International Journal of Current Engineering and Technology
ISSN 2277 - 4106

Available at http://inpressco.com/category/ijcet

Research Article

Performance Improvements of Sheet Metal Industry using Kaizen A Case Study

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Accepted 05 March 2012, Available online 20 March 2012

Abstract

Thousands of small & medium scale industries are present in India. All are facing certain problems resulting in shortage of production and quality issues. This case study deals with the implementation of Kaizen in an engineering industry. The rejection rate of the products manufactured by Modern Engineering Works is on higher side and in particular the rejection rate of Washer-B used in fuel filler in fuel lock tank was very high. A case study is taken up with a purpose to reduce the defectives in the production of Washer-B used in fuel filler in fuel lock tank of Hatch back cars through Kaizen.

Keywords*: Kaizen, Takt Time, Productivity, PDCA, Rejection, Improvement*

1. Introduction

In the present scenario, the manufacturing industries globally have gone through significant change and the competition has increased dramatically. Customers focus on product quality, cost, availability, safety and environment. Now a day's various innovative techniques and management practices such as Total Productive Maintained (TPM), Total Quality Management (TQM), Business Process Reengineering (BPR), Material Requirement Planning (MRP), Enterprise Resource Planning (ERP), Just in Time (JIT), etc. are becoming popular among the business houses to improve quality and productivity continuously. Kaizen is a daily process, the purpose of which goes beyond simple productivity improvement. It is also a process that, when done correctly, humanizes the workplace, eliminates overly hard work ("muri"), and teaches people how to perform experiments on their work using the scientific method and how to learn to spot and eliminate waste in business processes. In all, the process suggests a humanized approach to workers and to increasing productivity: "The idea is to nurture the company's human resources as much as it is to praise and encourage participation in kaizen activities."Successful implementation requires "the participation of workers in the improvement."

2. Literature Review of a Concept of Kaizen

The philosophy of Kaizen has kindled considerable interest among researchers because it increases productivity of the company and helps to produce high-quality products with minimum efforts. Several authors have discussed the concept of Kaizen including Deniels (1996), and Reid (2006) etc.

The Kaizen philosophy has made great impact on researchers because it enhances the productivity of an organization and also helps to produce high quality products with minimum efforts. The following authors have discussed the concept of Kaizen: According to Imai (2003), Kaizen is a continuous improvement process involving everyone, managers and workers alike. Broadly defined, Kaizen is a strategy to include concepts, systems and tools within the bigger picture of leadership involving and people culture, all driven by the customer. Watson (2004) says that the origin of Plan-Do-Check-Act (PDCA) cycle or Deming cycle can be traced back to the eminent statistics expert Shewart in the 1920s. Shewart introduced the concept of PDCA. The Total Quality Management (TQM) guru Deming modified the Shewart cycle as: Plan, Do, Study and Act. The Deming cycle is a continuous quality improvement model consisting of a logical sequence of these four repetitive steps for Continuous Improvement (CI) and learning. Suzaki (2005) explains that CI is a philosophy widely practiced in manufacturing and quality circles. As the name implies, it relies on the idea that there is no end to make a process better. Each incremental improvement consists of many phases of development. Originally used for enhancing manufacturing processes, the philosophy has gained considerable popularity recently, and has been extended to all aspects of business including the software industry. Wickens (2006) highlights the impact of the teamwork on Kaizen. Teamwork and commitment do not approach from involving the representatives of employees, but from direct contact and communication between the individual and his boss. Teian (2007) explains that Kaizen stand for the daily struggles occurring in the work area and the way to overcome it. Thus it is more than just a means of improvement. Kaizen can be applied to any area where

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there is a requirement of improvement. Sharma (2008) explain that Kaizen generates process-oriented thinking since processes must be improved before better results are obtained. Improvement can be divided into CI and innovation. Kaizen signifies small improvements that have been made in the status quo as a result of ongoing efforts. On the other hand innovation involves a step—improvements in the status quo as a result of large investments in new technology and equipments or a radical change in process design using Business Process Re-engineering (BPR) concept. Bassant and Caffyn (2009) define the CI concept as 'an organization-wide process of focused and sustained incremental innovation'. Many tools and techniques are developed to support these processes of incremental innovation. The difficulty is the consistent application of CI philosophy and CI tools and techniques. As an organization wide process, CI requires the efforts of all employees at every level. Deming (2010) highlights that organizations are evolved at a greater rate than at any time in recorded history. Since organizations are dynamic entities. This highly competitive and constantly changing environment offers significant managerial opportunities as well as challenges. Doolen*et al.* (2011) describe the variables that are used to measure the impact of Kaizen activities on human resource. These variables include attitude toward Kaizen events, skills gained from event participation, understanding the need for Kaizen, impact of these events on employee, impact of these events on the work area, and the overall impression of the relative successfulness of these events.

3. Case Study and Implementation Process

The implementation of Kaizen in an engineering industry as a case study is discussed in this thesis. The rejection rate of the products manufactured by **Modern Engineering Works** is on higher side and in particular the rejection rate of **Washer-B** was very high. Washer-B is used in fuel filler in fuel lock tank. A case study as project is taken up with a purpose to reduce the defectives in the production of Washer-B of Hatch back cars through Kaizen. The improvement and benefits after the implementation of Kaizen projects finding are enumerated. The case study highlights can be used / referred by other industries in implementing kaizen successful in an efficient manner. The kaizen process must begin with the process owner, the individual with real ownership and responsibility who has the authority to change the process and be answerable for the consequences. He or she may be the general manager, president, or in some cases plant manager, but always the person in charge. Kaizen cannot be successful without strong support and direction from the top. These problems were discussed to managerial personals, engineers and operators levels, by considering different factors and found to be improved by using Kaizen. One of the major objectives in implementing Kaizen System is to achieve a common goal of the whole company. The main thing to implement kaizen is improve the level of quality of Washer-B of Hatch back cars. Kaizen shows a lead role for improving the productivity and quality of the products. To meet the part free from defects like Concentricity out, Burr Dent as shown in Figure 1.1 hence meeting customer requirement. The company receives the raw material in the form of CRC then process is done to make a final piece of Washer-B.

1st Concentricity Out 2nd Burr 3rd Bend

Figure 1.1

Concentricity Out

This is the 1st defect which is arises in the piece and with the help of **Fish Bone Diagram** we finds the possible cause and potential cause. The possible causes are those all the causes which may be the reason of rejection. The potential causes are finalized after the verification method.

Burr

This is the second defect which is arises in the piece due to cutting edge wear out and with the help of **Fish Bone Diagram** we finds the possible cause and potential cause. The possible causes are those all the causes which may be the reason of rejection. The potential causes are finalized after the verification method.

Bend

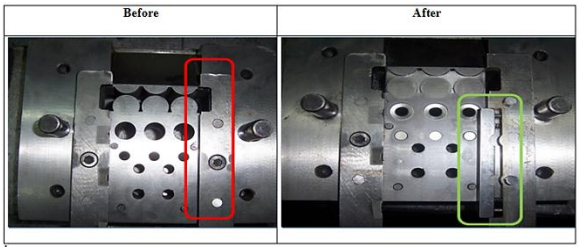
This is the third defect which is arises in the piece and with the help of **Fish Bone Diagram** we finds the possible cause and potential cause. The possible causes are those all the causes which may be the reason of rejection. The potential causes are finalized after the verification method.

Observation data collected for October November December months

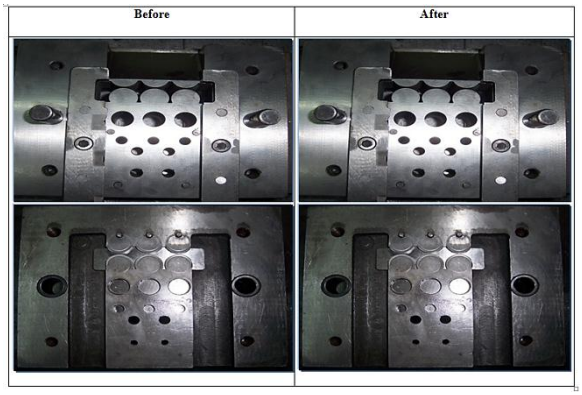
Table: 1.1 (Observation data collected for October November December months)

S. No.	Type of defects	% defective for October	% defective for November	% defective for December
1	Concentricity out	25.21	37.73	10.67
2	Burr	11.87	2.96	1.57
3	Bend	0	0.71	0

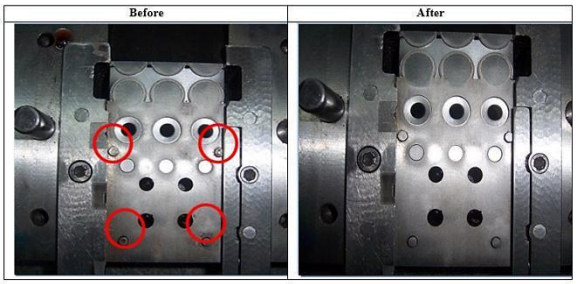
Kaizen 1



Kaizen 2



Kaizen 3



Data of Before Kaizen

Table 1.2: Data of October before Kaizen

Month	October		
Date	Production	Rejection	Rej.%=Rej/Prod*100
20	700	250	35.71
22	340	170	50
23	2000	520	26
25	4360	1650	37.84
26	920	430	46.73
28	1280	541	42.26

Table 1.3: Data of November before Kaizen

Month	November		
Date	Production	Rejection	Rejection%=Rej/Prod*100
17	1760	728	41.36
23	3860	1580	40.93

Table1.4: Data of December before Kaizen

Month	December		
Date	Production	Rejection	Rejection%=Rej/Prod*100
27	2300	380	16.52
2	8000	822	10.27
1	1480	240	16.21

Data of Washer B after Implementation of Kaizen

Table1.5 Data of January after Kaizen

Month	January		
Date	Production	Rejection	Rejection %=Rej./Prod*100
12	2400	43	1.79
14	1500	17	1.133
22	2850	110	3.85
27	3000	40	1.33

Table: 1.6 Data of February after Kaizen

Month	February		
Date	Production	Rejection	Rejection %=Rej./Prod*100
18	1000	28	2.8
19	6400	27	0.42
21	1560	35	2.24
23	1440	21	1.45
25	7040	180	2.55
28	3180	92	2.89
29	3660	107	2.92

Table1.7: Data of March after Kaizen

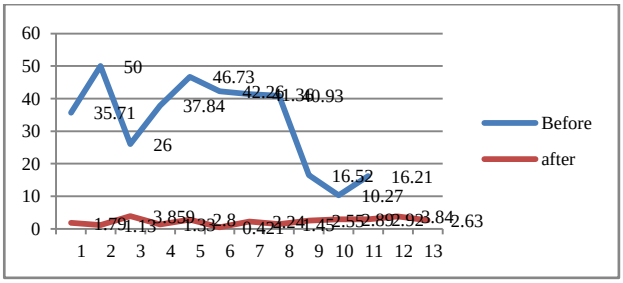
Month	March		
Date	Production	Rejection	Rejection %=Rej./Prod*100
1	4940	190	3.84
21	3420	90	2.63

4. Discussion on Results of the Implementation

Kaizen are used to reduce defects and to increase productivity in MODERN ENGINEERING WORKS. The results obtained after the application of Kaizen are described below:

Line graph before and After Rejection Analysis

This is the line graph of before & after rejection as we collect the data of October, November, and December & make kaizen on die then we collect data of January, February, March. The production data of month October is collected as the item is running on different dates and the same process is follow up for collection of data of month November and December. The production data is noted after the Kaizen of month January, February and March as the item is manufactured on different dates.



Benefits after Implementation of Kaizen

Table: 1.8 Data of February after Kaizen

Rejection percentage of Washer-B before action	27.09%
Rejection percentage of Washer-B after action	3.9%
Reduction In Rejection	23.19
Saving Percentage From Current Condition	86%
Grand Total of rejection cost per day in rupees	21.80
Saving Of the same after improvement @86% of Rs.21.80	18.74
Saving per month in rupees	654Rs.
Saving Per Year in rupees	7848rs.

Reduction in Rejection: After application of Kaizen rejections rate of Washer-B reduces from 27.09% (7311/26980*100) to 3.9 %(980/24600*100).Before application of Kaizen the rejection rate of Washer-B was very high.

Increase in Profit: After application of kaizen the rejection rate of the products manufactured by Modern Engineering Works decreases, thus profit of company get increases.

Customer Satisfaction: Company achieved customer satisfaction by fulfil the daily demand of the customer by providing defect free products to customer.

Top Line Impact: Organizational reputation in market is improved by providing products and services of good quality. Overall rejection reduces from 0.24% (61967/24786850*100) to 0.0003 %.(8305/22582800*100) Rejection controlled 86%, Bend defect eliminated.

Concluding Remarks

The studies on the project demonstrate achievements of the significant benefits. Rejection level of Washer –B reduced from 27.09% to 3.9%. It is conclude that by Kaizen, the productivity of company increased, rejection level of products reduces, customer's satisfaction are achieved and profit for the company increases, hence performance of the company is improved. Successful implementation and growing organizational interest in Kaizen have been exploding in the last few years. It is rapidly becoming the major driving force for many technologies – driven, project driven organizations. Factors influencing successful Kaizen projects include management involvement and organizational commitment, project management and control skills, cultural change, and continuous training. Understanding the key features, obstacles, and shortcomings of Kaizen provides opportunities to practitioners for better implementation of these projects. It allows them to better support their organizations strategic direction, and increasing needs for coaching, mentoring, and training.

In this paper, a case study is presented with the objective of discussing the implementation Kaizen in the industry. Continuous improvement is a key goal for healthy company. Kaizen is a philosophy that needs the involvement of all people in the company. This study proves that with the Kaizen and other techniques, the company can survive with lower manufacturing cost and higher quality. Multimedia can be used in educating the workers about KAIZEN concept and their implementation issues.

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