



OVERALL EQUIPMENT EFFECTIVENESS

A. S. More¹, S. K. Ugale², D. B. Unawane³

^{1,2,3}Lecturer in Mechanical Engineering Department, CSMSS College of polytechnic, Kanchanwadi,
Aurangabad (India)

ABSTRACT

In the present scenario of active industrialization, the machines and its utilities are becoming complicated. To overcome this complication Overall Equipment Effectiveness (OEE) plays an important role for quality enhancement and on time supply to consumer. The paper presents the methodology and terms important for the Overall Equipment Effectiveness (OEE). For a better manufacturing plant, the most suggested objective is quality, effectiveness, productivity and operating expenses. These are the constraints depend on the utility of the equipment used in the production.

Overall Equipment Effectiveness (OEE) is one of the performance valuation methods that are most common and popular in the production industries. Overall Equipment Effectiveness (OEE) is commonly used as a important term in TPM (Total Productive Maintenance) Kaizen, Pokayoke, 5S and Lean Manufacturing programs and gives a reliable method to measure the efficiency of TPM and other creativities by provided that an whole structure for evaluating production effectiveness.

Keywords: *Effectiveness, Industrialization, Lean Manufacturing, TPM.*

I. INTRODUCTION

Overall Equipment Effectiveness (OEE) is a way to observe and increase the efficiency of Production plant. OEE has become an accepted organization tool to measure and estimating the plant productivity. OEE is divided into three measure terms that are Availability, Performance and Quality. These terms help to improve the plant's efficiency and effectiveness and classify these basic productivity losses that occur within the production plant. Overall Equipment Effectiveness (OEE) endures manufacturing companies to expand their processes and in turn confirm excellence, uniformity, efficiency and productivity measured at the final line.

Now a day's production plant facing the capacity problems, they instantaneously decide to increase overtime, purchase new equipment or add shifts. As an alternative they should decide to improve the performance of their present machines to improve equipment reliability, improve operator performance and minimize the whole idle time. All these things can be prepared to increase capacity and will pay greater expenses by allowing a production plant to devote its valuable time and money on their production process as an alternative of new machine procurements.

The main objective of production plant to improve the performance of their present equipment for that purpose Overall Equipment Effectiveness (OEE) tool is used. OEE is

An effective tool to analyse and improve your production process. The OEE tool gives you the capability to measure equipment for productivity improvements. OEE measures the inefficiencies as well as groups them into three categories to help evaluate the machine and have a better appreciative of the production process.

As per the definition, OEE is the calculation of Availability, Performance, and Quality.

Overall Equipment Effectiveness (OEE) = Availability X Performance X Quality

The Overall Equipment Effectiveness Availability takes into account any Down Time Losses.

The Overall Equipment Effectiveness Performance takes into account any Speed Losses.

The Overall Equipment Effectiveness Quality takes into account any Quality Losses.

II. METHODOLOGY

The Production industry permits the whole plant to be involved in the process of improving Overall Equipment Effectiveness (OEE). From the machine operator to the production manager to the plant manager, this production monitoring result think about data that can help every person end or see results. The basic thing for all teams should be to minimize production losses and form Commercial products. The Production industry provides production managers and machine operators with the necessary actual time data to make critical decisions about the effectiveness of the production process. As an alternative of manually recording this data for final of shift results, the machine operator can observe, evaluate, and develop their process in actual time all over the day.

Table for Major Loss Events Affecting Simple OEE:

Major loss events	OEE Metric	Loss Category	Example of Loss Category
Machine Failures	Availability	Down Time	Equipment Let-downs, Tooling Destruction, Unplanned Repairs.
Machine Stops	Performance	Speed	Wrong alignment of job, Component Block.
Machine producing defective Parts.	Quality	Quality	Tolerance Variations, Damage

Table2.1:Major Loss Events Affecting Simple OEE

2.1 Common concerns of many production companies:

- Reducing Blockages – Increase Throughput.
- Implementing Machine Operator Training
- Reducing Machine Setup Time
- Improving Machine Reliability – Implement Preventive Maintenance
- Maximizing Optimal Run Rates and Capacity
- Eliminating Down Time – Provide Down Time Reason Codes



2.2 Important Term for Overall Equipment Effectiveness

The following terms describe the various production terms which make up simple OEE. The three terms (Availability, Performance, Quality) used in the calculation of Overall Equipment Effectiveness.

- 1) **RUN TIME** (Availability) - The total production time that the machine has been running and producing parts.
- 2) **SETUP TIME** (Availability)- The period of time on the machine required for an operator to perform all the necessary tasks to produce the first good part.
- 3) **DOWN TIME** (Availability) - The period of time the machine is not available for production due to maintenance or breakdown
- 4) **TOTAL TIME** (Availability) - The total accumulated machine time of Run Time + Down Time + Setup Time.
- 5) **TARGET COUNTER** (Performance) - the number of parts or cycles that should be completed at a particular point within the shift, day, or production run.
- 6) **TOTAL COUNT** (Performance & Quality) - The total number of parts, good and bad, that are produced on a machine.
- 7) **GOOD COUNT** (Quality) - The input count for any part produced to Manufacturing specifications on the machine.

2.3 Overall Equipment Effectiveness (OEE) = Availability X Performance X Quality

- **Availability:** Percentage of the actual amount of production time the machine is running to the production time the machine is available. If the machine is running during a scheduled break then that machine operator is or is not on break OEE considers this to be part of the machine runtime and is factored into machine availability.

2.4 Availability = Run Time / Total Time

- **Performance:** Percentage of total parts produced on the machine to the production rate of Machine. Performance tells us how well the machine was running, when it was running. Performance takes into account all the factors that cause the machine to operate at less than the maximum speed.

$$\text{Performance} = \text{Total Count} / \text{Target Counter}$$

- **Quality:** Percentage of good parts out of the total parts produced on the machine.
One of the three Simple OEE Measured in the Simple OEE by tracing rejected parts. Quality takes into account bad parts that do not meet quality standards.

$$\text{Quality} = \text{Good Count} / \text{Total Count}$$



III. CONCLUSION

It is necessary for a production plant to progress the production rate and excellence of the products. In direction to accomplish this, the Overall Equipment Effectiveness was better-quality for we have to conclude following points

- 1) Low machine breakdown.
- 2) Lower idling time and minor stops time.
- 3) Minimizes the quality defects.
- 4) Decreases the chances of accident in plants.
- 5) Productivity rate can be better than before.
- 6) Improved process parameters.
- 7) Machine operator involvement.
- 8) Increased profits by reducing the cost.
- 9) It can fulfil the requirement of customer.
- 10) By execution of Overall Equipment Effectiveness better utilization available resources.
- 11) Customers get high quality products.
- 12) It also satisfies the need personnel spirits and increase the confidence.

REFERENCES

- [1] Harsha G. Hegde¹, N. S. Mahesh², Kishan Doss³, "Overall Equipment Effectiveness Improvement by TPM and 5S Techniques in a CNC Machine Shop" Volume 8, Issue 2, September 2009 PP 1-32.
- [2] S.R.Vijayakumar¹, S.Gajendran², "Improvement of Overall Equipment Effectiveness (OEE) In Injection Moulding Process Industry" IOSR Journal of Mechanical and Civil Engineering (IOSR-JMCE) e- ISSN: 2278-1684, p-ISSN: 2320-334X PP 47-60.
- [3] Exor / Datavisor Marquees, "The Complete Guide to Simple OEE" PP 1-26.
- [4] Carlo Scodanibbio presents, "World-Class TPM Total Productive Maintenance how to calculate Overall Equipment Effectiveness (OEE)". PP 1-23.