

Continual Improvement in Manufacturing of Pedal Shaft of Eicher Tractor by the Application of Six Sigma

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Abstract— According to safety factor we are choosing this project .(242 model number) pedal shaft is a unit of breaking system if it is defected or dimensions is unperfected then assembly should not be fix properly. As a result we cannot apply brake properly and chances of accident occur is more. If a dimensions of model is imperfect then there is stoppage of assembly in panel of assembly line of EICHER TRACTOR in assembly of eicher tractor they assembled various part. If part is not assembled properly they use another part to save their time. Cost of tractor is near about 5-5.5 lacks. If company have 20 to 25 working days if there is stoppage of assembly line due to single part then company get huge lost in money. So for saving their time and money we try to prepare a perfect product.

Key words: Six Sigma, 2Dimension, Eicher Tractor

I. INTRODUCTION

World over many projects still fail to reach completion within budget, fail to be delivered in time, or fail to fulfil the quality requirements.

- Possible reasons for project failure are improper requirements management, weak project management, poor estimation of cost and schedule, improper risk management etc. many of these reasons can be clubbed as “process failure”.
- Today, it is not just enough to complete the projects within budget and on time, but the aim also must be to ensure if it is world class quality. Quality must be the focus of every organization.
- The image of pedal shaft model no 242 is shown as fig.



Fig. 1: Pedal shaft (242 models)

- Six Sigma is practiced as a methodology of process improvement to achieve business excellence. Six Sigma is a systematic method of using extremely rigorous data gathering and statistical analysis.
- The concepts surrounding the drive to Six Sigma quality are essentially those of statistics and probability. In simple language, these concepts boil down to, “How confident I be that what I planned to happen actually will happen?”

II. LITERATURE REVIEW

Dr. R.L. Shrivastava, K.I. Ahmad, T.N. Desai [1] proposed a method to improve manufacturing performance by identifying and eliminating the defects using six sigma methodology. They also proposed an approach to reduce the number of vehicle engine rejection and finally in the control phase various tools were implemented for tracking the process and putting it under control.

Dr. R.L. Shrivastava, T. N. Desai[2] discusses the quality and productivity improvement in a manufacturing enterprise through a case study. It deals with an application of Six Sigma with DMAIC methodology in an industry which provides a framework to identify, quantify and eliminate sources of variation in an operational process in question, to optimize variables, improve and sustain performance.

H. Wang [3] demonstrates Six Sigma approach i.e. this discussion reviews some related literatures to describe methodology, implementation and future researches. This discussion summaries four issues within the sub-category of the initial Six Sigma concept: basic concept, DMAIC, DFSS and deployment. Then, some sectors that benefit from the implementation of Six Sigma are listed out, and the key factors influencing the successful Six Sigma project implementation are identified.

M. Hekmatpanah, M. Sadroddin, S. Shahbaz, F. Mohair, F. Fadavinia [4] describes the survey of Six Sigma process and its impact on the organizational productivity. So, they give a final conclusion from the complete study of key concept, problem solving process of Six Sigma as well as the survey of important fields such as: DMAIC, Six Sigma and productivity applied programme and other advantages of Six Sigma.

Y.H. Kwak, F.T. Anbari [5] examines the evolution, benefits and challenges of Six Sigma practices and identifies the key factor influencing successful six sigma project implementations. It integrates the lesson learned from successful six sigma projects and considers further improvement to the six sigma approach. Effective six sigma principles and practices will succeed by refining the organizational culture continuously

III. INDUSTRY BACKGROUND

Shree Industry, It is located in, 156/1, MIDC, Hingna Road, Nagpur-4400016. It is the manufacturing industry as well as the only one vendor Eicher Tractor for producing pedal shaft of model (242).

They manufacturing following 3 parts

- Pedal shaft (241)
- Pedal shaft (242)
- Pedal shaft (south west)

Pedal shaft is a part of braking system in Eicher tractor. They made Eicher tractor in CNC machine.

- 1) There are 3-4 CNC machine. Company schedule is divided in 2 shifts. There are 30 employs working in different post.
- 2) Cost of pedal shaft (242 model)=298 to 302 RS including all cost.
 - Company has already gone through DFSS under 6 sigma but they are willing to work on DMAIC Methodology of six sigma.
- 3) Monthly Production
 - 241-MODEL: 200/400 PER PM
 - 242 MODELS: 800/1200 PER PM
 - SOUTH WEST: 3000-4500 PER PM
- 4) Rejection And Rework
 - If they make 50 product of eicher tractor then 11 goes to rework

Defect per unit=no of defect/no of product inspected =11/50 =0.22

DPMO=defect per unit*10, 00,000 =0.22*1000000 =220000

Sigma level =(1-(DPMO/1000000)+1.5) = (1-(220000/1000000)+1.5) = 2.28

From the collected data 11rework are found out of 50 products the current sigma level found to be 2.28.

We find the project to get minimize the rework.

IV. METHODOLOGY

We use DMAIC methodology to get higher accuracy level.

A. D- Design Phase

This phase determines the objective and scope of the study. Information about the present processes is collected, determination of customers and deliverables to customers are also determined.

1) Problem Definition

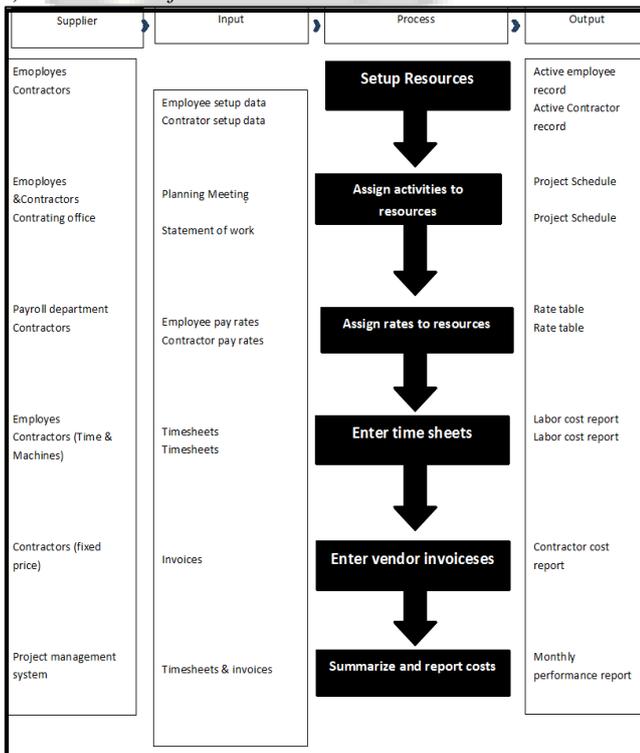


Fig. 2: SIPOC Diagram

Reducing the % of rework of pedal shaft (242model) supplied to EICHER tractor

In which we fined the problem identification with the help of SIPOC diagram shown in fig 1.

B. M-Measure Phase

This phase presents the detailed process mapping, operational definition, data collection chart, evaluation of the existing system, assessment of the current level of process performance etc. In the measure phase, performance of process in pain areas is determined and operations data was collected. The reason to collect data is to identify areas where current processes need to be improves

We have taken 50 readings with micrometer. And use data collection & measurement tool to calculate measure phase.

C. A-Analyse Phase

The analyse phase is the third step in the DMAIC improvement cycle. This section describes the work and result of the cause and effect diagram to identify probable causes. This phase describes the potential causes identified which have the maximum impact on the operational wastages.

In which we analyses causes behind the problem with the help of cause effect diagram.

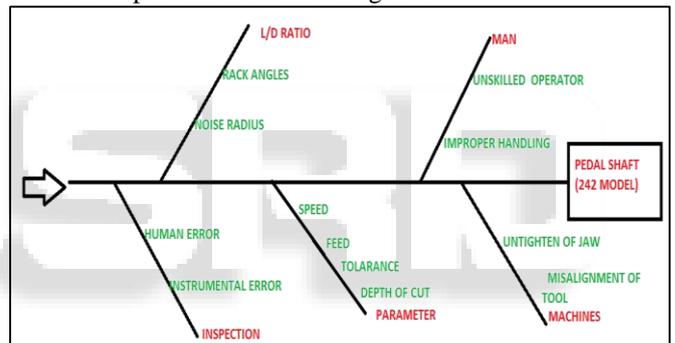


Fig. 2: Name cause effective diagram

D. I-Improve Phase

It is the Second last stage of DMAIC methodology. The objective of this phrase is to confirm, the key process variables, and qualify their effect on the CTQs; identify the maximum ranges of the specifications and then, tackle the capability of the process on the two fonts required by six sigma:

In which phase we are trying to improve our project by the applying six sigma.

E. C-Controll Phase

The last phase of DMAIC is control, which is the phase in which we ensure that the processes continue to work well, produce desired output results, and maintain quality levels. We are trying to use different type of control plan and charts to control the rework. And also using does and don't we can maintain the dimensions

V. CONCLUSION

We applied all these techniques to increase the sigma level of the company we had seen that the sigma level has been increased along with many other improvement that has been done in the company the different improvement that has

been analyzed by comparing with the condition and the future condition showing that the productivity has been doubled, rework percentage has been reduced almost half of the previous data that we have analyzed when we have entered in the company to do our project.

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