iJRASET
International Journal For Research in
Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 6 **Issue:** IV **Month of publication:** April 2018

DOI: http://doi.org/10.22214/ijraset.2018.4425

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887
Volume 6 Issue IV, April 2018- Available at www.ijraset.com

Modification of Centro-Maskin Machine for Reduction in Breakdown Time

Ajay Gupta[1], Shubham Dhuri[2], Deepak Chouhan[3], Shubham Raskar[4], Yogesh R. Ingole[5]
[1, 2, 3, 4, 5] *Mechanical Engineering, SRTTC FOE Pune, Maharashtra, India*

Abstract: The manufacturing process stops due to many unplanned event it accumulate in breakdown time. While breakdown time is most often related with equipment failures it actually encompasses any unplanned event that causes your manufacturing process to stop. For most manufacturers breakdown time is single largest source of production loss. The breakdown time may cause due to maintenance failure, operator mistake and machine failure. When managing machine tool maintenance a manufactuer must apply an proper decision technique in order to reveal hidden costs associated with production losses, reduce equipment breakdown time in an efficient and capable way and similarly identify the machine's performance. This paper presents a review of various causes of breakdown and it's effect on system which ultimately reduces the productivity from machine. As a result of the study, the critical rate of machine breakdown which affects the system has been determined.
Key words: Breakdown, Failure, Production loss.

I. INTRODUCTION

Manufacturing environments are dynamic in nature and are subject to various disruptions, refered to as real-time events, which can change system status and affect its performance [1]. These disruptions are machine breakdown, rush orders, and order cancellations etc. Machine breakdown is often an important factor in the throughput of manufacturing systems [2]. If machine breakdown occurs it stops the manufacturing process thus reduces the productivity of the system. Machine maintenance is gaining importance in industry because of the need to increase reliability and to decrease the possibility of production loss due to machine breakdown. Schedule preventive maintenance reduces the regular breakdowns and increases the availability of machine[3]. Maintenance is an activity to ensure that equipment is in a satisfactory condition and reliable. The goal of maintenance is to ensure that equipment is satisfactory[4]. There is an intense need for manufacturing industries to reduce unexpected breakdowns and remain competitive, and motivating maintenance operations should be integrated into production scheduling models[5]. Centro-Maskin machine is type of grinding machine which is use to remove oxdised layer, surface defect, sharp edges for safe transportation from bloom (steel bar).

Fig. 1: Centro-Maskin Machine.

The main parts of Centro-Maskin machine are trolley, loading bridge, crossfeed on which grinding wheel is attached and operator cabin. The trolley and loading bridge works on hydraulic system and crossfeed works on pneumetic system.

II. METHODOLOGY OF WORK

A. The initial data collection of the breakdown details of the machine i.e. The data's such as breakdown hours, breakdown occurrence.
B. Studying the type of failures occurred & frequently repeating failures.
C. Following the breakdown reduction methodology.
D. Finding the various causes of breakdown with the help of cause and effect diagram.
E. Performing time analysis to reduce the recurrence of failures.
F. Using quality control tool (pareto chart and histogram).
G. Replace the defective parts of the machine.
H. Implementing the corrective steps.
I. Monitoring and verifying the results.

III. STUDYING THE TYPE OF FAILURES

Machines fail for a variety of reasons. Likewise, not all failures are the same. The term machine failure indicate that machine has stopped working in the way in which it was intended to work. This failure lead to breakdown of the machine. Failure that lead to breakdown in Centro-Makin machine can be divided into mechanical, hydraulic, trolley, structural and pneumatic.

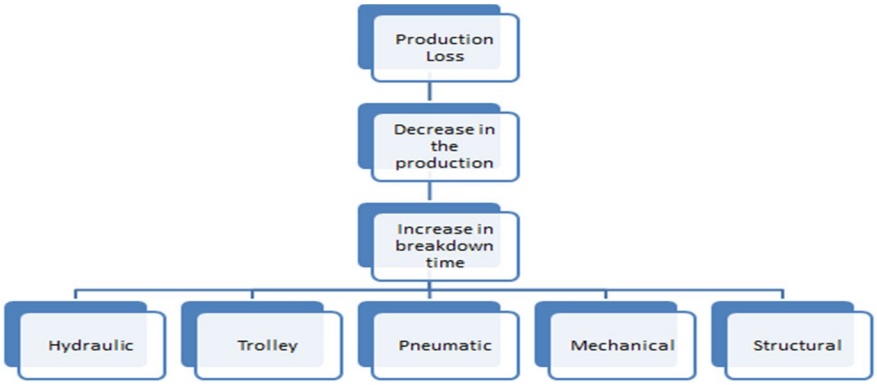


Fig. 2: Type of failures.

Hydraulic failure is caused because of overheating, cavitation, air lock, etc. Trolley failure is caused because of improper tensioning of belt, tilting of trolley, clamping, etc. Mechanical failure may caused due to bolt loosing, vibration, facture, coupling misalingment, etc. Structural failure may caused due to foundation, improper mounting of machine, etc.

IV. TIME ANALYSIS BY USING PARETO CHART AND HISTOGRAM

Pareto Analysis is a statistical technique in decision-making used for the selection of a limited number of tasks that produce significant overall effect. It uses the Pareto Principle (also known as the 80/20 rule) the idea that by doing 20% of the work you can generate 80% of the benefit of doing the entire job. We plotted the pareto chart for breakdown time delay of various failures.

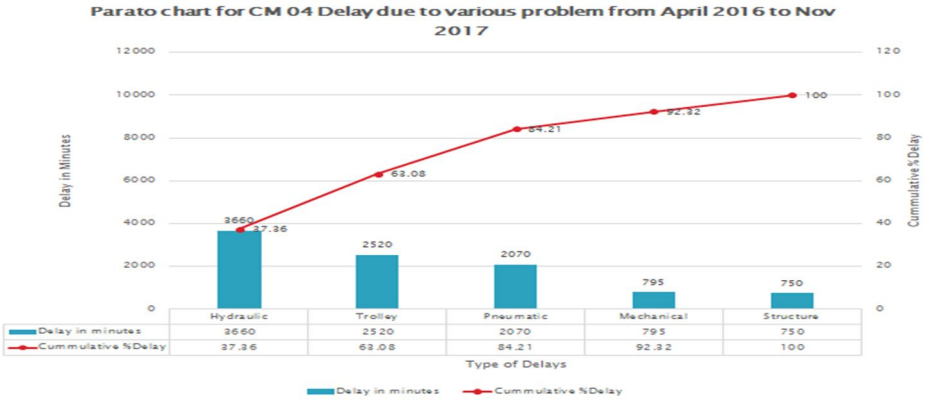


Fig. 3: pareto chart for breakdown time delay of various failures.

According to pareto chart the maximum breakdown were caused by hydraulic failure, therefore we focused on hydraulic failure. The delay caused due to hydraulic failure for twenty months in Centro-Maskin machine is shown in fig.4 below.

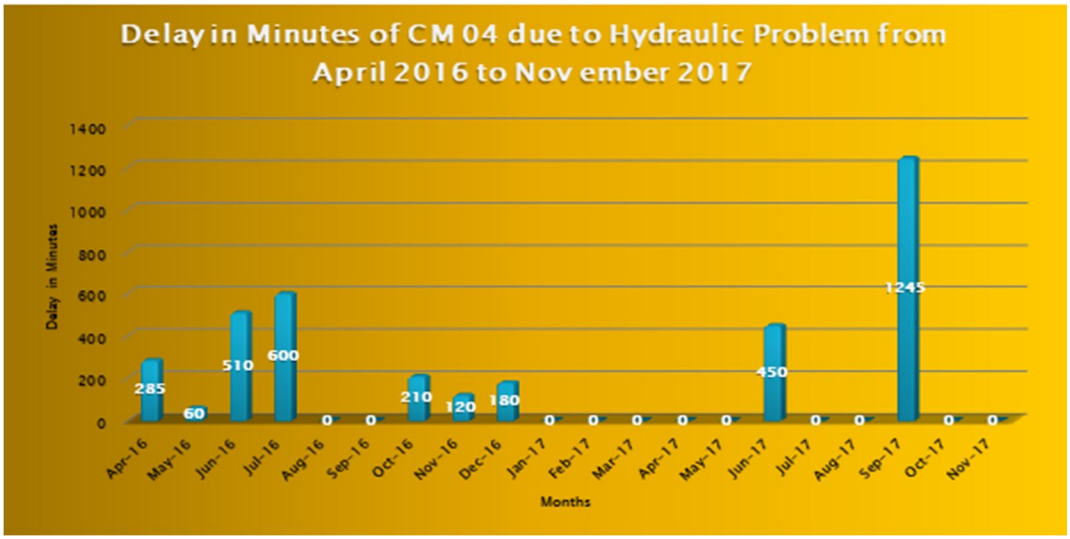


Fig. 4: Delay time for 20 months.

Total Number of Delay Minutes in 20 months = 3660 minutes.
Average number of Delays in 20 Months = 183 minutes.

V. CAUSES OF BREAKDOWN WITH THE HELP OF CAUSE AND EFFECT DIAGRAM

The breakdown time may cause due to maintenance failure, operator mistake and machine failure. There are so many reasons of pump failure ,seal leakage from weep hole, bearing overload, casting breakage, cavitation, cooling system contamination, shaft breakage, thermal shock, excessive vibration, seal leakage.

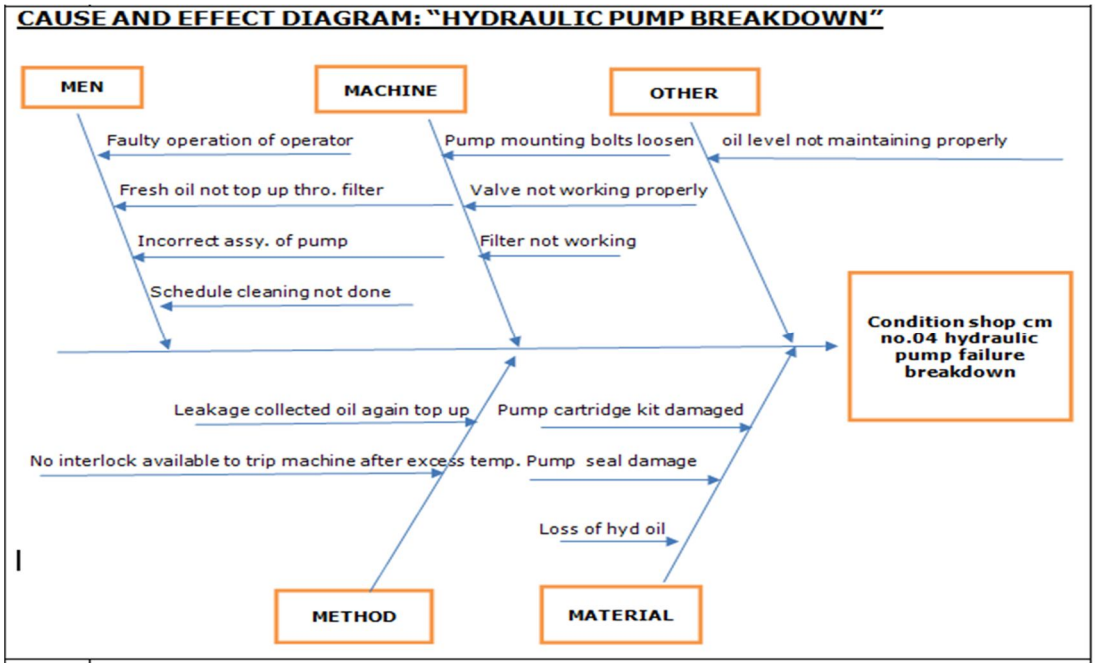


Fig. 5: Cause and effect diagram.

VI. ACTION TAKEN

In general, the pump is placed over the fluid storage tank (vertically mounted). The pump creates a negative pressure at the inlet which causes fluid to be pushed up in the inlet pipe by atmospheric pressure. It results in the fluid lift in the pump suction but if the

the fluid level is low inside the tank it results in formation of air bubbles inside the tank and rapid decrease in pressure which results in cavitation penomena. The cavitation is the formation of vapor cavities in a liquid. The cavities can be small liquid-free zones ("bubbles" or "voids") formed due to partial vaporization of fluid (liquid). These are usually generated when a liquid is subjected to rapid changes of pressure and the pressure is relatively low. At higher pressure, the voids implode and can generate an intense shockwave. Therefore, the cavitation should always be avoided. so to avoid it we changed mounting from vertical to horizontal.

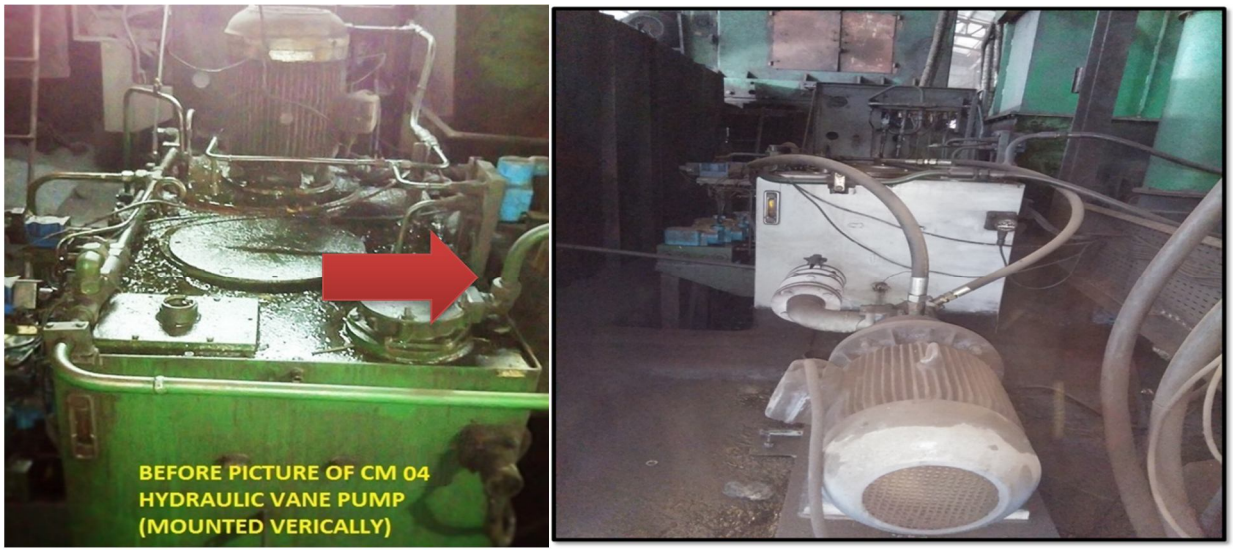


Fig. 6: Pump mounting changed from vertical to horizontal.

Cavitation does not occur in horizontal mounting as suction is always flooded. Horizontal arrangement can be directly coupled to electric motor, engine or turbine. Maintenance required for horizontal arrangement is less as compared to vertical arrangement.

VII. RESULTS

By comparing the pareto chart of both the arrangement we found out the breakdown time in horizontal mounting were low as compared to vertical mounting.

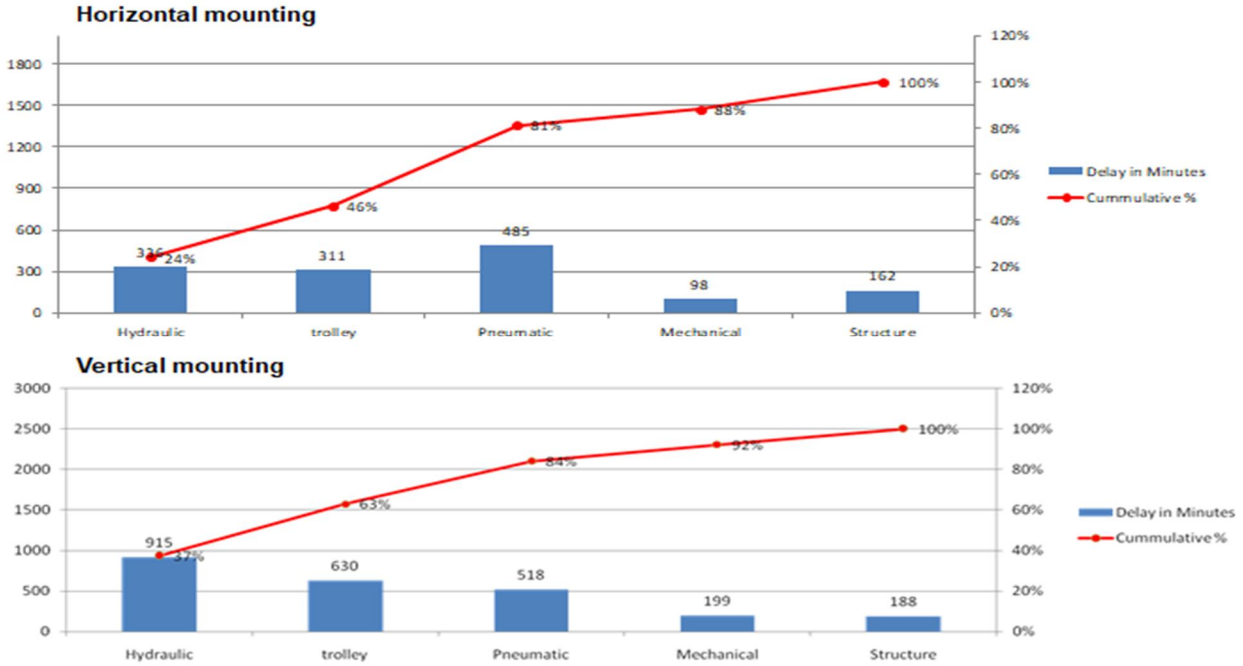


Fig. 7:pareto chart comparision

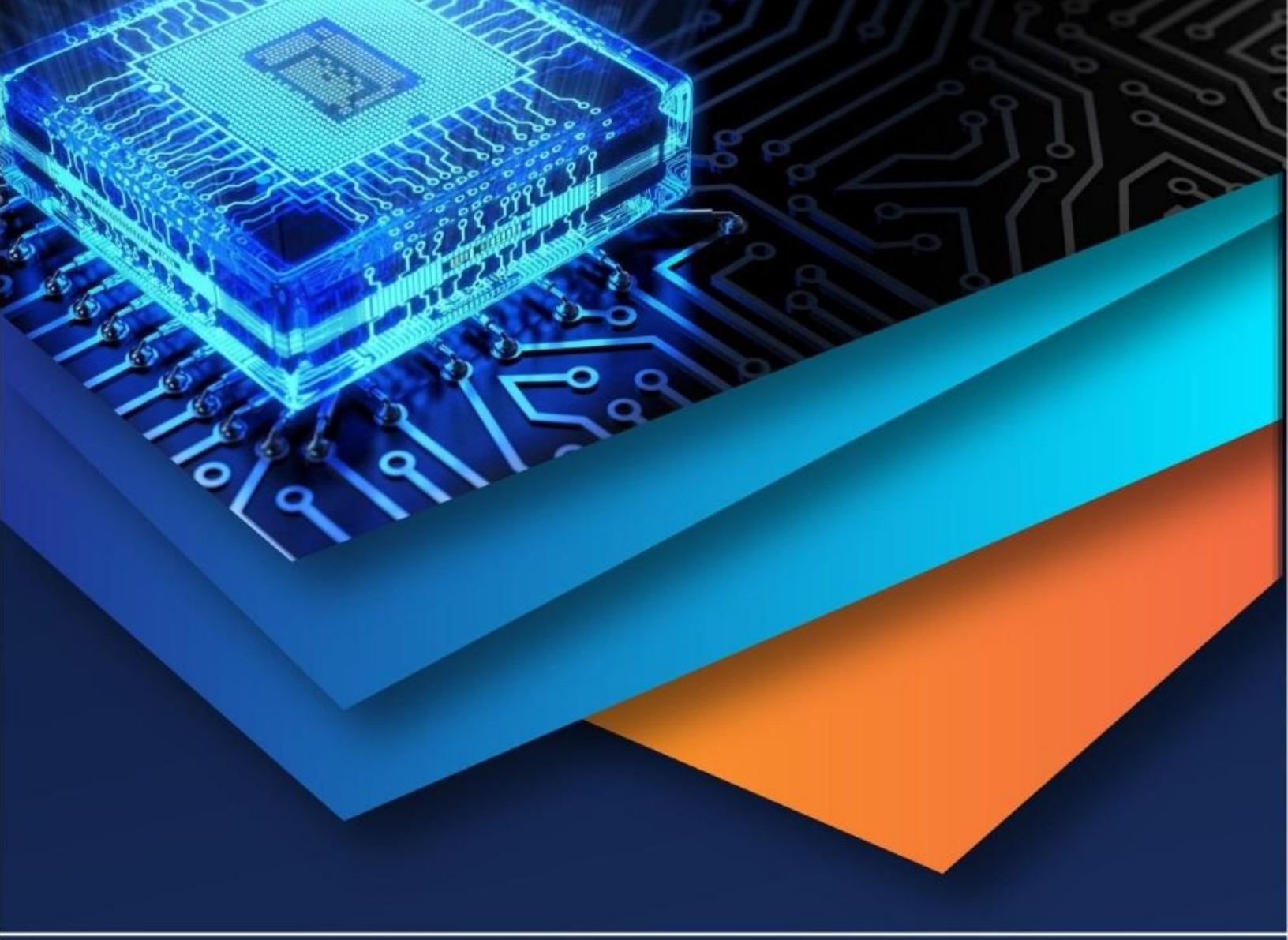
The delay time decreased from 915min in vertical arrangement to 336min in horizontal arrangement for period of six months.

VIII. CONCLUSION

The use of time analysis (pareto chart, histogram) and cause and effect diagram helped to identify the correct causes of failures by which the suitable countermeasures are developed and implemented. By changing the mounting from vertical to horizontal we counter most of our hydraulic breakdown such as cavitation, excessive heat, faulty operation, Incorrect pressure generation by pump, frequent damage of pump.

REFERENCES

[1] Gholami, M. ‘‘Scheduling hybrid flow shop with sequence-dependent setup times and machines with random breakdowns’’, Int. J. Adv Manuf. Technol., 42, pp. 189–201 (2009).
[2] Lu, L. ‘‘Classification analysis for simulation of machine breakdowns’’,Proceedings of the 2007 Winter Simulation Conference, pp. 480–487 (2007).
[3] Sergio Rossi [lean manufacturing].in early 1930’’s, http; //www.relableplant.com/authors
[4] Dew, J. R. (1991) – in search of the Root Cause. Quality progress,24(3),pp97-107,
[5] Gits, C.W., DzOn the Maintenance Concept for a Technical System: A Framework for Designdz, Ph.D. Thesis, Eindhoven University of Technology, 1984.



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY