

Literature Review on Implementation of TPM

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Abstract- TPM (Total Productive Maintenance) main function is to change the culture of the company maintenance policy by participating all employees toward the maintenance system of the company. TPM reduce unplanned stoppage, breakdowns, accidents and losses of equipment effectiveness. Therefore by implementing TPM the industries can increase their equipment effectiveness and productivity.

This is a review paper which presents the study and overview for the implementing approach of Total Productive Maintenance by different research papers. The main objective of this paper is to understand TPM concept and to generate awareness of the TPM.

Key words- OEE, Kaizen and Pillars of TPM

I. INTRODUCTION

Now a day because of global recession and competition it is basic business requirement is to supply quality products at competitive prices through reducing manufacturing cost which is only possible by improving manufacturing performance. This increased global competition forcing companies to improve and optimize their productivity in order to remain competitive[1]. Today the Organizations that want to sustain in highly competitive business must have the need for wide product range and features with high quality, lower costs, and more effective. [1]

In this highly competitive globalize scenario, the maintenance function is being looked on by organizations as a potential source of cost savings and competitive advantage. The effective integration of maintenance function with engineering and other manufacturing functions in the organization can help to save huge amounts of time, money and other useful resources in dealing with reliability, availability, maintainability and performance issues [1]. TPM employs overall equipment effectiveness (OEE) as a quantitative metric for measuring the performance of a productive system[2].

The rapidly changing global marketplace calls for affecting improvements in a company's performance by focusing on cost cutting, increasing productivity levels,

quality and guaranteeing deliveries in order to satisfy customers. Organizations that want to survive in today's highly competitive business environment must address the need for diverse product range with state-of-the-art product features, coupled with high quality, lower costs, and more effective, swifter Research and Development (R&D). In fast-changing marketplace, slow and steady improvements in manufacturing operations will not be able to sustained in an organization. Thus the organizations need to improve at a faster rate than their competitors, if they want to sustain in the industry. With increased global competition, attention had been shifted from increasing efficiency by means of economies of scale and internal specialization to meeting market conditions in terms of flexibility, delivery performance and quality. The changes in the current business environment are characterized by intense competition on the supply side and heightened volatility in customer requirements on the demand side. These changes have left their unmistakable marks on the different facets of the manufacturing organizations. To meet the challenges posed by the contemporary competitive environment, the manufacturing organizations must infuse quality and performance improvement initiatives in all aspects of their operations to improve their competitiveness[3].

II. LITERATURE REVIEW

Sarang G. Katkamwar, Sadashiv K. Wadatkar and Ravikant V. Paropate(2013) had explained the overview for the implementation of TPM in Indian spinning industries by the study which is carried out in medium scale cotton spinning industry using the observations coupled with documents collection. The TPM implementation methodology is suggested for improvement in the availability, performance efficiency and the quality rate, results in improvement of the overall equipment effectiveness of the equipment's.

While implementing TPM the various difficulties are solved by using different techniques like see through, one point lessons, CLITA, KK, PM, Poke yoke etc. In this paper only first three pillar i.e. JISHU HOZEN (Autonomous maintenance), KAIZEN, and Planned Maintenance are highlighted for the implementation

practice. A Study is considered on Carding Machine in spinning industries for describing all the aspect and changes which are observed after implementation.

TPM is the effective tool to increase the productivity of Indian industries. While implementing TPM they found some barriers for effective implementation of TPM, such as Lack of Management Exposure, difficulty in understanding TPM methodology and philosophy by middle management, long time taken for implementation so people shows strong resistant to it. But it is the only thing between the success and failure for many companies as far as the maintenance is concern. TPM works on major 8 pillars which are (JH, KK, PM, QM, E&T, OT, 5s and SHE). It works on methodologies like CLITA, OPL, P-M Analysis for achieving its goal of success. After implementing TPM in medium scale cotton spinning industry they found that the Overall Equipment Efficiency is improved, Customer complaints had been reduced and 100% customers are satisfied, also there was reduction in the manufacturing cost by 30%, & accidents are also reduced[4].

Abdul Talib Bon and Lim Ping Ping(2011) proposed that how with the implementation of TPM in automotive industry they can provide excellent quality, reliable delivery and competitive pricing. This demands that the manufacturer's machines and processes are highly reliable. In order to possess highly reliable machines to make sure smooth manufacturing process, many organizations have implemented Total Productive Maintenance (TPM) as the enabling tool to maximize the effectiveness of equipment by setting and maintaining the optimum relationship between people and their machines. Overall Equipment Effectiveness (OEE) is used as a measure when evaluating the result of TPM.

Automotive industry in Malaysia is one of principal producers and exporters of vehicle parts, components and accessories, which are widely accepted to most of leading countries of world. The goal of TPM is to bring competitive advantages to organizations, improve quality of the products, and reduce the cost production of the line. It is vital to study the state of TPM implementation by examining the measure of Overall Equipment Effectiveness (OEE) in companies like those located in developing countries such as Malaysia.

Measurement is an important requirement of continuous improvement process. TPM can be defined in terms of Overall Equipment Effectiveness (OEE) which in turn can be considered a combination of the operation maintenance, equipment management and available resources. The goal of TPM is to maximize equipment effectiveness, and the OEE is used as a measure. By the

comparison of result between before and after the use of TPM that had been carried out they have shown the impact that TPM brought. Study on OEE figures had been conducted as OEE is the indication of machine performance. Identifying the OEE element with the lowest value by comparing the result between OEE obtained to world-class OEE benchmark will be done as it will affect the rate of OEE in TPM implementation. It is to believe that by improving the element's figure, overall OEE rate will increase, production rate of the factory will increase and thus, bringing higher sales and revenue to organization[5].

Hemlata Sahu, J.M. Batham and A. Bangar(2012) observed that TPM is a fundamental component of World Class Manufacturing is that of the Total Productive Maintenance (TPM), which has been recognized as one of the significant operation strategy to regain the production losses due to equipment inefficiency. TPM process itself undergoes continuous improvement. Thomas Observes that "in highly technical, rapidly changing environment, traditional TPM Methodologies will have to be adapted to provide earlier returns if it is to become a viable means for improvement." TPM used as tool to improve reliability involve the workforce in equipment are improve the maintenance function and overall cleanliness and safety.

Today as we are moving towards globalization, to compete with other worldwide industries like Japan, Korea, China etc. therefore it is necessary to move our industries towards modern trend development in all sectors of industries including maintenance department. So they found total productive maintenance (TPM) is one of the best tools for making our industries competitive and effective in the field of maintenance. TPM can be maintenance philosophy prevents the failure of the organization.

During the research program in Jamma automotive industry the study has been carried out on two machines first is parabolic machine and second one is eye rolling machine have selected because these are oldest machine there efficiency and performance were very low & also unsafe because of 100% air cleaning. These are most expensive machines with high maintenance cost, supply improper coolant and lack of skilled workers. After selection of machine data collection had been carried out for the past four months before TPM and after implementation of TPM in Jamma auto industry, we found that two month data show electrical fault, belt drive problems, operator, power and air, oil leakage etc. are reduced after implementation of TPM. The operation is based on the three shifts per day every shifts is for eight hours the

planned down time per shift 15min at the end of each shift for cleaning and tidying up the work area. By comparing the readings before and after implementing TPM they find reduction in down time of a machine and also improvement in quality performance [6].

Prof. A. Bangar, Hemlata Sahu and Jagmohan Batham (2013) had planned that after implementing TPM (Total Productive Maintenance) by using kaizen methodology, TPM used as a tool to improve equipment reliability by redesign the workforce in equipment care and improve the maintenance function. The OEE is product of equipment availability, performance efficiency of process and quality performance of manufacturing operations. TPM is intended to bring both functions (production and maintenance) together by a combination of good working practice, team working, and continuous improvement. OEE combines multiple manufacturing issues and data points to provide information about the process.

TPM and its implications received prestigious worldwide recognition in achieving the ultimate Zero Defects and Zero breakdown targets. TPM starts with 5S. TPM based on kaizen. Kaizen means Kai means change and Zen means good (for the better). Kaizen introduced the idea that employee expertise generates improvement. Which should be taking place all the time in every process involving every one- top management supervisors and workers? "Kaizen is a process oriented approach where efforts for process improvement are properly rewarded. It is a people oriented approach which promotes discipline participation and involvement, skill development, morale, motivation and communication. Achieve and sustain zero losses with respect to minor stops, measurement and adjustment defects and unavoidable downtimes.

During the study in Jamma auto industries Limited is ISO-9001 certified company they found that there are 750 employees and 104 machines available in the company. The company's products include suspension products, multi-leaf springs and parabolic springs. The company has its production facilities in India. It manufactures multi-leaf springs ranging from 3 kilograms to 200 kilograms. The main product of the company was conventional leaf springs and parabolic leaf spring which was made up of eight machines. The study has been carried out on parabolic and eye rolling machine. Under TPM, machine operators carry out routine maintenance such as checking water, oil, coolant and air levels. This may involve some training of machine operators. The actual maintenance teams should as a result of spending less time doing routine maintenance is procedure properly on both machines, Jamma auto industry provide a team for proper

implementing TPM based corrective action plan. There are various problem found on machine Hydraulic oil leakage, Belt drive problem, electrical fault, air problem and sudden power failure, from which hydraulic oil, belt drive and electric fault are major problems and cover 80% area of on Pareto Chart. After implementing TPM they make them to distort 80% problems such as Hydraulic oil leakage and equipment failure major problems which create more losses in production

After that the Data is collected for the past four months and to understand the current levels of performance, it was planned to calculate the OEE. From the analysis of overall equipment effectiveness and the proper implementation of TPM the company has finally achieves reduce downtime of machine, increase output/month, availability, performance efficiency and quality performance which result increase OEE of machine. TPM methodology not only increases the effectiveness of the manufacturing system but also increases the effectiveness of the entire organization through compulsory participation of the employees and continuously improves Productivity, quality, cost, Delivery, safety health and Morale [7].

III. CONCLUSION

This literature review paper highlights the contributions of various TPM implementations in different industries for meeting the challenges proposed by global competition. Today as we are moving towards globalization, to compete with other worldwide industries like Japan, Korea, China etc. therefore it is necessary to move our industries towards modern trend development in all sectors of industries including maintenance department. So we found that total productive maintenance (TPM) is one of the best tools for making our industries competitive and effective in the field of maintenance. TPM has emerged as a key competitive strategy for business organizations in the global marketplace. TPM concepts and philosophy can be effectively employed to realize fundamental improvements of manufacturing performance in the organization, thereby leading the organizations successfully in the highly competitive environment. The study clearly reveals that the successful TPM implementation program can facilitate the manufacturing organization's quest for achieving enhanced manufacturing performance leading to competitive advantage. Definitely various problems come while implementing TPM but with the help of various techniques and with different methodologies we solve the problems and got the good results. TPM methodology not only increases the effectiveness of the manufacturing system but also increases the effectiveness of the entire

organization through mandatory participation and continuously improves Productivity, quality, cost, Delivery, safety health and Morale

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