

Inventory Control and Spare Part Management through 5S, KANBAN and Kaizen at ABC Industry

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Abstract: *The objective of spare part management in the paper is to ensure the availability of spares for maintenance in minimum time with the help of different management techniques like 5s system, kanban system and different kaizens. It aims to reduce the searching time of spares and reduce the level of inventory. The 5s system helps to understand the actual condition of spares in store department. It also helps to manage the spare parts effectively giving satisfactory results. The kanban system leads to control and maintain the inventory to optimum level. The different kaizens made the store department easy to access the spares. The result shows that the improvement in reduction of searching time and also control the cost of inventory significantly accomplished through 5s, kanban and kaizen systems. The searching time is reduced from 10 - 15 min. to 6 - 8 min.*

Keyword: 5s, Kanban, Kaizen, Lean manufacturing

1. Introduction

Inventory management is primarily about specifying the shape and percentage of stocked goods. It is required at different locations within a facility or within many locations of a supply network to precede the regular and planned course of production and stock of materials. The scope of inventory management concerns the fine lines between replenishment lead time, carrying costs of inventory, asset management, inventory forecasting, inventory valuation, inventory visibility, future inventory price forecasting, physical inventory, available physical space for inventory, quality management, replenishment, returns and defective goods and demand forecasting. Balancing these competing requirements leads to optimal inventory levels, which is an on-going process as the business needs shift and react to the wider environment. Inventory management involves a retailer seeking to acquire and maintain a proper merchandise assortment while ordering, shipping, handling, and related costs are kept in check. It also involves systems and processes that identify inventory requirements, set targets, provide replenishment techniques, report actual and projected inventory status and handle all functions related to the tracking and management of material. This would include the monitoring of material moved into and out of stockroom locations and the reconciling of the inventory balances. Management of the inventories, with the primary objective of determining/controlling stock levels within the physical distribution function to balance the need for product availability against the need for minimizing stock holding and handling costs.

Kaizen is the fastest and most powerful approach to profitability improvement, especially for companies who have already realized most of their core manufacturing efficiency improvement opportunities. Kanbans maintain inventory levels; a signal is sent to produce and deliver a new shipment as material is consumed. These signals are tracked through the replenishment cycle and bring extraordinary visibility to suppliers and buyers. A kanban card is small card containing information about a specific part used in production. A kanban card is a signal that tells someone upstream to move, purchase, or build more of a component for production. 5S is the name of a workplace organization methodology that uses a list of five Japanese words which are seiri, seiton, seiso, seiketsu and shitsuke. Transliterated or translated into English, they all start with the letter "S". The list describes how to organize a work space for efficiency and effectiveness by identifying and storing the items used, maintaining the area and items, and sustaining the new order.

2. Brief introduction of ABC industry

The ABC industry has a wide products range which includes irrigation pump sets, gray iron castings, diesel engines, generating diesel sets, valves and engine bearings. ABC industry is the manufacturer of diesel engines both air-cooled and liquid cooled, covering a power range of 3hp to 11,000hp. The different applications in nine distinct segments such as: agriculture, power generation, construction, material handling, earth moving, mining, offshore, fluid handling, agro industrial and defense automotive retrofits. 35,000 AC generators in 5kVA to 300 kVA range. The company has diversified its range of products and has entered the segment of HP engine 160

HP- 220HP. The ABC industry has also entered in the business of assembling of gas and steam turbines. The ABC industry engines confirm to the norms of Tier-II and have also received approval from the Agency of Emission Protection of the United States. The company has got the license with which it can do business in power and had obtained this license in 2003-2004. The ABC industry has become one of the topmost companies in the engines and pumps manufacture sector in India. This has been possible due to the fact that the company has always given the best quality of products to its customers.

3. Methodology

To solve the defined problem in the organization, three different methodologies are used .5S is the name of a workplace organization methodology that uses a list of five Japanese words which are seiri, seiton, seiso, seiketsu and shitsuke. Translated into English, they all start with the letter "S". The list describes how to organize a work space for efficiency and effectiveness by identifying and storing the items used, maintaining the area and items, and sustaining the new order. The decision-making process usually comes from a dialogue about standardization which builds a clear understanding among employees of how work should be done. It also instills ownership of the process in each employee.

Kanban is the methodology to maintain inventory levels; a signal is sent to produce and deliver a new shipment as material is consumed. These signals are tracked through the replenishment cycle and bring extraordinary visibility to suppliers and buyers. Kanban literally meaning "signboard" or "billboard", is a concept related to lean and just-in-time (JIT) production. According to its creator, Taiichi Ohno, Kanban is one means through which JIT is achieved. Kanban is not an inventory control system. It is a scheduling system that helps determine what to produce, when to produce it, and how much to produce. The need to maintain a high rate of improvement led Toyota to devise the Kanban system. Kanban became an effective tool to support the running of the production system as a whole. In addition, it proved to be an excellent way for promoting improvements because reducing the number of Kanban in circulation highlighted problem areas. A kanban card is small card containing information about a specific part used in production. A kanban card is a signal that tells someone upstream to move, purchase, or build more of a component for production.

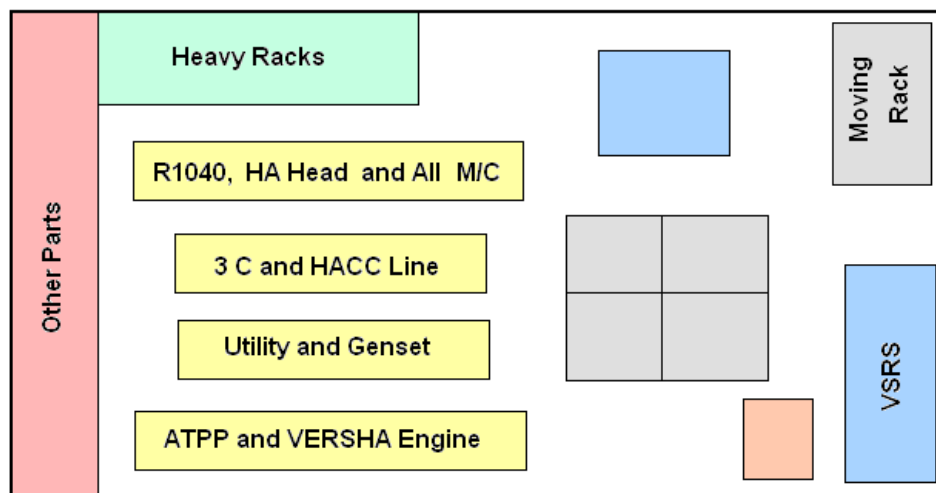
The third methodology kaizen event is the term given to a highly focused continuous improvement event consisting of a team working together for a brief time period to solve a business problem. The kaizen event could focus on any business opportunity. It could be a line redesign, SMED (single-minute exchange of die) setup reduction event, speed improvement, cycle time reduction, waste reduction or any other issue. Kaizen events are also conducted in service industries such as hospitals, banks and other non-manufacturing businesses. A kaizen event is similar to a brainstorming exercise, at least in the beginning stages. Kaizen teams normally consist of four to seven individuals. The team normally spends 100 percent of their time for a few days until the business problem or issue is solved or improved. The team often consists of a cross-functional group of individuals with either knowledge in the area of focus or working in a department which is impacted by the issue. Idea is for the team to be able to consider all views of the problem. A cross-functional team will be able to understand the impact of every decision on all other areas. Kaizen events are normally conducted for significant improvement. The above methodologies were used to solve the problem in the organization.

4. Study of present status of ABC industry

When the survey was made different problems regarding store were observed. While survey the different questions were asked to workers and staff and the present status of spare part was also observed. We also observed the time required to search different spares randomly. While doing this following problems were recorded.

1. Store department is not maintained properly.
2. Time required for finding spare parts was more.
3. All defined and undefined items were combined in racks.
4. Most of the items were undefined.
5. Unverified spare parts.
6. 5S conditions were poorly maintained.

During the initial stage of study, the layout for the store department was plotted and it is shown in Figure 1.



Before Implementation of 5S, KANBAN and Kaizen

Fig. 1 Previous layout for the store department

5. Analysis and work done

5.1 5s

By analyzing seiri questions it came to conclusion that there is lot of scope for improvement. By studying the racks of store department according to their size, capacity and place the decision is made to sort the material by frequency of use, weight, lot size of material, and workstation line. For analyze the items company provided us detailed information of spare parts in sheets. Those sheets were used for sorting, verifying and analyzing the spare parts which are sorted in the racks of store department. In verifying items were checked and their codes; also checked the position and quantity of spare parts as given in the sheet. It is also found out repaired items which are placed with the usable items, which were occupied unnecessary space. We also took out the scraps like broken parts which cannot be repaired. For example broken switches, used battery cells.

After implementation of seiri, we came to conclusion that,

1. Defined and undefined items are in one rack.
2. Various types of items are in one bin.
3. Bins were labeled with wrong items.

To solve the above problems, first we differentiate rack system with defined and undefined racks.

In this stage of 5s i.e. seiso cleanliness enough good for all space but some material were on the floor only in the open space or in corners and the backside of rack. We just found out the list of all this items like motors, empty bins, rollers, pipes and hoses and we suggest the proper place for them. We also locate the liquid items like oil, lubricant and paint in different rack as they are safe in lower racks.

While the seiri analysis it is found that some material were not coded and to which coding should be essential. This task of coding to items is performed with the help of engineer and experienced workers. The standard location is also given to spare part and some undefined items are defined. The other processes like cleaning, receiving part from vendors, checking it, registering and updating the information are also improved to some standard extend. As the main aim of shitsuke is to maintain the above the 4s so to maintain 4s question sheet was given which should be checked monthly and used this proper action should be taken.

5.2 Kanban

Purpose of implementation of KANBAN

In the store department, while applying the 5s system to all self life items a lot of imbalance between the self life items in the list from the software and actual quantity of self life items that is some of the self life items were above the maximum stock level and some of were below the minimum stock level given in the list also some items were money actually not present there. So some of the money was unnecessarily invested in the extra apply kanban system to it.

Procedure for implementation of KANBAN

1. Change in location and proper arrangement of self life items- all the self life items were scattered according to their workstation line and for some items there were separate locations. To solve the

problem all items were combined and gave the separate position to all items. Also it was given the kardex location number to each self life item.

2. Preparation of kanban cards – prepared red and yellow cards for each self life items. Each card contain line name, bin no., material description, minimum quantity, kardex location and reorder point.
3. Preparation of kanban board – kanban board was prepared which contain pocket for each date in which kanban cards are kept. There separate pocket for inward and outward card.
4. Position for kanban cards – there were no sufficient place for kanban cars at the kardex location of self life items. So kanban cards were kept at separate position according to alphabetical line location.

5.3 Kaizen

It is noticed that there is a lot of scope for small improvement in the store, so we have made continuous improvement in store ,such as exchange window , different place for pipes and hoses, different racks for defined and undefined items, making easiness in handle cables and pu tubes and sorting of undefined belt . So these continuous improvements are called as KAIZEN. The improved layout of store department after implementation of 5s, KANBAN and Kaizen is shown in Figure 2.

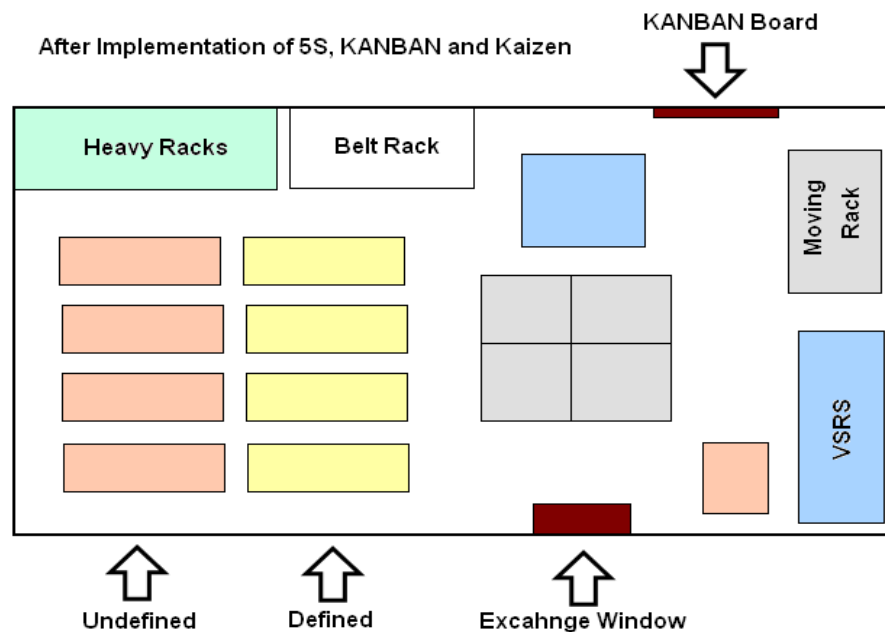


Fig. 2 the current layout for the store department after implementation of suggestions

6. Results and conclusion

1. Due to implementation of 5s system, we able to reduce searching time. The average time was about 10 - 15 minutes for searching the items before implementation of 5s but afterword it is reduced to 6 - 8 minutes. Due to reduction in searching time, items are available quickly at the work station. This leads to increase in production rate of machine and indirectly increase the overall efficiency of plant.
2. After implementing 5s it is observed that, there was a lot of mismatch between E-spare and Oracle items. Also there was difference between actual physical items and e-spare software items.
3. Due to implementation of kanban, we able to reduce the inventory up to certain level by maintaining minimum level of self life items.
4. Due implementation of exchange counter, it restrict the line worker movement in the store, who used to keep repaired and scrap items with unused items.

5. Due to different Kaizens at store department like at hoses, pipes, exchange window, cables and PU pipes. The process time get reduced.

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