

## **BREAKDOWN ANALYSIS OF CUTTING FACILITY IN A MANUFACTURING INDUSTRY**

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*Abstract: In this paper breakdown analysis of cutting machine has been carried out using the technique Root Cause Analysis. It has been used to rectify faults causing breakdown and thereby improve productivity of the machine. In this project methodology of breakdown maintenance has been applied and analysed. It is the process of identifying causal factors using a structured approach with techniques that will provide a focus for identifying and resolving problems. Tools that assist individuals or groups to identify the root cause of problems are known as root cause analysis tools. Every equipment failure happens due to a number of reasons. There is a definite progression of actions and the resulting consequences that lead to a failure. Root cause for productivity and it's related problems needs to be analyzed as it's a complicated process especially in multistage manufacturing. This empirical study shows as to how it can be utilized and how it can be communicated with others with full appreciation. It shows how the solutions will prevent the problem from recurring. The Root Cause Tools and Methods could be used according to prevalent conditions and situations of Material, Machines, Systems and Processes. It can be observed that after application of Breakdown Analysis, the productivity of the cutting machine has improved.*

**Keywords:** Breakdown Analysis, Cutting Machine, Productivity, Root cause analysis.

### **INTRODUCTION**

The productivity of the cutting facility was declining as there were continuous breakdowns involved. Root cause Analysis was carried out to know the factors responsible for breakdowns and for that Overall Equipment Effectiveness of the cutting facility was to be measured. This was done by considering factors like Availability, Quality and Performance. The Overall Equipment Effectiveness is measured as the product of Availability, Quality and Performance. The Three Overall Equipment Effectiveness of the machines was calculated by collecting the three metrics i.e. Availability, Quality and Performance data. Then the factors causing major breakdowns are found out by root cause analysis. Then an Anova Test is carried out and the graphs are plotted from the result of Anova Table using Minitab 15 software.

#### **I. Work Done**

The overall equipment effectiveness of the cutting machine is calculated .Using Anova, the probability is analyzed for the machine failure and using the results it is predicted whether

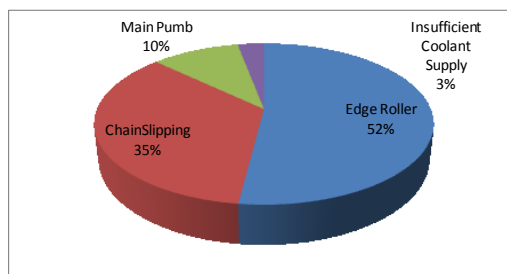
the breakdown analysis done and the suggestions given made the maintenance work successful.

**A. EQUIPMENT EFFECTIVENESS**

**Table 1: Operational Equipment Effectiveness Calculation.**

factors	Calculation	Calculated data	Percentage
Availability	$\frac{\text{Actual Production Time}}{\text{Planned Production Time}}$	$\frac{386}{800}$	0.4825 =48.25%
Performance	$\frac{\text{Ideal Operating Time}}{\text{Actual Operating Time}}$	$\frac{630}{827}$	0.7617 = 76.17%
Quality	$\frac{\text{Good pieces}}{\text{Total pieces}}$	$\frac{560}{620}$	0.9032= 90.32 %

The Operational Equipment Effectiveness is 33.19% which is far below of the global standard (85% for manufacturing industry).The OEE is 33.09% which is below the Global standrad.From OEE calculation it can be noted that the OEE of the cutting machine is far below the global standards. So the major causes for low Operational Equipment Effectiveness were to be identified.



**A. .ANALYSIS**

**Table 2: Production Averages of Torches after Analysis**

Production Averages	Week 1	Week 2	Week 3	Week 4	Week 5
Torch A2	210	230	210	230	246
Torch B2	220	220	212	228	215
Torch C2	238	260	239	228	236

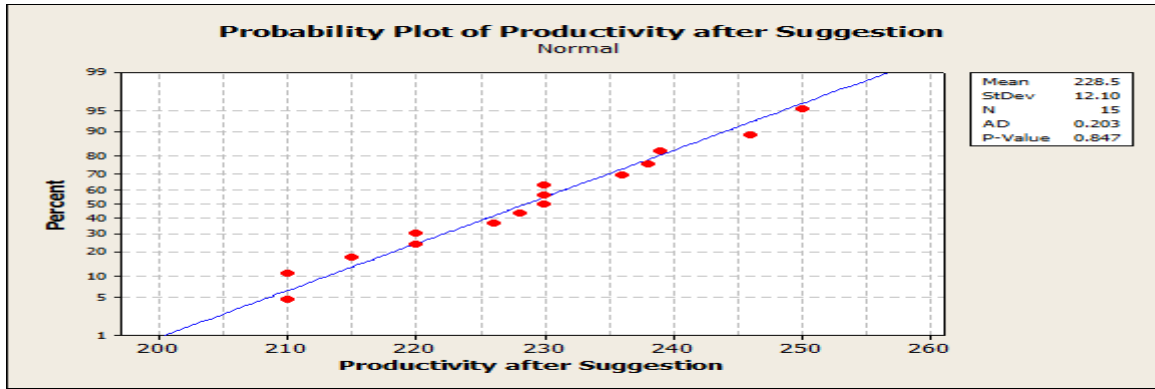


Figure 2: Probability Plot

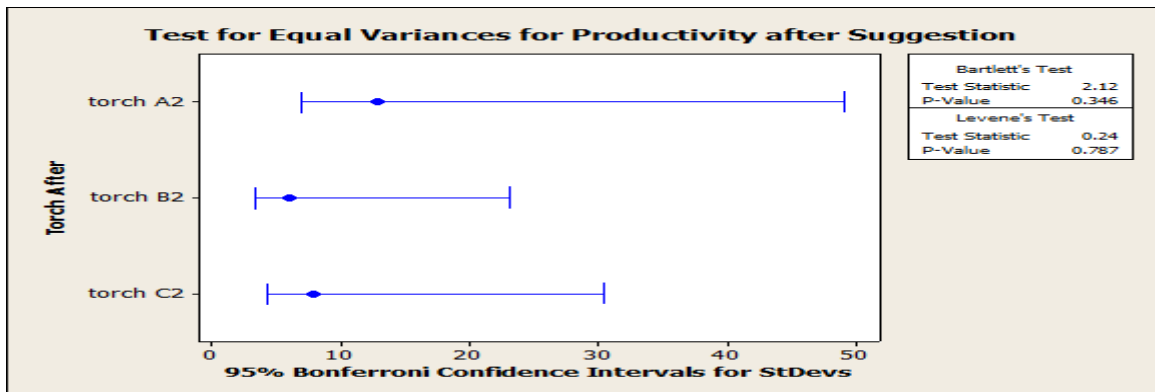


Figure 3: Test for Equal Variances

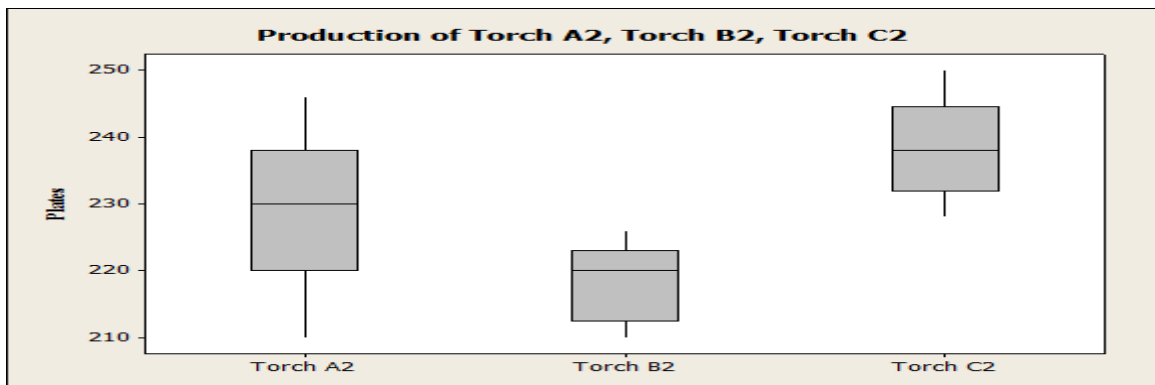


Figure 4: Box plot of production of torches

Comparing the probability graph it can be confirmed that the data is normally distributed after the suggestions. The Bartlett's test proves that it can be confirmed with 95% confidence that there is variation in productivity of the three torches that is the means are varying.

**CONCLUSION**

- It can be concluded that the production averages of the torches is significant with that of Torch C being greater compared to Torch B since the boxes don't overlap.
- Torch C can be used further for production by keeping Torch A and Torch B idle as Torch C gives the maximum production compared to the other two.

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