

A Review on Total Productive Maintenance

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ABSTRACT

Total productive maintenance (TPM) is the methodology aims to improve the accessibility of equipment and in consequence improve the further capital investment. Objectives of TPM are zero breakdowns, zero losses, zero defects and zero health hazards and hence increase quality and productivity in industries. This paper gives a literature review of ten papers on the total productive maintenance (TPM). Calculation of Overall Equipment Effectiveness (OEE) helps to find the machine performance. The literature review indicates that, Total Productive Maintenance is being adopted across many organizations in the India enhancing the productivity and efficiency of manufacturing.

Keywords : TPM, OEE, SME, TQM

I. INTRODUCTION

TPM is a practical application of total quality and empowerment of the workforce. (Willmott, P. 1994). TPM has helped the organisation in improving the synergy between the maintenance department and the rest of the production and manufacturing functions resulting in eliminating defects, improving manufacturing process reliability, improving OEE, reducing costs (Ahuja I.P.S. 2008). TPM aims to promote a culture in which operators feel they “own” their machines, learn much more about them, and in the process release skilled trades to concentrate on problem diagnostic and equipment Improvement projects (Willmott, P. 1994). TPM brings maintenance into focus as a necessary and vitally important part of the business. It is no longer regarded as a non-profit activity. Down time for

maintenance is scheduled as a part of the manufacturing day and, in some cases, as an integral part of the manufacturing process. The goal is to hold emergency and unscheduled maintenance to a minimum (J. Venkatesh, (2007).

II. LITERATURE REVIEW

1. Shelke G.D (2019) presents the case study on implementation of TPM in automotive chain manufacturing industry. After implementation of TPM researcher concluded that success of TPM depends on various pillars like 5-S, Jishu Hozen, Planned Maintenance, Quality maintenance, Kaizan, Office TPM and Safety, Health & Environment. Also he concluded Overall Equipment Effectiveness is has improved from 63% to 85% indicating the

improvement in productivity and improvement in quality of product.

2. Venkateswaran N. (2017) presents a work of TPM program in manufacturing unit and uses various tools - Pareto chart, Histogram, Why-Why analysis, Fish bone diagram for analyzing the data. The researcher finds OEE (Overall Equipment Effectiveness) has increased due to proper utilization of machine. And he concluded that major improvements reflected especially on productivity.

3. Kumar D.(2014), presents the a study overall equipment effectiveness by Implementing Total Productive Maintenance in plastic pipe manufacturing industries. He compares before implementing TPM and after implementing TPM data and distorts major problems by TPM based corrective action plan they had reduce 60% problems and improve OEE.

4. Singh R.(2013), reported the experience of implementing TPM concept in automotive manufacturing company by implementing all the pillars of TPM in a phased manner leading to continuous improvement. In this paper author reported OEE has improved from 63% to 79% indicating the improvement in productivity and improvement in quality of product in machine shop of automotive company.

5. Nishal M.(2018), presents need for total productive maintenance in SME and barriers in implementing TPM in SME. Researcher visualized the indirect benefits of TPM making the production smoother at a faster rate.

6. Patil J., Raut N. (2019), carried out study in a Manufacturing industry which is now facing problem in establishing processing certain machining in their Plant, and also maintaining it to reduce downtime due to maintenance issue. By applying TPM and doing root cause analysis he reduced the maintenance issue is by 50%.

7. Dr. Kedar A. P., (2016) presents comparative study of literature focusing on factors of TQM and TPM implementation which have positive impact on the organizational performance. The study found some

factors are common categories of activities when implementing TQM and TPM as combined strategy. He said that, there is no unique model for a good combined TQM & TPM programme. TQM and TPM implementation implies organizational change. It is imperative that management and employees are committed to implementation. Management must address intangible factors such as motivation, engagement and acceptance, in order to nurture a willingness to change.

8. Vigneshwaran S., (2015), review the literature on impact of Total Productive Maintenance (TPM). He spots the tangible and intangible Benefits attained after TPM implementation. He noted that the tangible benefits such as availability performance efficiency and quality rate increases considerably on TPM implementation which impacts in the improvement of OEE. This reaches the main goal of TPM program zero breakdowns and zero product defects.

9. Gupta A.K.,(2012), presents a case study analysis of OEE and TPM in an automobile manufacturing organization through model machine and model shops . After successful implementation of TPM, he found that Overall Equipment Effectiveness is increased.

10. Kocher G.(2012), discuss the TPM development & implementation program of case study in manufacturing industry. Author also discusses difficulty face in TPM implementation. In his study he concludes that TPM significantly contribute to improve the productivity, quality, safety and morale of workforce. His study shows that implementing TPM is by no means an easy task without strong backup from the top management.

III. OVERALL EQUIPMENT EFFECTIVENESS

The basic measure associated with Total Productive Maintenance (TPM) is the OEE. This OEE highlights the actual "Hidden capacity" in an organization. OEE is not an exclusive measure of how well the maintenance department works. The design and

installation of equipment as well as how it is operated and maintained affect the OEE. OEE is a function of the three factors mentioned below (J. Venkatesh, 2007).

1. Availability or uptime (downtime: planned and unplanned, tool change, tool service, job change etc.)
2. Performance efficiency (actual vs. design capacity)
3. Rate of quality output (Defects and rework)

Availability: Availability is the ratio of total time for which machine is available for production to the total time of production.

$$\text{Availability} = \frac{(\text{Production time} - \text{Downtime})}{\text{Production time}}$$

Performance Efficiency: Net production time is the time during which the products are actually produced.

$$\text{Performance Efficiency} = \frac{(\text{Cycle time} \times \text{Number of products processed})}{\text{Production time}}$$

Rate of Quality output: it is percentage of good parts out of total produced. Sometimes called yield.

$$\text{Quality Rating} = \frac{\text{Number of OK parts}}{\text{Total parts produced}}$$

OEE = Availability x Performance Efficiency x Rate of Quality output

IV. CONCLUSION

The literature highlights that various TPM implementation programs are initiated to achieve benefits for meeting the challenges of global competition. This paper presented contributions of researches on Total Productive Maintenance and case studies in India. From the literature review it is revealed that TPM implementation gives improved overall equipment effectiveness which makes industries competitive and effective, in the field of maintenance.

From the literature study is noted that OEE has contributing in increase in production.

V. REFERENCES

- [1]. Willmott, P. (1994) 'Total quality with teeth', The TQM Magazine, Vol. 6, No. 4, pp 48-50.
- [2]. Ahuja I.P.S., Khamba J.S.(2008), "Total productive maintenance implementation in a manufacturing organisation", International Journal of Productivity and Quality Management, Vol. 3, No. 3, pp. 360-381.
- [3]. Shelke G.D. , Javed M. , Walde S.D. (2019), "Implementation of Total Productive Maintenance in Automotive Chain Manufacturing Industry: A Case Study ", International Journal of Science and Research (IJSR), Vol. 8 No. 2, pp 1339-1345.
- [4]. Venkateswaran N (2017), "Total Productive Maintenance (TPM) Practices Adopted at Manufacturing Unit: An Analysis." , Arabian Journal of Business and Management Review, ISSN: 2223-5833, Vol. 7, No.4 , 1000313, pp 1-6.
- [5]. Kumar D.,Kumar D., Rawat R.(2014), "Methodology used for improving overall equipment effectiveness by Implementing Total Productive Maintenance in plastic pipe manufacturing industries" International Journal Of Modern Engineering Research (IJMER), Vol. 4 No.9,pp6-12.
- [6]. Singh, R., Gohil, A.M., Shah D.B. , Desai, S. (2013), "Total productive maintenance (TPM) implementation in a machine shop: a case study", Chemical, Civil and Mechanical Engineering Tracks of 3rd Nirma University International Conference on Engineering (NUiCONE 2012), Vol. 51, Procedia Engineering, pp. 592-599.
- [7]. Nishal M., Ramprasad K., Arun Theja A. J., Saravanan S. A., Abishek S. (2018), "Need For Total Productive Maintenance In SME And Barriers In Implementing TPM In SME",

International Journal Of Mechanical And Production Engineering, Vol. 6, No.6, pp 15-20.

- [8]. Patil J., Raut N. (2019), "Study Of Total Productive Maintenance And Improving The Production", International Journal of Research and Analytical Reviews,, Vol. 6, No. 1, pp519-522.
- [9]. Dr. Kedar A. P., Borikar V. N., (2016), "Critical Success Factors for Effective Implementation of TQM & TPM", International Journal for Innovative Research in Science & Technology, Vol. 2, No. 09 , pp160-164.
- [10]. Vigneshwaran S. , Maran M., Manikandan G.(2015), "Impact of TPM Implementation: Literature Review and Direction", International Journal of Innovative Science, Engineering & Technology, Vol. 2 No. 12, pp. 114- 120.
- [11]. Ahmed S., Hassan M. H., Taha Z, (2005), "TPM can go beyond maintenance: excerpt from a case implementation", Journal of Quality in Maintenance Engineering, Vol. 11 Iss: 1 pp. 19 – 42.
- [12]. Gupta A.K., Dr. Garg R. K., (2012), "OEE Improvement by TPM Implementation: A Case Study", International Journal of IT, Engineering and Applied Sciences Research (IJIEASR), Volume 1, No. 1, pp 115-124.
- [13]. Kocher G., Kumar R., Singh A., Dhillon S.S.(2012), "An Approach for Total Productive Maintenance and Factors Affecting its Implementation in Manufacturing Environment" , International Journal on Emerging Technologies, Vol.3, No.1, pp 41-47.
- [14]. J. Venkatesh, (2007), "An Introduction to Total Productive Maintenance", The Plant Maintenance Resource Center, http://www.plant-maintenance.com/articles/tpm_intro.pdf

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