

# APPLICATION OF LEAN KAIZEN IN PRODUCTIVITY IMPROVEMENT AND SAFETY MEASURES IN A MANUFACTURING INDUSTRY

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**Abstract :-** Productivity is very essential factor in any manufacturing industry. Productivity of production system is analogous to the efficiency of machine. Productivity is an average measure of efficiency of production. Highest efficiency in production is obtained by manufacturing required quantity of product, of required quality, at required time, by the best and cheapest method. The basic requirement of any industry is to maintain the quality and productivity of product in continuous improvement. The way to increase this, is to apply proper manufacturing strategy and use of tools to achieve business objective in order to stay competitive and to increase profit. Kaizen is the best method to improve manufacturing in continuous manner, as Kaizen means Continuous improvement. Kaizen results for greater improvement in labour productivity. The Kaizen philosophy has been implemented in organizations around the world as way to improve production values while also improving employee moral and safety. Kaizen is a team process so that the interaction between the labours and management get increases. It concludes that the application of Kaizen, transformation at workplace can be establish to leading productivity improvement.

**Keywords :** Productivity, Kaizen, Continuous Improvement, Low cost, Worker efficiency, Safety precautions, Better solution.

## INTRODUCTION

Lean manufacturing is the systematic elimination of waste from all aspects of an organization's operations, where waste is viewed as any use or loss of resources that does not lead directly to creating the product or service a customer wants when they want it. Lean production is an approach to improve manufacturing efficiency and product quality. As productivity is most important factor for overall growth of organization and lead to stay competitive in the world. The LEAN kaizen is established as a best technique to improve the productivity in production system.

Kai-Zen = Continuous-Improvement

**What is Kaizen?** Kaizen (Ky 'zen) is a Japanese term that means continuous improvement taken from words 'Kai', which means continuous and 'zen' which means improvement. Some translate 'Kai' to mean change and 'zen' to mean good, or for the better. The creator of the concept of kaizen, or continuous improvement, was the late Dr. W. Edwards Deming, an American statistician. The Kaizen philosophy is to "do it better, make it better, and improve it even if it isn't broken, because if we don't, we can't compete with those who do." Kaizen encompasses many of the components of Japanese businesses that have been seen as a part of their success. Quality circles, automation, suggestion systems, just-in-time delivery, Kanban and 5S are all included within the Kaizen system of running a business as it is shown in figure. Kaizen involves setting standards and then continually improving those standards. To support the higher standards Kaizen also involves providing the training, materials and supervision that is needed for employees to achieve the higher standards and maintain their ability to meet those standards on an on-going basis.



**Fig 1: KAIZEN Umbrella**

### CONCEPT

This paper refers to apply the KAIZEN technique for productivity improvement in BAJAJ INDUSTRIES LIMITED, IMMAMWADA, NAGPUR. Their main products are Cotton Ginning Machinery and its parts. The concept is to study problems encountered in industry and provide proper solution due to which the company can run with high performance. The reason of this is that the industries acquire the high economic growth only by eliminating non value added activities, reducing waste like longer waiting times, interruptions, travel time and keeping standardisation in industry. The concept of work is to-

1. Observe the process
2. Find out problems in industry
3. Generating ideas and design action plan to overcome the problems
4. Implementing
5. Analysing all aspects of conclusion
6. Refining the solution and set for final result with respect to quality and quantity.

### METHODOLOGY

We are applying kaizen methodology to solve the problem identified in industry. Kaizen is defined as ongoing improvement involving everyone in the organization. Kaizen management has two main components. These include improvement and maintenance of standard operating procedures. Maintaining standards involves training and discipline. Kaizen represents small improvements in the current system. Everyone in the organization is involved in Kaizen from top managers who introduce, support, and build systems conducive to Kaizen, to workers who engage in Kaizen activities through suggestion systems and small group activities. Kaizen involves quality circles, small group activities, as well as permanent and continuous use of the PDCA cycle. Team members in the quality circles identify problems, identify their causes, analyze the causes, implement and test countermeasures, and establish new standards and procedures.

### PRINCIPLE OF KAIZEN

- Its rules may vary in detail from company to company.
- Use all of the team's knowledge.

- It is almost entirely action based.
- It involves every employee in making change in most cases .

It focus on identifying problems at their source.

### STEPS OF KAIZEN

1. Identify Present Losses
2. Theme And Goal Setting
3. Scheduling
4. Analysis And Counter-Measure
5. Implementation
6. Common Effectiveness
7. Taking Measure To Prevent Recurrence
8. Horizontal Replication

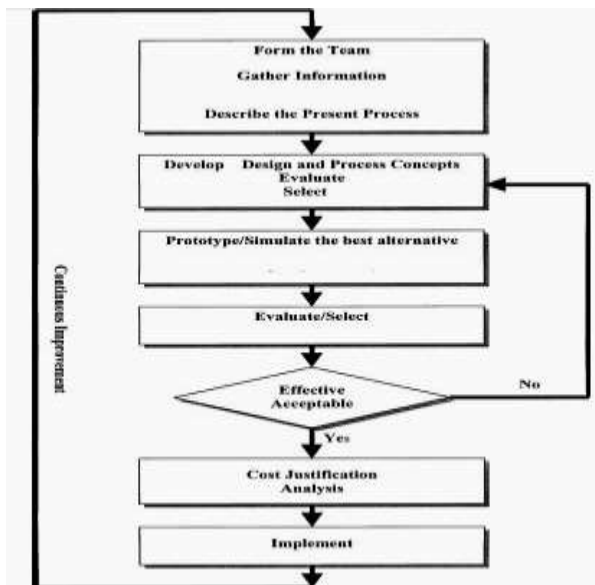


Fig 2 : Process Of Kaizen

### IDENTIFICATION OF PROBLEMS

In many manufacturing industry there are so many problems related to productivity. It is major problem in industry because it affects industrial growth. In this industry there are so many problems which affects there productivity and production. The following are the problems found in that industry:-

1. **No Painting shop**:- There is no separate paint shop. Thus painting is done in free space. The paint particles get spread in all over the shop.
2. **Improper handling of material**:- In this industry improper material handling by workers take place, due to which chances of accident increases.
3. **Improper inventory of materials**:- There is no specific space for raw materials and finished products. Due to this workers face much problem to find proper material. It increases production time.
4. **Less safety measures**:- In this industry, the proper safety equipments are not available. So that it increases accidents to them.
5. **Environmental hazardous**:- In the industry some machining operation is done in open space like grinding, painting etc. Due to this particles get spread in environment because of it environment get hazard.

## IMPLEMENTATION OF KAIZEN

### CURRENT SITUATION (CAUSE ANALYSIS)

As the actual production of industry is completed at shop floor and majority of defects in product and services are generated at a stage of shop floor, we focus on shop floor processes. Shop floor processes include machining, grinding, welding, painting, etc. We have observed most of the problems and defects related with painting, machining and grinding processes.

Currently in Bajaj Steel Ltd., the spray painting is done on auto feeder and subassembly before final assembly and after the final assembly. The separate painting shop has not been provided for spray painting so the spray painting is done in open free space. Thus paint particles get spread in all over the shops including machining department, assembly department and quality inspection department. There is vast problem of spray painting in all three shops. The spread paint particles occupy all the area in all three shops of industry which converts good into bad environment. The suspended paint particles disturbs the workers from their jobs by polluting the area. So that the workers are not giving full efforts in machining products and other processes. Thus the less products or work are processed by the workers in same time and at same payment which result in less working efficiency. Also there is problem of health of persons working in industry including managers, engineers and mostly the workers. This problems was creating panic to the industry. To solve this problems, company decided that the painting will done when machining operations are not performing and vice versa that is the painting and other operation can not performed on same time. So that there is loss of work during painting as well as machining. And loss in work means loss in production, loss in productivity and increase in production lead time. Again in spray painting, they are completing less products. If they improve the painting method they could complete more products. Present data is given for 1 employee. 1 worker is painting 14-15 ginning machine in 1 shift of 8 hours which could be painted 20-21 ginning machines in same time.

For cleaning and grinding, the workers use hand grinders. We have got information that there accident in grinding. The problem is that the grind particles get flow into the eyes of worker though he was wearing all safety measures. This may happen due to less safety measures and traditional grinding method.

The industry has not decided the standardised time for production line because there is stoppage of work constantly. Again there is no specific space for raw materials and finished products. Due to this workers face much problem to find proper material. It increases production time.

### CORRECTIVE ACTIONS

PROBLEMS	CAUSE	ACTION
Labour inefficiency	Bad working Condition	Provide good working condition
Stoppage of work	Spread paint particles all over the shop	Restriction to flow the particles
Incomplete target in painting	Waste of time in refilling paint gun	Use advanced method
Health Problem	Bad working condition	Provide good working condition
Loss in Production	Breakdown in work	Remove breakdown in work
Loss in working time	Breakdown in work	Remove breakdown in work
Increase in Production lead time	Breakdown in work	Remove breakdown in work

Accidents in Grinding	Less safety measures	Provide full safety measures
Improper inventory	Improper use of area/space	Proper use of space
Improper handling material	Less handling equipment	Provide full handling equipment
Environmental hazardous	Spread paint particles	Restriction to paint particles
No standardisation	Stoppage Of work	Remove stoppage in work

The kaizen actions include the above actions with following actions-

- 1) Making of separate paint shop or allow partition to the spray painting area with exhaust blower.
- 2) Use advanced method for refilling the painting gun.
- 3) Provide full safety measures
- 4) Provide full handling Equipment
- 5) Use proper method for grinding

### EVALUATION

PROBLEM	BEFORE KAIZEN	AFTER KAIZEN
Labour inefficiency	Less	More
Stoppage Of work	More	Less
Loss in Production	More	Less
Loss in Working time	More	Less
Health and accident problems	More	Very Less
Improper Inventory	More	Very Less
Improper Handling material	More	Very Less

### CONCLUSION

The positive approach with kaizen is implemented in Bajaj Steel ltd. The problems observed during kaizen implementation are solved with better working efficiency, better working environment, continuous work production. Under these circumstances, the

implementation of lean tool kaizen, improves the production environment with moderate investment. This case study carries evidence of genuine advantages when applying KAIZEN to the manufacturing shop floor.

#### REFERENCES:

- [1] Book on GEMBA KAIZEN, A Commonsense Approach to a Continuous Improvement Strategy, By Masaaki Imai
- [2] LEAN KAIZEN- A simplified Approach To Process Improvement BY George Alukal and Anthony Manos.
- [3] IMRAN AHMAD KHAN , KAIZEN : The Japanese Strategy for Continuous Improvement, et. al / VSRD International Journal of Business & Management Research Vol. 1 (3), 2011 (ISSN NO. 2231-248X)
- [4] Murugan Nagaretinam , Implementing Kobetsu KAIZEN STEPS IN A MANUFACTURING COMPANY GOODWAY RUBBER INDUSTRIES (M) SDN BHD November 2005
- [5] G.S Nhlabathi, P. Kholopane (2013) , Using Manufacturing Kaizen to Improve a Manufacturing Process, PICMET '13: Technology Management for Emerging Technologies , (PG 1680-1687)
- [6] Ketki Kaskhedikar & Harish V. Katore, Improvement Of Quality And Productivity In Casting Industries, Mechanica Confab (ISSN: 2320-2491)Vol. 2, No. 3, April-May 2013
- [7] Mr. Chougule, Dr. Kallurkar (2012), Productivity Improvement in Furniture Manufacturing Small Scale Industry by Kaizen Technique with Value Engineering, International Journal of Emerging trends in engineering and development, Issue 2, Vol. 7(november 2012) (ISSN 2249-6149)
- [8] Ajit Pal Singh, Manderas Yilma (2013), Production Floor Layout Using Systematic Layout Planning in Can Manufacturing Company, CoDIT'13 IEEE ( PG 822-828)
- [9] Asayehgn Desta , Hadush Berhe Asgedom, Alula Gebresas & Mengstu Asheber (2014) , Analysis Of Kaizen Implementation In Northern Ethiopia's Manufacturing Industries , Published by Asian Society of Business and Commerce Research , Vol. 3, No.8: Apr 2014[39-57] (ISSN: 2225-2436)
- [10] Sambathkumar. R, Vijayanand. V, (2013) IMPLEMENTING LEAN TOOLS IN CENTRIFUGAL PUMP MANUFACTURING INDUSTRY, National Conference on Manufacturing Innovation Strategies & Appealing Advancements MISAA2013 April 19, 2013, PSG College of Technology, Coimbatore, India MISAA2013-LM312
- [11] Sundarrajan, Kiruthika Devi, "STUDY OF GRINDING BURN USING DESIGN OF EXPERIMENTS APPROACH AND ADVANCED KAIZEN METHODOLOGY" (2012). Industrial and Management Systems Engineering -- Dissertations and Student Research. Paper 26.
- [12] Hines, P. & Taylor, D. (2000). Going Lean, Lean Enterprise research center, Cardiff Business School.
- [13] Panizzolo, R. (1998). Applying the lessons learned from 27 lean manufacturers-The relevance of relationships management. International Journal of Production Economics, Vol.55, PP.223-240