Consumption Based Replenishment from Suppliers to XYZ Company for Single Cylinder Fuel Injection Pumps

Kishore. P. Chakravarthy

M.tech Student, Dept. of Industrial Engineering
MS Ramaiah Institute Of Technology
Bangalore, India

A. Balakrishna

Associate Professor, Dept. of Industrial Engineering
MS Ramaiah Institute Of Technology,
Bangalore, India

Abstract—**Automotive industry is under strategic transition phase due to the fierce competition and fluctuating market demand. Industries are more focused on reducing the cost of the product. Inventory nearly adds up to 20% of the overall cost of the product. Thus to regulate the inventory** *consumption based replenishment system* **is adopted here. It is achieved with the integration of Electronic data interchange with Kanban. Kanban formulae used here is according to XYZ Company standard which involves factors such as replenishment time coverage, lot size coverage, withdrawal size coverage and safety time coverage. Some of the key performance indicators (KPI's) studied with the implementation of this project are reduction in inventory level, increase in delivery fulfillment, elimination of manual intervention in the process and enhancing the transparency in the supply chain process.**

Keywords—*E-kanban; consumption based replenishment system; Electronic data interchange; Inventory management; delivery fulfilment.*

I. INTRODUCTION

Traditional procurement process works on 'push' system. Generally huge amount of inventory is associated with it. Planning schedule that is used as production authorization mechanism has push material from one location to other location. However, this creates big problem for people on the floor in dealing with huge WIP inventories, unsynchronized production processes and producing non-required products. [1] To overcome these issues Kanban is used as a media of information flow for the suppliers. Kanban is a lean concept originated with Toyota and helps companies achieves more with less human effort, time and cost. [2]Kanban is defined as a 'material flow control mechanism which controls inventory levels, the supply of material and production'. [3] Inventory cost nearly adds up to 20% of the overall cost of the product. To reduce this cost companies are striving forward with different replenishment strategies. In this case study of an automobile industry 'consumption based replenishment system' is adopted to procure the pump housing from the suppliers. It is achieved with the help of E-Kanban.

II. METHODOLOGY

Following steps are adopted in introducing an electronic Kanban with the suppliers

1.Value stream mapping- Based on the value stream map for the entire source loop, suppliers are identified for whom Electronic Kanban is feasible. Then replenishment lead time is reduced as much as possible with the help of Electronic Kanban.

2.Analysis of parts-ABC-VED analysis-Analysis is done based on the criticality of the product and also amount of consumption. Based on this products are chosen under pull with the suppliers.

3.Dimensioning of Kanban loops-Kanban formulae used here is according to XYZ Company and it consists of the parameters such as replenishment lead time, lot size coverage, withdrawal peak coverage and safety coverage. Based on this formulae and the demand number of Kanban are calculated.

4.Supplier preparation-Once the Kanban loop is defined flow of information to the suppliers must be defined and necessary information regarding the Kanban must be given (i.e., Kanban triggering time, Kanban replenishment time)

5.Internal preparation-Before starting with pull system lot size for the material has to standardized and required material handling equipment such as trollies, bins and lifting equipment must be suitably considered.[4]
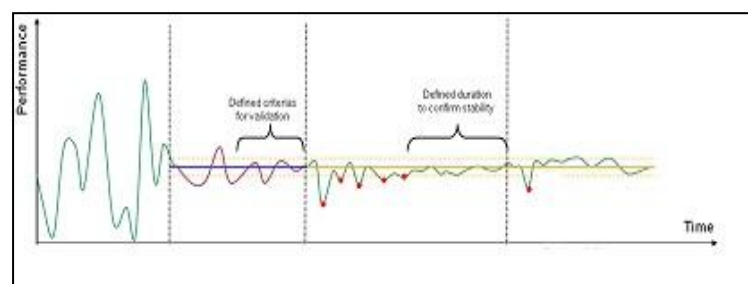
Performance in the above graph can be compared to the inventory. There are four phases in the graph. Phase 1 is the comprehensible derivation and prioritization of focus topics and the definition of target conditions for a value stream based on Key Performance Results (KPR). Input parameters are the business requirements and the ideal state (True North) of a production system. The target of Phase 1 is the holistic and continuous development of a value stream. Scope is the value stream from the customer to the supplier and the required indirect areas. The long-term and sustainable business success is achieved by short and efficient improvement cycles in the guided improvement process. The success is verified by suitable Key Performance Indicators (KPI). The implementation is realized in projects (Phase 2 Projects) and is stabilized by Phase 3. This approach requires a deep understanding of the business requirements and the knowledge of cause-effect relationships in the entire value stream. [5]

OBJECTIVES

1. To regulate the inventory in the production process as per supermarket calculations
2. To step up the entire inbound supply chain process and reduce lead times
3. To create a better information flow between suppliers and XYZ company through the Kanban movement.
4. To eliminate manual interventions in the process.
5. To create a 100% delivery fulfillment process

III. DATA COLLECTION AND ANALYSIS

Based on the monthly demand of the housing Kanban calculations are calculated and suitable number of Kanban are released in the loop.

| Table Head	Kanban required for the housing		
	Daily Requirement	Min Kanban	Max Kanban
Month 1	1000 pcs	2	17
Month 2	1050 pcs	2	17
Month 3	900 pcs	2	15

A. Supermarket data for the housing

Month 1
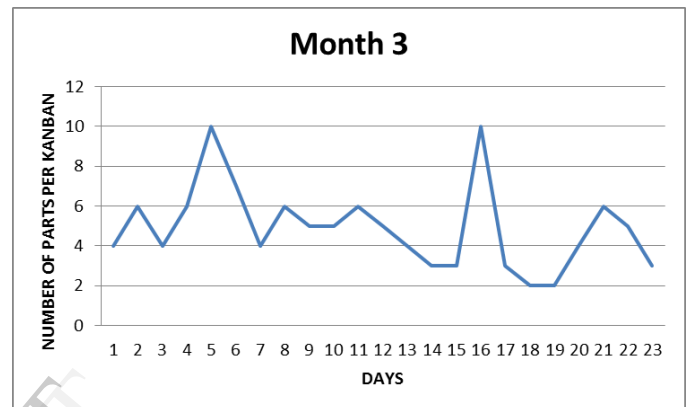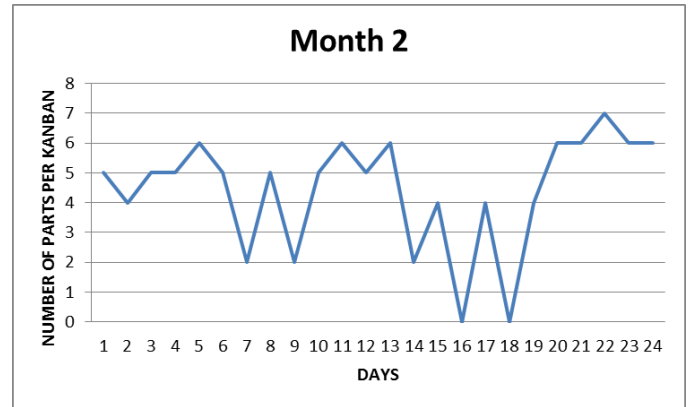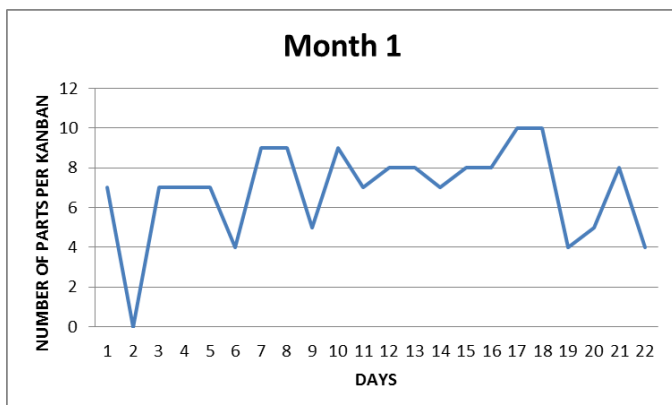
B. Delivery fulfilment

Before introducing Kanban delivery fulfillment of the parts was very less. This was due to the unplanned consumption and lack of transparency in the procurement process. There was no proper communication with the suppliers for the required number of parts on a daily basis. Thus we can see that delivery fulfillment is low for the considered duration of 3 months.


Delivery fulfilment before
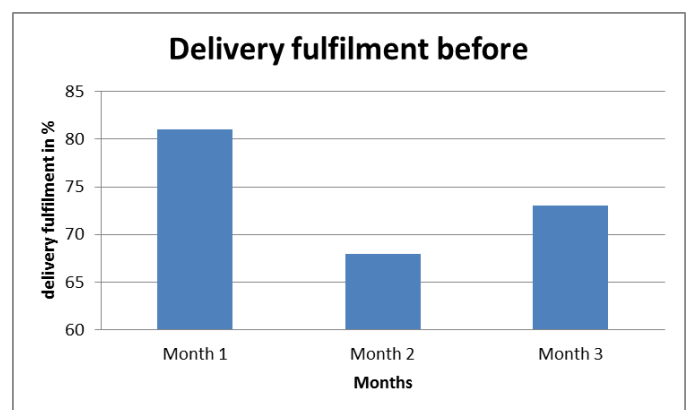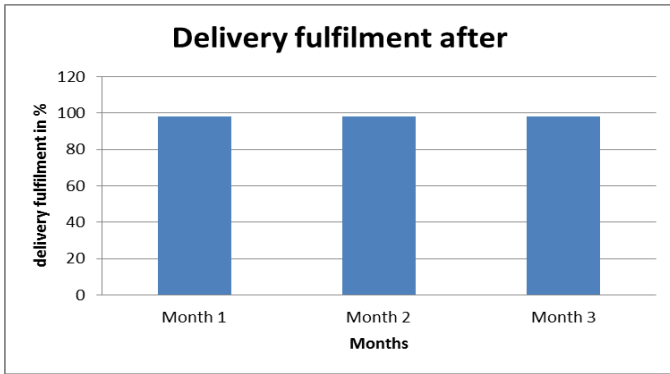
With the implementation of Electronic Kanban we can see that the delivery fulfilment has increased tremendously.

C. Consumption vs Inventory

Consumption vs. Inventory is plotted in order to study the gap between the consumed parts and Inventory on a daily level. From the graph we can infer that before implementing pull with the suppliers there is no co-ordination between the consumption vs. inventory. But once pull is implemented we can see that both go hand in hand. Thus we can infer that inventory is regulated after the implementation of pull with suppliers.
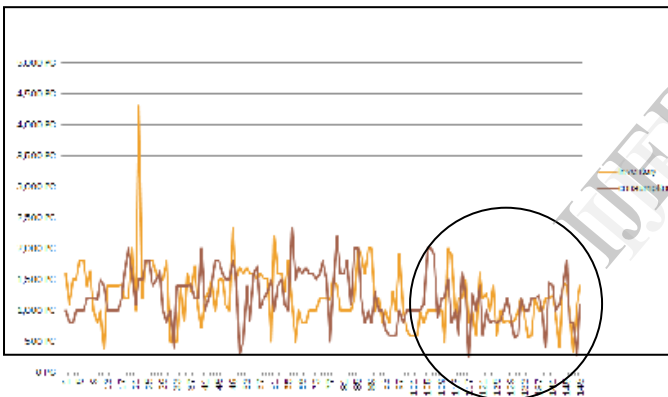
Graph- Inventory vs. Consumption

IV. CONCLUSIONS

Before implementing pull with supplier the inventory cost was approximately thirty thousand rupees, but now it has reduced to less than nine thousand per month. On an average savings up to one And a half lakh rupees can be achieved with the help of pull based replenishment system. Furthermore inventory carrying cost which was nearly three lakh rupees for a month has been reduced to nearly twenty eight thousand per month. By creating a pull with suppliers with the help of Electronic Kanban the replenishment lead time is reduced and manual intervention in the process can be eliminated. Transparency in the supply chain process is also enhanced.

FUTURE SCOPE

Implementation off pull with suppliers can be achieved even with a greater success by implementing supermarkets in the supplier's location. Extended Kanban system approach [6] can be used to integrate pre part pull loop and finished part pull loop. To have a better results RFID based Kanban cards can be used.

REFERENCES

[1] Implementation of Just in Time Production through Kanban System by Ahmad Naufal Bin Adnan ISSN 2224-6096, (Vol.3, No.6, 2013)

[2]] Lage Junior and Godinho Filho (2010)

[3] Womack J.P., Jones D.T., From Lean Production to the Lean Enterprise, Harvard Bus. Rev.,(93–103, 1994.)

[4] Supplier replenishment policy using e-Kanban: A framework for successful implementation by Grant MacKerrona*, Maneesh Kumarb, Vikas Kumarc and Ann Esainb (2013)

[5] Reducing the lead time by implementing kanban based production in finish match grinding loop of delivery valve by Harshitha N L, ISSN 2319-345x, (July 2013)

[6] Extended kanban control system: combining kanban and base stock by Yves Dallery and George Liberopoulos. IIE Transactions (2000)