Storage Racking System for efficient warehousing

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Abstract- Every warehouse now a days is facing the space storage problem. The main reason is nothing but the slow/dead/old or excessive inventory. It happens many times that first stored or entered products in warehouse gets accumulated below newly entered products, so as time passes the upper products are dispatched while lower products stay under pile catching dust, resulting in old or expired or damaged inventory . No need to mention but this First come last served policy is responsible for this problem.

This paper focuses on how to deal with this type of inventory by efficient racking system which promotes the First in First out (FIFO) methodology. Paper the First in First out (FIFO) methodology. Paper involves evaluation of various methods and designs of racks. Each of these methods have some advantages and disadvantage. Implementation of FIFO involves use of best possible suited method from all of these methods.

Key words: *warehouse layout, RFID, racks and pallets, barcodes*

1. Introduction

Uncontrolled production leads to the pile of unused inventory due to unpredictable demand and supply. The part of this inventory goes on accumulating at the back of warehouse, catching dust ending up damaged or expired inventory. The newly entered products are stacked over older one therefore only those are treated (retrieved and stored) time to time while older products are completely neglected. This problem becomes sever when there is insufficient space for storage. It becomes very difficult to retrieve the older products from the pile as it is very time consuming and laborious process. Sorting and picking process becomes critical in such case.

During storing or retrieving process workers keep the items in shelves or racks with same label. Much of the time, due to the high volume, they keep the items in whichever way suitable. They do try to remember which the older items are but this is not possible as there are different people in different shift, etc. During an order process, the packers go about the shelves bringing all the stuff they need, but they cannot always pick out the oldest items first. If they have free

time, then they may rearrange the items in the shelves according to FIFO. This is difficult though.

Due to high amount of pressure and tiredness, some the pickers sometimes get the items that are easy to grasp, even though those may be the newest products made. So there is no FIFO. Pickers do have a general idea about which are the older items and which items are newer, but due to the problem of moving around items/rearranging, especially when people literally run around to keep up with time, FIFO takes the rearmost seat. Many times the person storing the item and person picking the item for dispatch are different, as stocker keeps the item at his desired place and only he knows where it is placed, So when the packagers who are responsible for picking up items from the shelves come to get what they need, it may not be possible for them (even if they wanted) to pick up the oldest manufactured batch of an item. The other issue is that the pickers themselves do not have the time to sort through the stored boxes of items to find the oldest ones first.

This is creating a big problem as older items may just sit and gather dust, while the newly manufactured items are sent out well before. Since the batches of the manufactured products are simply not organized in terms of manufacturing date (no FIFO), it is not possible to pinpoint where a particular manufactured batch is. For example, if it is found out later that the batch manufactured in XYZ month is faulty, there is no other way but to take all the batches of that particular item and rework them.

A system must be developed that makes the job of retrieving the older manufactured items before the newer ones. The system must be simple, efficient in terms of time, and capable of handling the large volumes. The same system should make possible the tracking of all manufactured batches. It should also take into account that products come in a variety of shapes and sizes.

2. Flow Racks

Carton Flow Rack is a high-density type of Storage and Picking System. It utilizes a first- in/first-out rotation of cartons by using gravity flow to bring product from the stocking aisle to the picking aisle of the System. The products of same frequency can be loaded on the same lane from the back so that the oldest product is always

in the front of the lane.

The most frequently shipped products can be placed at the most accessible height to save time. There can be clips/lock holding the cartons behind the first carton so that they wouldn't slide abruptly if the front Carton was removed. Another advantage of this system is that if the packer picks up more items than he requires he can always put it back in the appropriate lane without having to worry about FIFO as the oldest items are always in front.
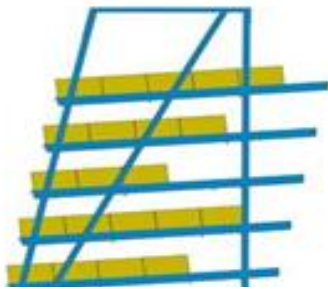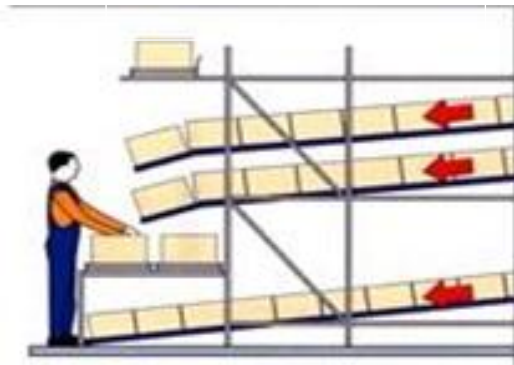

Fig.1. gravity racks

Fig.2. unloading

A number of things need to be considered before implementing a flow rack system. The area currently available inside the cage has to be measured to see how many flow racks can be placed in the available space. We also need to estimate the number of cartons a flow rack can store in comparison with the current shelves. Since all items placed on flow racks have to be stored in cartons we need to take into account the different sizes of products stored and change the size of cartons accordingly.

3. Drive-in and drive-through racking

Although this is a racked storage system, it is operationally similar to block storage. There should only be one product line in each row, and the effective utilization of the pallet positions is about 70%. The racking structure supports the weight of the pallets

so this system is suitable for high stock product lines, where strict FIFO movement is not required, but where the pallet loads are not strong enough or of regular enough shape to carry superimposed loads. This system consists of vertical support frames, tied at the top, with cantilever pallet support beams at different heights.

4. Adjustable Pallet Raking-(APR)

Adjustable pallet racking is probably the most widely used type of pallet racking, and offers free access to every pallet held. It can be built to match the lift height of any fork- lift truck. Unit loads other than pallets can be stored using APR, and there is a range of accessories such as drum supports and channel supports for post pallets to facilitate this. The conventional way of laying out APR is to have one row single deep at each end of the installation, with back-to-back rows in between. This gives every truck aisle access to two rows of racking, and minimizes the number of aisles required.

5. Powered Mobile racking

Powered mobile racking is effectively single deep APR, with the racking, except the end or outer rows, mounted on electrically powered base frames. Operationally it has similar characteristics to APR, but it is slower in use, and the pallet position utilization is likely to be similar to APR at 90 to 95%. This type of storage is expensive in equipment and floor costs, and it tends to be slow in operation. However it gives very dense storage, and is suitable for the typically large number of product lines forming the 'Pareto tail' of a product range, where individual product lines have low stock and low throughput. It also finds use in cold-storage applications where space costs are especially high, and however temperature variations are reduced by cutting the air space in the storage area.

In order to make the system efficient the storage and picking methodology can be altered. Product stored in a forward pick area can be placed in a different storage medium than product used as backup storage. Forward pick areas have high degrees of picking activity, so the storage medium must compliment that. Backup storage tends to be handled in larger unit volumes and therefore have lower and different storage needs. The items for which FIFO is not a concern can be stored in static shelves so that space and money is saved.

6. Slotting

Your warehouse is a limited resource environment. You have a finite amount of people, equipment, products and available storage space. Slotting will help you make the most of the cubic space you have. At its most basic

level, slotting is the series of tasks that precede the decision of where to put away inventory based on space available within your warehouse facility. If the contents of your warehouse are not static then don't expect that your slotting activities can remain forever unchanged. Plan on continually tweaking your slotting strategy in response to unforeseen events or deviations from plan. Ideally, your slotting strategy would change in sync with your historical or fore-casted product usage information, and things would remain fairly smooth.

7. Slotting by ABC analysis

ABC analysis or Pareto's law is a well-known principle that is widely used for decision making and management control in many areas of management. ABC analysis is the process of dividing items in to three classes according to their price usage so that managers can focus on items that have the highest value. Class 'A' items typically represent only 20% of the items but account for 80 % of the price. Class "B" items account for another 30% of the items but 15% of price. Finally, 50% of the items fall in class "C", representing a mere 5 % of the price.

8. 5'S

First thing first, no matter how much advanced technology any organisation may have implemented, unless the lower   level employees or workers are not well experienced or one can say strict cultured all efforts are in vein. Organisation culture takes the vital part in the success of implementation of any new technology in any organisation. It is observed that workers are not keen about placing or storing the right product at right place in proper manner, and here comes the role of 5'S organisation culture.5's are the five rules or standards for maintain order, cleanliness and standardisation in any organisation.

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