

Productivity Improvement through Kaizen Workshop – A Case Study

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Abstract: Owing to tight competition in global market industrial units are trying to reduce production cost retaining high quality of the products. Lean manufacturing is one of the possible techniques to serve the purpose. In lean manufacturing wastes are reduced and quality of the product is being increased. In this study, we focus on designing an efficient method of implementing lean tools in small and medium scale enterprises. The need of imparting lean awareness and it's know how among the workers of the industrial unit is emphasized. After surveying the workers regarding lean awareness, lean tools at the first level are introduced. The expected improvements in performance of the sections are attained, with the help of well-organized workshops.

Keywords: DL productivity, Kaizen, Lean tools, Quality factor, SME, TEEP, SME.

1. Introduction

SMES in India faced several competitions owing to globalization and market liberalization resulting in financial crisis. To meet the challenges, such industrial units introduced lean manufacturing. Lean manufacturing [1,2] is a production system that strives to improve the performance by eliminating wastes, satisfying customer needs, achieving continual improvement so as to attain perfection. As a result of lean techniques, production cost is greatly reduced maintaining the high quality of products and hence products are sold at lower price bringing the entire satisfaction of customers.

It is observed that although lean manufacturing [3, 4] is quite successful in large scale industries. SMES haven't recorded appreciable improvement because of formidable barriers [5, 6] in the successful implementation of lean tools.

At this context, we made a systematic study of implementation of lean tools in SMES [7, 8] especially in India and we have chosen certain industrial units. It is found that one of the major barriers in the implementation of lean tool is the lack of awareness among the workers regarding lean tools and knowhow of their implementation. By a series of trainings [9, 10], workshops lean awareness is imparted to the workers of the company. Then we adopted lean tools to various sections of the manufacturing divisions like molding, plating, and stamping and assembly. The lean tool at the first level are the measures to eliminate wastes, KPI(Key Performance Indicator) tracking to workers, innovations, developing customer focused lean culture, training and education, visual work place, management involvement, quality control, instant delivery of goods to the customers. By the introduction of lean tools [11, 12], when KPIs are measured, it was found that DL (Direct Labour) productivity has shown slight improvement. TEEP (Total Effective Equipment Productivity) and OEE (Overall Equipment Efficiency) of plating and molding have shown sharp increase while TEEP and OEE of stamping and assembly section have not shown steady improvement but have shown fluctuating values. This may be observed in figure 1.

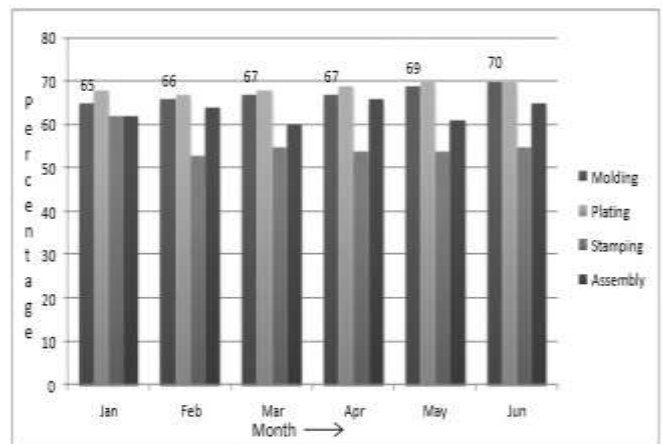


Figure 1: Graphical Representation of OEE of Molding, Plating, Stamping and Assembly

To increase and sustain Productivity, DL Efficiency, OEE and TEEP of these sections, following measures were taken to tone up the effectiveness of implementation of lean tools.

- 1) Capacity utilization of each manufacturing unit is planned and implemented. For example, in assembly section 50000 connectors are assembled per day, in molding section 50000 insulators are moulded per day, in stamping 60 lakhs contacts are made per day, plating 60 lakhs contacts per day. In value stream mapping, a road map for lean changes is affected, integrates material, process and information flow, provides lean implementation blue print, and identifies specific lean tools to use. Clarifies the sequence for lean implementation.
- 2) QRQC (Quick Response to Quality Control) workshop is conducted. It is aimed to improve responsiveness and efficiency in problem solving activity. It is used by Cross Functional Team (CFT) using appropriate quality control hypothesis are identified and root cause is found be for implementing solution.
- 3) Team members are allowed to participate in Kaizen workshop and such workshops are aimed at continual improvement.

2. Kaizen Workshop for Improvement of Stamping

Kaizen aims at continuous improvement by all the workers in the organization so as to perform the duty assigned to them a little better each day. For that we set a goal or target to be attained for the workshop. The value of OEE before the workshop was 52% and down time 13% more than minimum time required. After assessing the strength and weakness of the workers of the company and capacity of the machines, the target is set up. The Kaizen workshop has set forth the following objectives. 1) To reduce the down time and hence to increase OEE. 2) Increase daily performance. 3) Eliminate scrap. 4) Reduce machine failures. 5) Quality improvement. So on the whole, Kaizen work strive to get improvement in the current process and the activities are directed to maintain current technological management operating steam down.

3. Action by Kaizen Workshop- Improvement of OEE

The following specific action plan was adopted for stamping improvement [13]. That is Kaizen workshop served the above purpose. Purpose was to increase stamping OEE from 52% to at least 67% and also to reduce the high tool down time by 13%. Tool TC 0254 was considered for the study.

Overall equipment effectiveness quantifies how well a manufacturing unit performs relative to its designed capacity, during the periods when it is scheduled to run.

The Pareto Chart shown in the figure 2 reveals the different tools in stamping with its down time and the tool TC 0254 was considered for the study, since it showed the high down time.

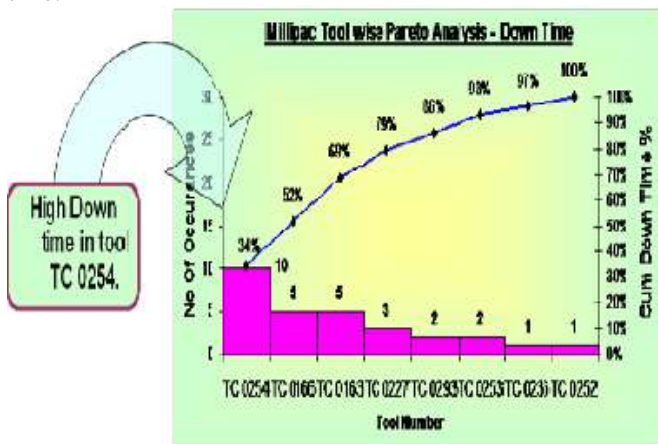


Figure 2: Pareto Analysis for Tool down Time

The reasons for the down details of TC 0254 were analyzed and shown in the figure 3.

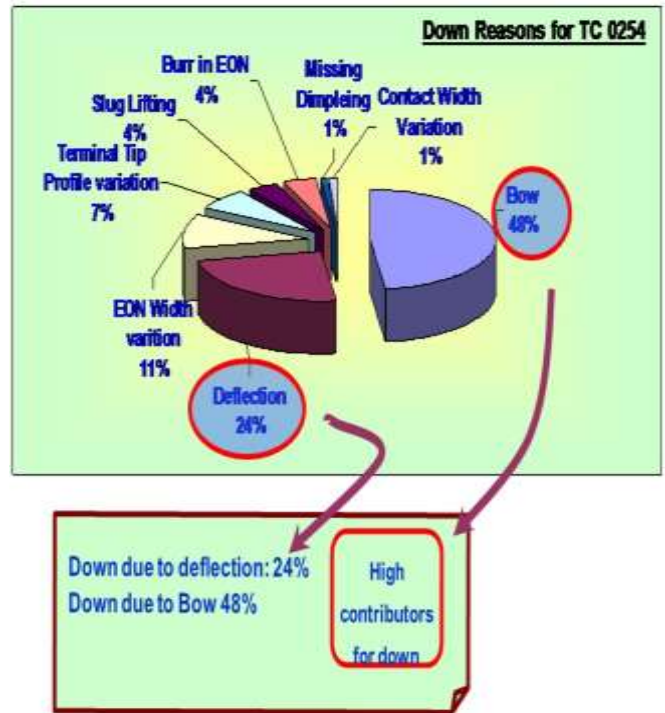


Figure 3: Down Reasons for Tool TC 0254

Seven reasons were sort out for the down time in which down due to bow and deflection contributes more, that is 48% and 24% respectively. The study had been focused on Deflection and Bow and Root Cause Analysis study is made as in figure 4.

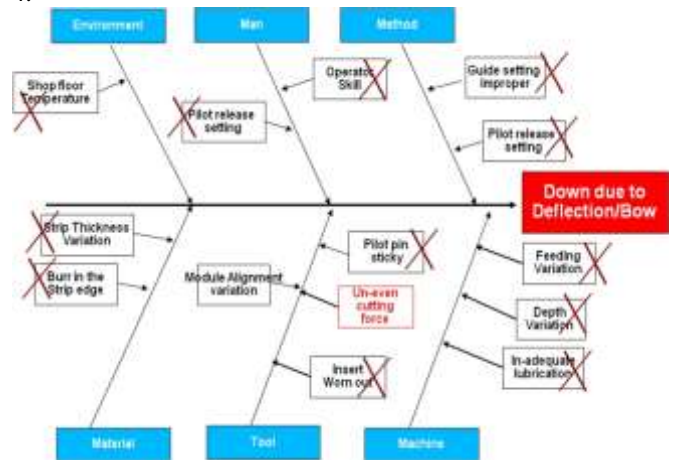


Figure 4: Root Cause Analysis

The result obtained from the root cause analysis shown in figure 4 was that the reason for contacts deflection was the un-even cutting force. To confirm it, 5 Why Analysis had been done. The reason for the fault was more shearing force acting on the moving half of the tool and it had been rectified by applying counter force from the bottom side of the fixed for balancing shown in figure 5.

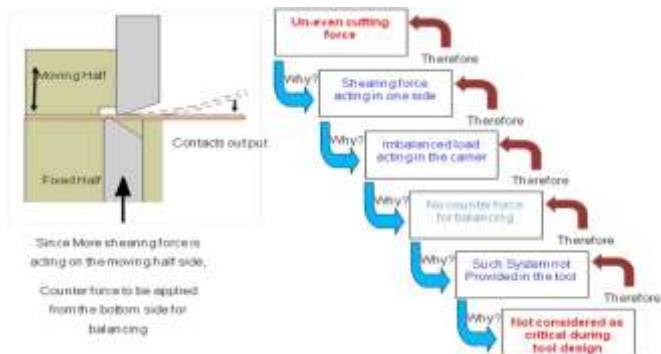


Figure 5: FIVE WHY Analysis

The Stamping OEE Improvement[14] obtained is an increase from 52% to 67%. In stamping process, owing to deflection-width wise bend and bow thickness wise bend, there was a large loss of OEE. It was found that owing to deformation and bow, machine often stopped for correction. Machine operator found the above defect and it is occurred in stamping tool contact and it was repeated every shift during coil change and on the average there were 10 numbers of tool set up per week.

For correction, we used 5 why analysis. We adopted two corrective actions in (1) Deflection and bow correction stage were added in stamping tool (2) New slug collecting mechanism provided, eliminating machine stoppage 15 mins for slug removal twice in a shift. In preventive action tool drawing was modified and controlled, updated the CA to tool design FMEA. Tool design validation checklist updated to consider the bowl deflection issue. Stamping OEE is improved from 52 % to 67 %.

Stamping Improvements



Figure 6: OEE Improvement in Stamping

4. Conclusion

Our study shows beyond doubt that implementing lean tools, workers should have minimum level of awareness regarding lean tools and their implementation. When lean tools are implemented after imparting lean awareness, there has been consistent and appreciable improvement in performances of certain sections of the company where as the performance of some section has not shown improvement. Exploring the basic reasons for non improvement and by the help of kaizen workshop, we overcome the barriers blocking improvement and then those sections also shows appreciable and consistent improvement.

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