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Implementation of Two Bin System with Catwalk Storage System for Spares Warehouse

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Abstract : Efficient inventory management is critical for maintaining smooth operations in large-scale manufacturing. This paper examines the implementation of the Two Bin System in the spares warehouse of an automotive industry, incorporating a Catwalk type storage system. By integrating ABC analysis and strategically organizing storage levels based on part movement and size, the study aims to evaluate the impact on service levels, inventory turnover, and operational efficiency. The results demonstrate significant improvements in service levels, reduced stock outs, and optimized warehouse operations.
Keywords – Two bin system, Inventory control, service level

Introduction

Effective inventory management is vital for large manufacturing companies to ensure timely availability of spare parts. A leading automotive manufacturer, faces challenges in managing a diverse inventory of spare parts. Implementing the Two Bin System, coupled with a Catwalk storage system and ABC analysis, offers a strategic approach to optimize inventory management.

Failing in supplying the spare parts in time directly affects the image of the company and so, the spares ware house which has about 5700 parts is of prime importance in the company's view. Basically the function of the department is to pack the spare parts on the orders received and to dispatch them to the customers. The suppliers of the department are MIW (Made in works), LAC and other suppliers all over the country.

The objective is to increase the service level of the parts operations from 75 % within 30 days to 95 % within 30 days by the introduction of Two Bin system of Inventory Control with CAT walk type of storage system by

- Reducing the picking time
- Facilitating easy procurement of material
- Facilitating visual control
- Facilitating easy stock maintenance

Background & Problem Definition –

The spares warehouse has about 5700 parts, of which 1600 parts are pruned, as there had been no orders for them for the past twelve months. For the remaining parts, the marketing department of parts operations receives the orders and based on the orders, the spares are procured from various suppliers as well as MIW and correspondingly sent after being properly packed.

As the number of parts to be maintained is very large and the space available is limited, it is difficult for the picker to pick the parts efficiently and move it to the packing area. Because of this, the orders are not being properly delivered in time, thus reducing the service level of the spares warehouse. In some cases, the stock takes more than seven days to be binned and made ready for picking, owing to the delays in the generation of GRN etc. This also results in reducing the service level of the department.

The stock is placed in pallets one above the other for four levels. So binning and retrieving the pallet while picking is troublesome. Also, it is not very safe for the picker or retriever to move the material from the bins that are above three other bins.

The pick list generation is done based on the orders randomly and so at times the picker has to retrace his path during the picking operations. This also accounts for increase in picking time.

It is not possible to maintain the stock easily, as there is no visual control. There are no norms to decide when to reorder and in how much quantities.

Service Level -

The efficiency of the parts operations is denoted in terms of its service level. It is defined as the ratio of number of units delivered to the number of units demanded. It is usually expressed as a percentage.

If the service level is high, it means that there are no shortages and the orders are delivered in time.
In the spares warehouse, it is defined in two ways.

1. Service level within seven days - based on the number of orders and

$$Service\ level = \frac{\text{Number of orders serviced}}{\text{Number of orders received}} * 100$$

2. Service level within thirty days - based on the value

$$Service\ level = \frac{\text{Value serviced}}{\text{Value of orders received on the day,thirty days back}} * 100$$

Value serviced is the difference between value of the orders received on the day, thirty days back and the pending order value as on this day.

Literature Review

The Two Bin System uses two bins for each inventory item. Each bin has a bin card with part details, supplier details and replenishment quantity printed on it. When the first bin is empty, the bin card of the empty bin is taken and put on the VCS board. Immediately a replenishment order is triggered while the second bin ensures continuous supply during the lead time. This system helps maintain optimal inventory levels and minimizes stock outs.

The advantage of this system is that large quantities of inventory need not be kept as a stock and also, excellent visual control is there. But, the bin quantity should be in such a way that no stock out should arise even in case of a slight deviation in the lead-time.

Methodology -

Data Collection - Data was collected from the spares warehouse over six months, before and after implementing the Two Bin System and Catwalk storage system. Key performance indicators (KPIs) such as service level, economic order quantity were analysed.

Implementation Process -

Categorization -

The total number of invoices generated and the total dispatch values are taken for the last twelve months. There are 3963 parts, for which there were orders in the last twelve months.

Based on the supplier, these parts are categorized into MIW, BO, LAC, IMP and TOOL categories. MIW stands for Made in Works, meaning Plant I and Plant II. BO stands for Bought-out, the supplier for these parts are all over the country. IMP stands for Imported. LAC stands for Plant III.

Based on the number of invoices, the 10% of parts, which contribute to 70% of total number of invoices, come under 'F' class. The 20% of parts, which contribute to 20% of total number of invoices, come under 'M' class. The remaining 70% of parts, which contribute to 10% of total number of invoices, come under 'S' class.

Apart from this, the parts are classified into three divisions - A, B, C based on dispatch value. The 10% of items, which contribute to 70% of the value, come under 'A' class. The 20% of items, which contribute to 20% of the value, come under 'B' class. Similarly, the remaining 70% of items, which contribute to 10% of the value, come under 'C' class.

The number of parts in FMS and ABC classes is shown in table 1. As shown in the table, the total dispatch value over the last year is Rs. 100.10 Crores. 254 parts are under both 'F' and 'A' categories. 17 parts are under 'M' and 'A' categories whereas 332 parts are in 'F' and 'B' categories. These are considered to be the most important items, as they are of high value and fast moving.

Table 1 - FMS and ABC Table

	F	M	S	TOTAL
A	254	17	0	271
VALUE (Cr.)	67.97	2.08	0	70.05
B	332	131	30	493
VALUE (Cr.)	14.35	4.62	1	20.05
C	230	668	2301	3199
VALUE (Cr.)	2.59	4.55	2.86	10

TOTAL	816	816	2331	**3963**
VALUE (Cr.)	84.91	11.25	3.93	**100.1**

Calculation of Bin Quantities -

For all these 3963 parts, the supplier details are taken from the master data in the spares warehouse. For the parts, which do not have the supplier details in the master data, the required data is taken from the buyers. From these supplier details, the best possible supplier frequencies are taken from the buyers. Lead times for BO and TOOL parts are calculated from these supplier frequencies. The lead-time for all MIW parts is fixed as seven days. The imported parts are given three months as lead-time.

The marketing department has done the forecast of orders for all the parts for the coming year. This forecast takes care of the increase of turnover from Rs.135 Crores to Rs. 160 Crores and the average order quantities of all the parts. This forecast data is taken as the monthly consumption rate. From this, the daily consumption rate is calculated, as the lead-time is in days.

To overcome the deviation in the lead-time, a certain amount of material is fixed as the minimum level. Minimum level is fixed as the seven-day stock for 'A' class items.

Now, bin quantity= 1/2 [minimum level+ 2 (lead time consumption)]

For 'B' and 'C' class parts, the same formula is used but minimum level is fixed as fourteen-day stock for 'B' and 'C' class parts.

For the parts, which do not have the forecast details, the current stock in the warehouse is taken and one-third of it is tentatively fixed as the bin quantity

Fixing the Bin Sizes -

The standard sizes and volumes of all kinds of bins are taken such as Giant, Jumbo, Pallet, and Shelf. Similarly, the details of length, breadth and height for the parts are taken and from this data, the volume of each component is calculated. This volume is multiplied with the bin quantities to get the stock volume. From this, the appropriate bin is decided after comparing with the standard sizes aforementioned. For the parts, which are light but voluminous such as cover frame, seat foam, side panel, panel front, the shelf locations are allocated, as they cannot be accommodated in bins. Shelf space is the 0.5-meter space available between the floors.

Factors considered while fixing bin type are

- Size of the item.
- Sensitiveness of the item.
- Weight of the item.
- If material could not be accommodated in two bins, we can go for four bins, two of which act as a unit.

Allocation of Locations (Cat Walk storage system) -

For the space utilization, inventory reduction and safety in handling the material, the spares warehouse is reconstructed in a catwalk type of structure, which is composed of three floors. It is decided that the fast moving parts to be placed on the ground floor, the medium moving ones on the first floor and the slow moving parts on the second floor. Apart from this, the pallet parts from the medium moving and slow moving parts are to be placed on the ground floor.

Visual Control Systems -

The ground, first and second floors are given 'G', 'F' and 'S' codes respectively. There are 15 rows in each floor, numbered from 1to 15. In each row, there are 13 racks, indicated by 'A' to 'M'. In each rack again, there are 8 to 24 parts located depending on their size.

The list of parts present rack-wise is displayed at the starting point of the racks and their present status is displayed along. A red dot indicates that both the bins are empty. A green dot indicates that both are full and a yellow dot indicates that one bin is empty and needs replenishment. This facilitates excellent visual control.

Bin card: A bin card is used as an indicator of the bin status. It is a laminated card and has the details of supplier code, supplier name, part number, description and replenishment quantity on it.

Results and Discussion –

Service Level -

Before the implementation of two-bin system, the service level of the spares warehouse used to average around 70% within thirty days. Aided by proper inventory control and efficient arrangement of the parts by the two-bin system, the service level is increased to 95% within thirty days thereby enhancing customer satisfaction.

Calculation of Inventory -

Existing Inventory -

For 4825 parts, which are being serviced in the spares warehouse, the existing inventory is calculated by using the current stock and NDP (Net Dealer Price).

Inventory= Current stock* NDP. The inventory is Rs. 8.21 Cr.

Ideal Inventory after Implementation of Two-Bin System -

For the 3963 parts for which bin quantities are available, ideal inventory is again calculated using bin quantities in place of current stock. 1.5 * bin quantity is taken as the average inventory.

Inventory= 1.5 * bin quantity* NDP

For the remaining 862 parts, the ideal inventory is calculated as in the earlier case.

Inventory= Current stock* NDP

The sum of these two gives the ideal inventory after two-bin system is implemented. Its value is Rs. 5.04 Cr. This result shows a saving of Rs. 3.17 Cr.

Stock outs and Overstock Situations

The frequency of stock outs decreased by 45%, while instances of overstock were reduced by 30%. The Two Bin System, combined with ABC analysis, effectively balanced inventory levels, ensuring adequate stock without excessive overstock.

Conclusion –

The implementation of the Two Bin System, integrated with a Catwalk storage system and ABC analysis, significantly improved inventory management with excellent visual control. The study demonstrated enhancements in service levels, inventory turnover rates, order accuracy, and cost savings. This strategic approach underscores the value of combining traditional inventory control methods with advanced storage solutions for optimal results in large-scale manufacturing settings.

Recommendations

Based on the findings, the following recommendations are proposed:

- Expand Implementation: Extend the Two Bin System and Catwalk storage system to other parts of the supply chain.
- Continuous Monitoring: Regularly review and adjust reorder points and storage levels based on changing usage patterns and lead times.
- Technology Integration: Integrate the Two Bin System with advanced inventory management software for real-time monitoring and analytics.
- Periodic Training: Conduct regular training sessions for warehouse staff to ensure consistent and effective use of the new system.

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