

A case study on Kaizen and 5S Implementation in Plastic pipes manufacturing Company

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Abstract

Thousands of small & medium scale industries are present in India. All are facing certain problems resulting in shortage of production and quality issues like productivity, greater lead time, processing time etc. The paper contains basis definition of kaizen philosophy & a brief review of kaizen concept & its implementation. The purpose of this paper is to represent Kaizen, its related terms in a concrete way & its implementation in improving the overall effectiveness of organization. This paper illustrates about kaizen implementation in small manufacturing industry & also focuses on the scenario of Indian manufacturing company while implementing Kaizen. The paper also illustrate the implementation of kaizen technique in a company who is dealing with manufacturing the PVC pipes. The company is currently facing with the problem of increased lead time and backorders. The main objective is to implement kaizen practice in the case company. This implementation is focused on reducing the lead time of sales order processing by mean of which the productivity of organization will be improved. We also suppose to generate a case based simulation model which estimate the basic Kaizen implementation process before & after implementation. The tools used are Kaizen, 5S , kaizen sheet 5S sheet etc, monte-carlo simulation method (for analysis).

I. INTRODUCTION

Kaizen is Japanese philosophy which means continuous improvement. 'Kai' mean Change & 'Zen' mean "Good" the whole purpose of which is betterment of work & improving the organization efficiency. The concept of Kaizen is so deeply ingrained in the minds of Japanese people that they often do not even realize that they are thinking Kaizen. Japanese people uses the inborn instinct of being continuous change present in every human being & work for betterment by using existing resources available within the firm instead of spending lot much money on technologies. The kaizen

implementation crucially includes the complete involvement of employees from worker to top level of management in the organization. Kaizen involve small but continuous improvement & this small change can improve the productivity in huge multiplication .in short Kaizen distinguish as the best method of performance improvement among all the techniques as it involve less implementation cost.

Nowadays, organizations carry on seeking innovative ideas for improving their processes and retaining a competitive edge. Kaizen is a concept that focuses on improving a work area or an organization in incremental steps by eliminating waste. Kaizen can be applied to any area in need of improvement. Indeed, the overall concept of continuous improvement appears to be applicable to every area of industrial and logistics activity, from the production of basic materials such as steel, aluminum and timber to manufacturing industries as diverse as automotive, furniture, canning, food and drink (Leigh Pomlet, 1994). Many organizations have begun to incorporate the philosophy of kaizen through the use of kaizen methodology. Kaizen project typically focus on specific improvement goals like productivity improvement with small changes & improvement in the working area. The objective is to focus on SMI in India. In this paper we discuss the scenario of Indian SMI & Their work toward the implementation of Japanese techniques Kaizen & 5S.The ultimate objective of Small medium manufacturing industries today is to increase productivity through system simplification, organizational potential and small incremental improvements by using modern techniques. Most of the manufacturing industries are

currently encountering a necessity to respond to rapidly changing customer needs, desires and tastes. For industries, to remain competitive in market, continuous improvement of manufacturing system processes has become necessary. Competition and continuously increasing standards of customer satisfaction has proven to be the endless driver of organizations performance improvement. In this project we are dealing with the implementation of kaizen technique for improving the productivity of the company.

II. LITERATURE REVIEW

Kaizen philosophy embraces three main principles proposed by Imai (1986) which are process orientation, improving and maintaining standard and people orientation. All principles are significant in order to implement the kaizen.

The brief ideas about the three basic principals are:

i) Process orientation

Imai stated that kaizen is process-oriented. Before results can be improved, processes must be improved, as opposed to result-orientation where outcomes are all that counts. Berger (1997) added to what Imai said that the principle has at least two practical consequences for the improvement process. First, management's main responsibility is to stimulate and support the effort of organizational members to improve processes. In order to be improved, a process must be understood in detail. Second, process orientation calls for evaluating criteria which can monitor and bring attention to the improvement process itself, while at the same time acknowledging its outcome.

ii) Improving and maintaining standard

Kaizen is distinctive in its focus on small improvements of work standards as a result of an ongoing effort. Furthermore, Imai (1986) said "There can be no improvement where there are no standards" which in essence denotes the relation between kaizen and maintaining standard procedures for all major operations (Standard Operating Procedures).

iii) People orientation:

This principle basically referred to kaizen teian where the benefit gained from kaizen implementation can be seen on daily basis by all company employees. This principal simply focused on employee involvement in improvement process.

The main purpose of this paper is to show the basic kaizen implementation approach in Indian SMI.

The brief review of papers on kaizen implementation in Indian context is discussed below:

| Sr. no | Author | Type & Name of industry | Result |
|--------|---|--|---|
| 1 | Abhijit Chakraborty, Madhuri Bhattacharya | Front & rear axle manufacturing company | Production rate per hour increases & reduction of lead time |
| 2 | R.T. Salunkhe, G.S. Kamble, Prasad Malage | Irrigation pump manufacturing company | Productivity impwith less processing time |
| 3 | D Rajenthirakumar & P R Thyla represent | Dead link & centre link manufacturing company | Productivity improve with solving a problem of tube bending assembly line |
| 4 | Zaidahmed Z. Khan, 2,Dr. Sanjay Kumar | Double Window sight flow indicator manufacturing | Manufacturing lead time will be reduced |
| 5 | Pramod Kumar,Vineet Pandey | Wire harness manufacturing company | Productivity improved along with reduction in production cost |
| 6 | Mr. Bhupendra Kumar Daiya | Cement manufacturing plant | Productivity improved with improved human engineering |
| 7 | Gundeep Singh, Dr. R.M. Belokar | Tractor manufacturing company | Productivity improved with reduction in production cycle time |
| 8 | Pratesh Jayaswal & Hemant Singh Rajput | Automobile maintainance part manufacturing company | Productivity will be improved with improved OEE |
| 9 | According to Nor Azlin Binti Ali | Machine spare part manufacturing company | Productivity will be improved with reduction in losses |

III. IMPLEMENTATION PROCESS

Company Background

The Modigold Pvt. Ltd. is located in Butibori Nagpur, Maharashtra in India. The major product of the company is PVC & HDPE pipes used for water sprinkling & electric fitting purpose. This company is mainly focused on manufacturing as per customer's specification & requirement. The company currently has a capacity of about 150tonn per month (inclusive of all varieties), total annual sales volume is 5crores(in Indian rupees) and total employees are 12.The company is working in 2 shift & 24

hours. Out of 13 workers 7 workers are working in first shift & remaining on second shift. For implementation of technique we first need to identify that what the management people actually want and after identifying all the requirement the work will be started. So, we started our work in some prescribed manner.

Problem Statement:

As XYZ company is manufacturing variety of product, the company sometime facing difficulties in sales order processing specially in summer as there is large number of customer with varieties of specifications for forthcoming seasons. The company is facing with processing these varieties of order and hence not able to satisfy on time delivery of order. The niche for improvement in the lagging condition is the management people who are interested in applying the philosophies as well as they are very much concern about the implementation of these ideas.

The project work basically focuses on improving the productivity of the XYZ company by using Kaizen as a problem solving approach, reducing the time losses in sales order processing which indirectly satisfy the target customer and introduces win-win situation between customer & the company. Opportunities for productivity improvement through reduced time loss are critical to organizational survival and these efforts can be driven through kaizen initiative such as standard operating procedure or reflow the procedure of sales order processing which will be expose in this work.

Recognition of need:

Before starting the work I have discuss the requirement of the company in future & following are the need recognized from the manager of the company:

1. The top managerial person need improvement in productivity.
2. The employees of the company need to be involved & concern about organization achievement.
3. Need of reduction in accidental hazards while cutting the required length pipe manually.
4. There should not be too much of capital investment in productivity improvement as the company is batch type & small scale

Objectives

1. An objective of this study is:
2. Identify time losses at production area

3. Identify opportunities for kaizen improvement using a problem solving approach
4. Describe the effects of the improvement

Problem definition:

After analyzing the overall scenario of the company, the following are the problems which need to be focused.

1. The company is manufacturing varieties of pipes ranging from 400mm to 10000mm. There is much time involve in maintaining the stock of finish good.
2. The lead time for sales order is higher
3. Production cycle time is more than required.

Analysis of problem:

The following are main causes which serve as a barriers in productivity improvement:

Lack of multi skilled development, lack of training to operators, no proper utilization of resources, and Non involvement of staff toward work & improper maintenance of inventory of raw material as well as finished pipes.

IDENTIFIED PROBLEM AREAS :



Improper stock of Finish good



Poor working environment

Generation of alternative solutions:

To solve the problems following are the possible solutions that I have found

1. To solve the inventory related problem the electronic kanban can be used.

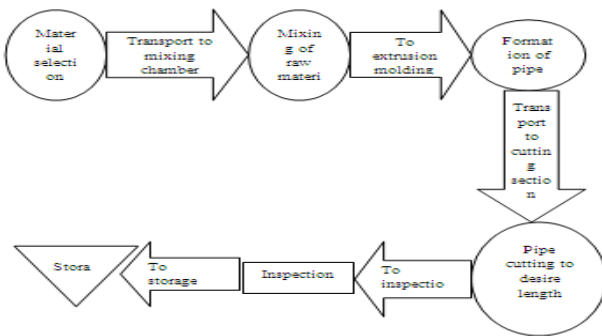
- The employees can be trained by official trainers.
- Fully automated machine can be used for improving production cycle time.
- To solve all the concern problems a small but continuous improvement is employed

Selection of best possible solution:

As the industry’s officials already require improvement but with not too much capital investment and as the first three possible solution required trained operator as well as capital investment I select Kaizen process implementation best suited for the improvement.

IV. IMPLEMENTATION OF KAIZEN,5S

Before actual implementation it is very necessary to study the standard operating procedure for completion of raw material into finished product. The process is shown by process flow diagram shown below:



Time calculation before Kaizen implementation:

Total Requirement: 1100 pipes (24 hours)
 Available time: 1440 minutes (24 hours)
 Lunch break: 40 minutes for both shift operators
 Tea break: 15 minutes for both shift
 Net available time: (1440-40*2-15*2) =1330 minutes/day

Tact Time= Net available time/customer requirement = (1385/1100) = 1.20 minutes=72.54 seconds.

Thus Tact Time 72.54 seconds at every station

5 ‘S’ System

Establish and maintain a clean, neat and tidy workplace
 Translation of 5 Japanese S’s, what is 5S and why do we want to do it? 5S represents 5 disciplines for maintaining a visual workplace (visual controls and information systems). These are foundational to Kaizen (continuous improvement)

and a manufacturing strategy based "Lean Manufacturing" (waste removing) concepts^[16].

Sort / Arrangement (SEIRI)

Set in Order / Neatness (SEITON)

Shine / Cleanliness (SEISO)

Standardize / Order (SEIKETSU)

Sustain / Discipline (SHITSUKE)

By applying all the Three S Rules following changes has been made in the company's layout and working areas.

Set in Order A place for everything and everything is in its place.



Standardize Cleaning and identification methods are consistently applied. Daily improvement process followed by using machine process chart & production plan board Before 5S





Production information chart for worker



V. RESULT AND DISCUSSION

1. Size changing operation: 2hr 35mins

Difference of time is:

=Size change time before implementation - Size change operation after implementation

=3hr - 2hr 35 min

=25min

The reduction in size changing operation time is due to applying a 5S practice in the storage of supporting tools, varying sizes of barrels (Fig.7 &8)

2. Operation time: 35.5hr

Difference in operation time:

=Operation time before implementation - Operation time after implementation

=36.67 - 35.5

=1.17hr

The operation time will be reduced by applying Kaizen practice via Kaizen suggestion board, use of detail production data sheet on each machine for the machine operators, refer fig (10 & 11)

3. Transportation time: 8min

Difference = 10 - 8 = 2min

4. Lead time after implementation of Kaizen

= Size change operation + Material preparation time + Operation time + Transportation time

= 2.58hr + .157 + 35.5hr + 0.122hr

= 38.359hr

Reduction in lead time will be

= 40.004hr - 38.359

= 1.64hr

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