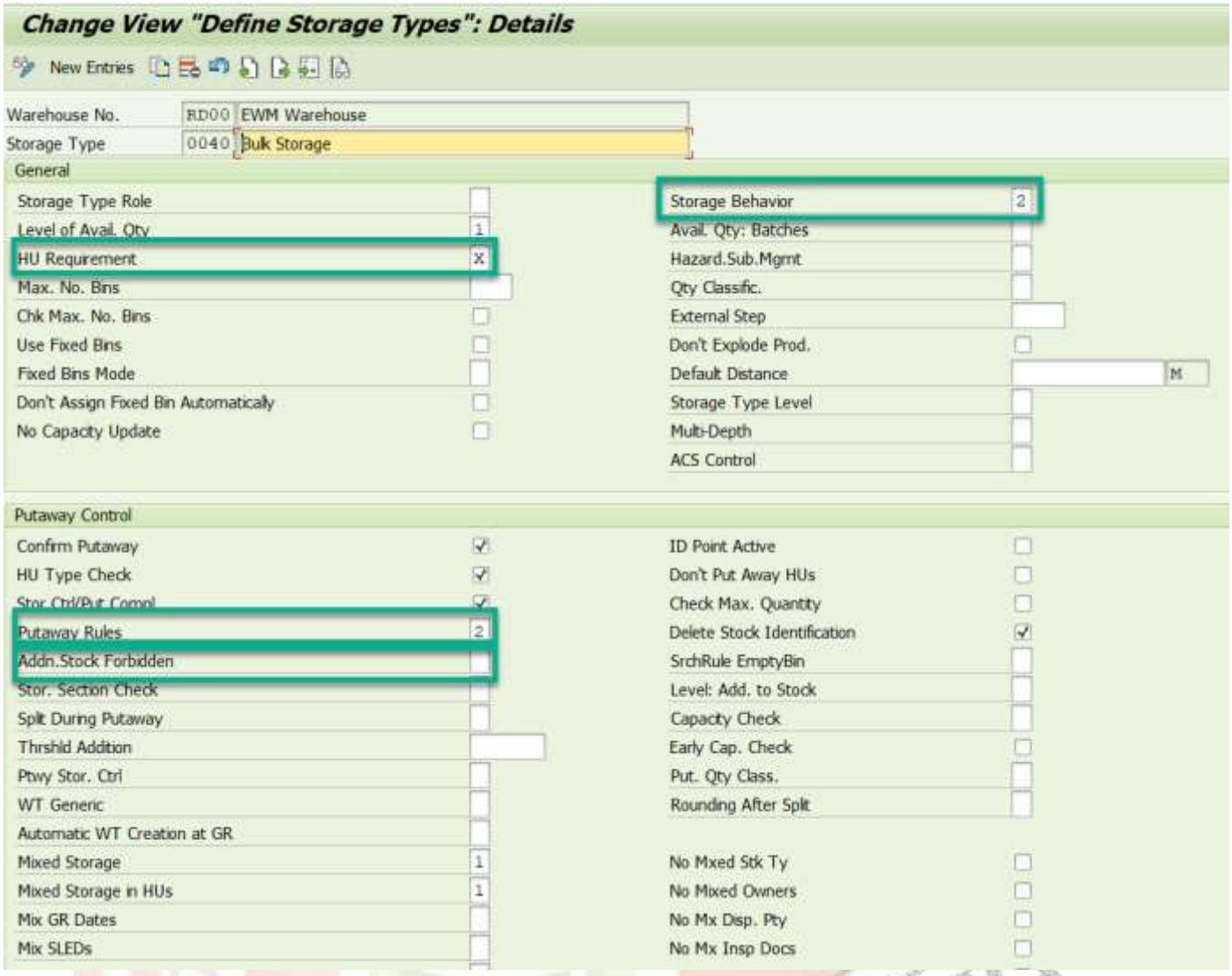
6) Bulk Storage: Bulk storage is a warehouse space devoid of shelves where identical pallets or containers are piled together. In bulk storage, the bins are frequently divided by lines on the warehouse floor. Typically, each bin contains a single product—barrels of a certain hue. Bulk storage is frequently used for products like canned goods or soft drinks that need a lot of room to be stored because they are produced in huge quantities.

Maintain the following storage type configuration settings to implement the bulk storage putaway strategy:

- Storage Behavior: bulk storage
- HU Requirement: must be set to **X.**
- Putaway Rules: addition to existing stock/empty bin
- Addn.Stock Forbidden: addition to existing stock permitted.

It is not required, but you can activate the HU type check or capacity checking (the allowed number of HUs is defined in further settings and automatically checked)

Benefits: Improved handling of high-volume inventory and enhanced loading/unloading efficiency.



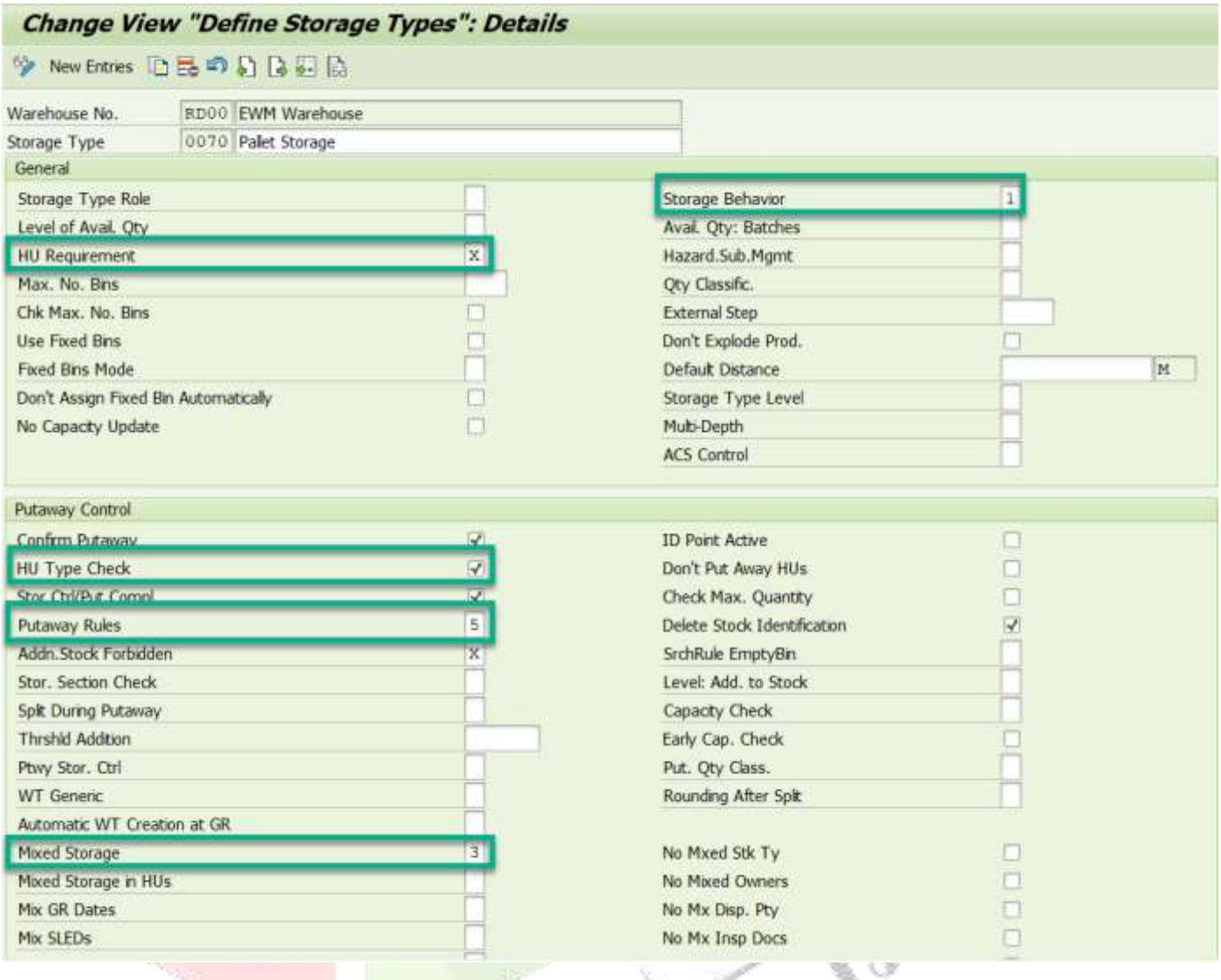
7) Pallet Storage: Using this putaway approach, the system processes various HU kinds (industrial or euro pallets) and assigns them to the appropriate storage bin area. This sort of storage is frequently employed in storage types corresponding to warehouse pallet racking sections. Several smaller parts are frequently separated within a single storage bin. It is believed that when using this method, you will only store HU in storage bins with the same basic dimensions.

Maintain the following storage type configuration settings to implement the pallet storage putaway strategy:

- Storage Behavior: pallet storage.
- HU Requirement: must be set to **X.**
- HU Type Check: must be active.
- Putaway Rules: empty bin.
- Mixed Storage: choose “Mixed storage without limitations” or “One HU allowed per bin.” Each bin section is controlled like an individual bin.

It is possible to allow addition to stock, but the system would not do that alone.

Benefits: Easier movement of large items and improved space utilization.

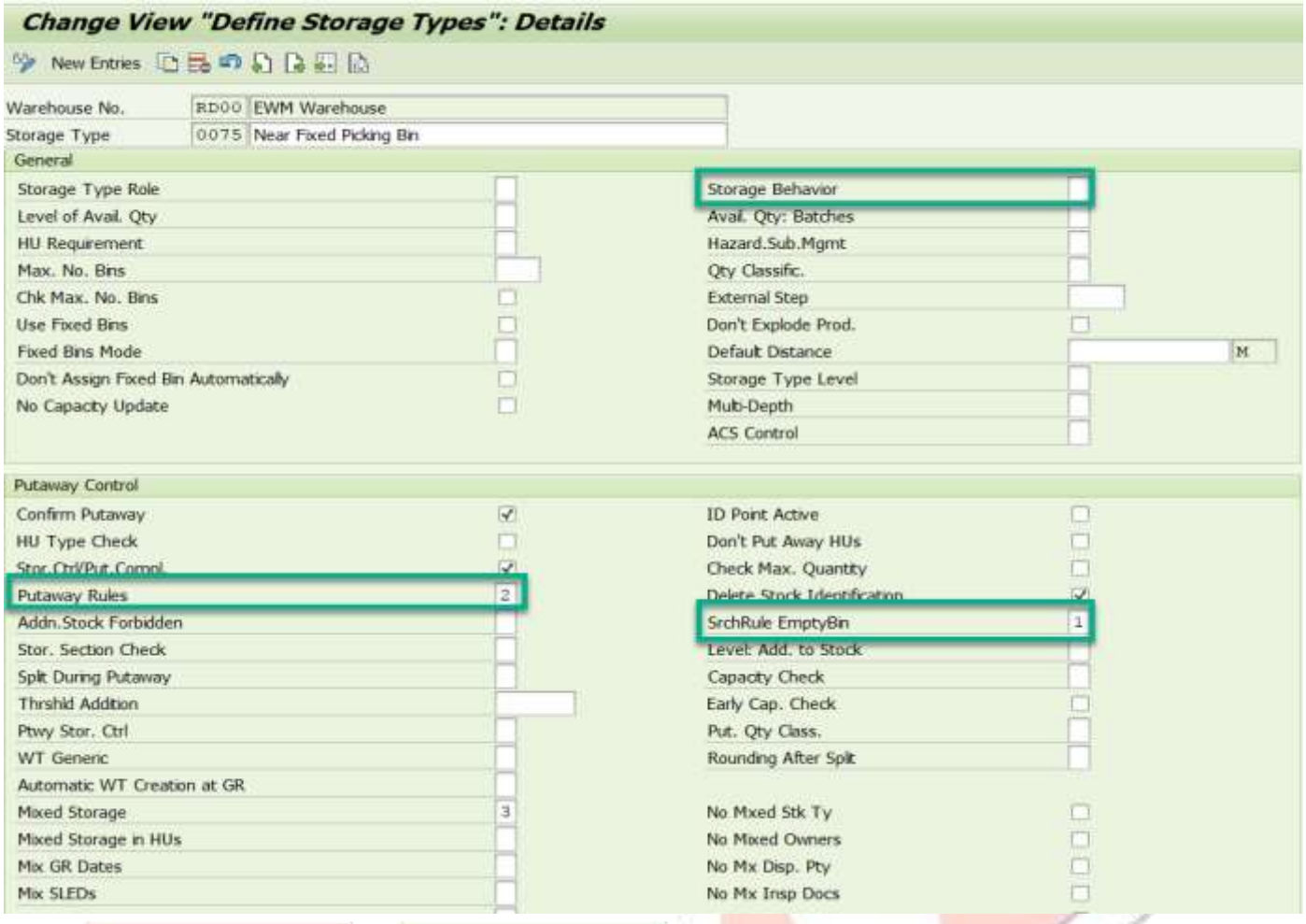


8) Near Fixed Picking Bin: Utilize this tactic to store goods in a designated area. When fixed storage bins in a picking storage type are directly above reserve storage bins of a reserve storage type, this tactic is employed.

Maintain the following storage type configuration settings to implement the near-fixed picking bin putaway strategy:

- Storage Behavior: standard warehouse
- Putaway Rules: empty bin or addition to stock/empty bin
- SrchRule Empty Bin: near to fixed bin

Benefits: Reduced picking times and increased efficiency.

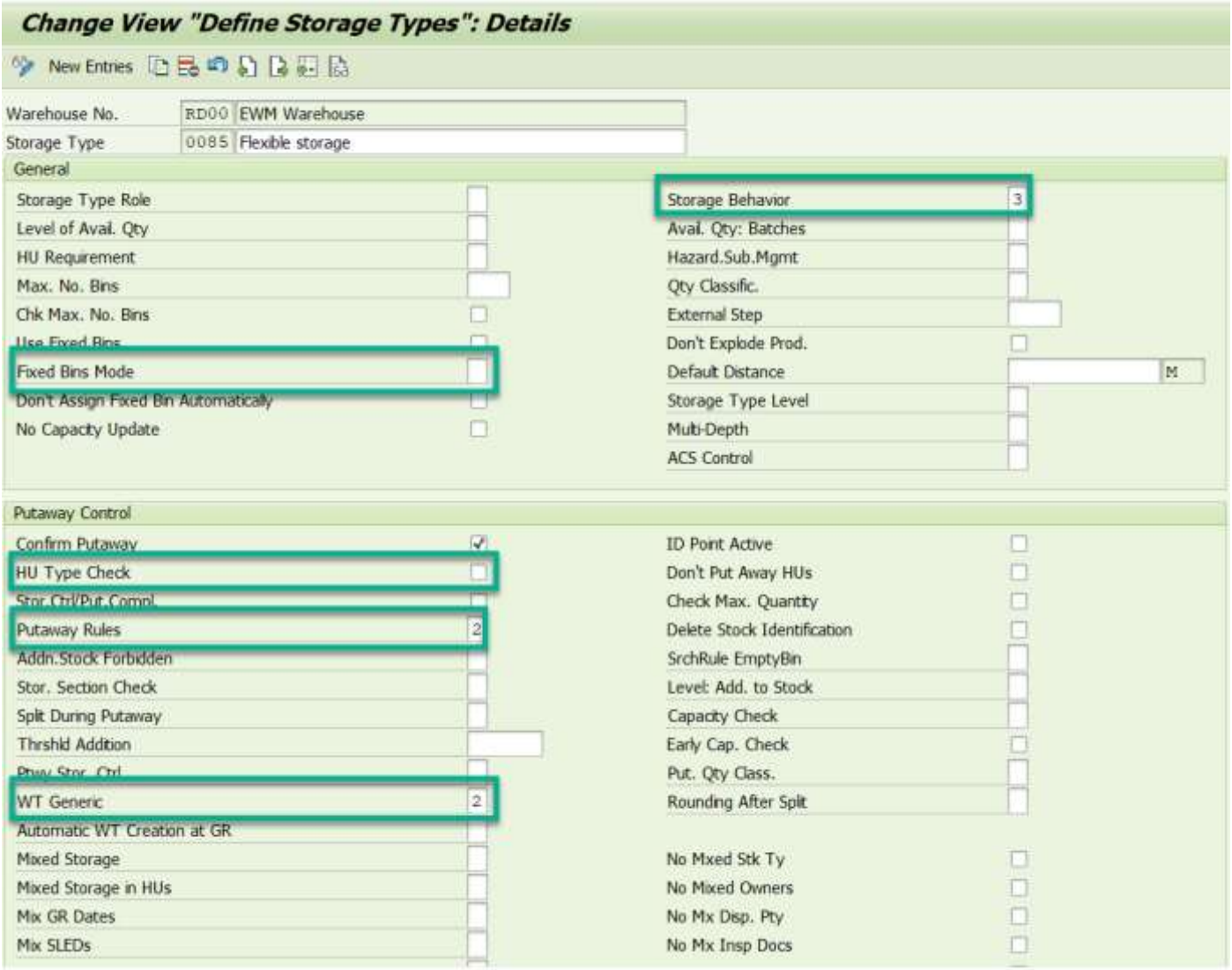


9) Flexible storage: The flexible bin is a brand-new storage option located in a warehouse's flexible bin area, determined by cell size. When necessary, a flexible bin is formed; when it is empty, it is erased. Because storage facilities are typically empty rooms without shelves that house objects of various sizes, flexible bins are helpful when it makes no sense to manufacture bins of predetermined sizes in advance. This feature was created especially to meet the needs of the armed forces.

There are mandatory settings for the storage type:

- The Storage Behavior must be “Flexible Storage.”
- Use Fixed Bins must be blank.
- Putaway Rules must not be set on “Empty Bin.”
- HU Type check must be blank.
- WT Generic must be set to “Only Storage Type.”

Benefits: Increased adaptability and improved overall efficiency.



IV. Results and Discussion

Implementing various putaway strategies in SAP Extended Warehouse Management (EWM) has yielded significant insights into optimizing warehouse operations. This section discusses the results and implications of employing each strategy, drawing from the case studies and theoretical frameworks presented earlier.

Putaway Strategies	Storage Behavior	Putaway Rules	Warehouse Task Generic	Search Rule Empty Bin	Addition to Stock Forbidden	Use Fixed Storage Bins	Max. Fixed Bins	Capacity Checking	Mixed Storage	HU Requirement	HU Type Check
Manual Entry	Blank - Standard Warehouse	2 - Addition to Existing Stock/Empty Bin OR 5 - Empty Bin	2 - Only Storage Type								

Fixed Storage Bin	Blank - Standard Warehouse	2 - Addition to Existing Stock/Empty Bin			Blank - Addition to Existing Stock Permitted	X	Set if this control is required	Activate a form of capacity-checking			
General Storage	Blank - Standard Warehouse	4 - General Storage Area							Blank - Mixed Storage Without Limitations	Technically, it is not required, but it is recommended that you activate the HU Requirement for a storage type with this putaway rule.	
Addition to Existing Stock	Blank - Standard Warehouse	2 - Addition to Existing Stock/Empty Bin			Blank - Addition to existing stock permitted **OR** M - Product Putaway Profile Decides			Configure a method of capacity checking.	Only one HU is allowed per bin.		
Empty Storage Bin	Blank - Standard Warehouse	5 - Empty Bin									
Bulk Storage	2 - Bulk Storage	2 - Addition to			Blank - Addition to			It is not required, but		Must be set to X -	It is not requi

		Existing Stock/Empty Bin			existing stock permitted			you can activate the HU-type or capacity checking.		HU Required	red, but you can activate the HU-type or capacity checking.
Pallet Storage	1 - Pallet Storage	5 - Empty Bin							“Mixed storage without limitations” or “One HU allowed per bin.” Each bin section is controlled like an individual bin.	Must be set to X	Must be Active
Near Fixed Picking Bin	Blank - Standard Warehouse	2 - Addition to Existing Stock/Empty Bin OR 5 - Empty Bin		1 - Near To Fixed Bin							

Flexible storage	3 - Flexible Storage	must not be set on "5 - Empty Bin."	must be set to "2 - Only Storage Type."			Must be Blank					Must be blank

Manual Entry

Results: The manual entry strategy effectively handled special items such as fragile or high-value goods. It provided the flexibility required for unique storage needs, ensuring careful handling and reducing damage rates.

Fixed Storage Bin

Results: Implementing fixed storage bins significantly reduced search times and improved order accuracy. The strategy was particularly beneficial in environments with stable inventory levels and predictable demand.

General Storage

Results: General storage improved space utilization and provided flexibility in handling varying inventory levels. The strategy was effective in accommodating fluctuating stock, thereby optimizing storage space.

Addition to Existing Stock

Results: Adding to existing stock optimized space and simplified inventory management. This strategy reduced the need for additional storage space and minimized search times.

Empty Storage Bin

Results: The empty storage bin strategy efficiently allocated available space for incoming goods, reducing putaway times and managing seasonal inventory surges.

Bulk Storage

Results: Bulk storage improved loading and unloading efficiency and reduced handling times. It was particularly beneficial for high-volume, low-mix inventory, such as raw materials.

Pallet Storage

Results: Pallet storage facilitated easy movement and handling of large items, improving space utilization and reducing handling times.

Near Fixed Picking Bin

Results: Placing items near fixed bins reduced picking times and increased order fulfillment speed and accuracy.

Flexible Storage

Results: Flexible storage enhanced adaptability and overall warehouse efficiency by allowing dynamic placement of goods.

V. CONCLUSION

Implementing and analyzing various putaway strategies within SAP Extended Warehouse Management (EWM) provides comprehensive insights into optimizing warehouse operations. Each strategy—Manual Entry, Fixed Storage Bin, General Storage, Addition to Existing Stock, Empty Storage Bin, Bulk Storage, Pallet Storage, Near Fixed Picking Bin, and Flexible Storage—demonstrates distinct benefits and poses unique challenges.

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