

Study and Improvement of Manufacturing performance By Implementation of TPM

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Abstract— The purpose of this paper is to evaluate the contributions of total productive maintenance (TPM) initiatives towards improving manufacturing performance in Small and Medium scale Enterprises. In this paper we investigate the relationship between Total Productive Maintenance (TPM) and manufacturing performance (MP) and improving it by using the fundamental TPM Pillars and reducing the six big loses in a Manufacturing Industry

Key Words— TPM, MP, Small and medium scale enterprises, six big loses

I. INTRODUCTION

Now days, Maintenance is an Important factor to improve productivity and quality in manufacturing industries. TPM is a techniques and an effective tool which aimed at increasing the productivity and quality by reducing the rejection, proper maintenance and availability of equipment and focusing toward no defect. TPM is a lean tool which establishes a system of productive maintenance, covering the entire life cycle of equipment, covers all departments, involves participation of all the employees from the top to bottom i.e., from management to the shop floor. The concepts of the TPM were first introduced in Japan by Seiichi Nakajima who is the father of TPM who gives a fundamental concept and also explains the steps for implementing TPM in Industry. The first implemented of TPM strategy in M/S Nippon Denso co. Ltd of Japan in the year 1971. The concepts of TPM was originally developed from maintenance and from United States between 1940 to 1950 at that time the company used to do only productive maintenance. TPM is method of a tool which wholly depend on the OEE which was proposed by Nakajima and it's a multiplication of A, P and Q which is used for finding out the current situation of company, where they are and what are the weakness and how to improve. Therefore, TPM can be considered as treatment to improve the performance of machines. TPM is a maintenance program for maintaining plant and equipment

II. LITERATURE REVIVE

Melesse, Workneh, Wakjira, Ajit Pal Singh [1] In this paper the Arthur study about Total Productive Maintenance: A Case Study in Manufacturing Industry, Chandrashekar G1, Dr. N. V. R. Naidu2[2] In this paper Arthur gives the systematic revive to implementation of Total Productive Maintenance Derek C. Jones [3] The Effects of Employee Involvement on Firm Performance: Evidence from an Econometric Case Study Zahid Habib, Kang Wang [4] in this paper Author implementing TPM in a assembly line ,Luis Mendes [5] study of Employees' involvement and quality improvement in manufacturing small and medium enterprise (SME): A comparative analysis, Kathleen E. McKone [6] The impact of total productive maintenance practices on Manufacturing performance, M.Moradi1, M. R. Abdollahzadeh2, A. Vakili3[7] Effects of Implementing 5S on Total Productive Maintenance

III. OBJECTIVE OF TPM

Total Productive Maintenance is a tool and technique to achieve the organization goals the objectives of TPM are six big losses the aim and the objective of the TPM are to minimize or eliminate the six big losses which mostly affect the efficiency of the plant, it is necessary to make improvement in maintenance strategy. Following are the six big losses which occurs during the production process which are as follows,

- (1) Breakdown losses.
- (2) Setup and adjustment losses.
- (3) Minor stoppages losses.
- (4) Speed losses.
- (5) Quality defect and rework losses.
- (6) Yield losses.

Breakdown losses: - This loss is comes under the downtime losses. This type of losses is occurs due to the failure of parts ,

which causes stop of production and these can be measured by how long it takes to repair or replaced the part or problem.

Setup and adjustment losses: This is also comes under the downtime losses .this type of losses occurs during to change in production process such as change of section , change operating condition , start of different shift , change of product and many more.

Minor losses: This loss come under the sped losses i.e. speed losses means the output is smaller than the rated output or targeted output. Minor stoppage occurs due to jamming, machine idling.

Speed losses: These losses are due to reduction in speed of the equipment that means the machine is not running at its original operating speed.

Quality defect and Rework losses: These losses are due to the defective product produced during the production process and the product are not in the standard Specification give by the company for stated products and therefore rework has to be done to remove the defects and make it again into the standard specification of the company.

Yield losses: These losses are due to wasted raw material. From the above losses, the first two losses affect the availability of a piece of equipment, the third and forth affect the equipment performance, fifth and sixth affect the quality rate.

IV. TPM PILLARS

Total Productive maintenance contains the eight pillars showing below if the figure each pillar possess a acknowledgeable concept to improving the Manufacturing performance



1. PILLAR 1- 5S

TPM starts with 5S. Problems cannot be clearly seen when the work place is unorganized. Cleaning and organizing the workplace helps the team to uncover problems. Making problems visible is the first step of

Table 1: 5s

Terminology	Equivalent to 'S'
Organization	Store
Tidiness	Systematize
Cleaning	Sweep
Standardization	Standardize
Disicipline	Self-Discipline

2. PILLAR 2 - JISHU HOZEN (*Autonomous maintenance*) This pillar is geared towards developing operators to be able to take care of small maintenance tasks, thus freeing up the skilled maintenance people to spend time on more value added activity and technical repairs. The operators are responsible for upkeep of their equipment to prevent it from deteriorating.

Policy:

1. Uninterrupted operation of equipments.
2. Flexible operators to operate and maintain other Equipments.
3. Eliminating the defects at source through active Employee participation. Stepwise implementation of JH activities

3 PILLAR 3 – KAIZEN "Kai" means change, and "Zen" means good (for the better). Basically kaizen is for small improvements, but carried out on a continual basis and involve all people in the organization. The principle behind is that "a very large number of small improvements are more effective in an organizational environment than a few improvements of large value. This pillar is aimed at reducing losses in the workplace

that affect our efficiencies. By using a detailed and thorough procedure we eliminate losses in a systematic method using various Kaizen tools. Its target is to achieve and sustain zero loses with respect to minor stops, measurement and adjustments, defects and unavoidable downtimes. It also aims to achieve 30%

manufacturing cost reduction.

4. PILLAR 4 - *Planned Maintenance* It is aimed to have trouble free machines and equipments producing defect free products for total customer satisfaction. This breaks maintenance down into 4 "families" or groups which were defined earlier.

1. Preventive Maintenance
2. Breakdown Maintenance
3. Corrective Maintenance
4. Maintenance Prevention

With Planned Maintenance we evolve our efforts

From a reactive to a proactive method and use trained Maintenance staff to help train the operators to better maintain their equipment.

5. PILLAR 5 - *Quality Maintenance*

It is aimed towards customer delight through highest Quality through defect free manufacturing. Focus is on Eliminating non-conformances in a systematic manner, much like Focused Improvement. We gain understanding of what parts of the equipment affect product quality and begin to eliminate current quality concerns, and then move to potential quality concerns. Transition is from reactive to proactive (Quality Control to Quality Assurance).

6. PILLAR 6 - *Training*

It is aimed to have multi-skilled revitalized employees whose morale is high and who has eager to come to work and perform all required functions effectively and Independently. Education is given to operators to upgrade Their skill. It is not sufficient know only "Know-How" by they Should also learn "Know-why". By experience they gain, "Know-How" to overcome a problem what to be done. This they do without knowing the root cause of the problem and why they are doing so. Hence it become necessary to train them on knowing "Know-why". The employees should be trained to achieve the four phases of skill. The goal is to create a factory full of experts. The different phases of skills are

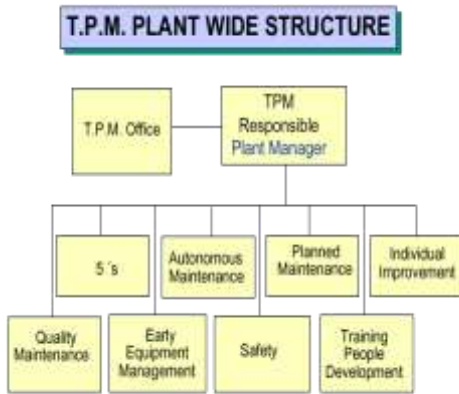
Phase 1: Do not know.

Phase 2: Know the theory but cannot do.

Phase 3: Can do but cannot teach

Phase 4: Can do and also teach

7. PILLAR 7- Office TPM



Office TPM should be started after activating four other pillars of TPM (JH, KK, QM, and PM). Office TPM must be followed to improve productivity, efficiency in the administrative functions and identify and eliminate losses. This includes analyzing processes and procedures towards increased office automation. Office TPM addresses twelve major losses.

8. PILLAR 8 - Safety, Health and Environment

Target

1. Zero accident,
2. Zero health damage
3. Zero fires.

In this area focus is on to create a safe workplace and a surrounding area that is not damaged by our process or procedures. This pillar will play an active role in each of the other pillars on a regular basis.

A committee is constituted for this pillar which comprises representative of officers as well as workers. The committee is headed by senior vice President (Technical). Utmost importance to Safety is given in the plant. Manager (Safety) is looking after functions related to safety. To create awareness among employees various competitions like safety slogans, Quiz, Drama, Posters, etc. related to safety can be organized at regular intervals

V. STEPS TO IMPLEMENTATION OF TPM

The systematic procedure to implementation of total productive Maintenance step by step according to its fundamental concepts all pillars, 5s of store keeping Health and Safety, Employee Involvement and Planed Maintenance

FIRST STAGE - PREPARATORY STAGE

STEP 1 - Announcement by Management to all about TPM introduction in the organization.

STEP 2 - Initial education and propaganda for TPM.

STEP 3 - Setting up TPM and departmental committees.

STEP 4 - Establishing the TPM working system and Target

STEP 5 - A master plan for institutionalizing

STAGE 2 - INTRODUCTION STAGE

This is a ceremony and we should invite all. Suppliers as they should know that we want quality supply can be our customers, sisters concerns etc. Some may learn from us and some can help us and customers will get the communication from us that we care for quality output.

STAGE 3 - IMPLEMENTATION

In this stage eight activities are carried which are called eight pillars in the development of TPM activity. Of these four activities are for establishing the system for

production efficiency, one for initial control system of new products and equipment, one for improving the efficiency of administration and are for control of safety, sanitation as working environment.

STAGE 4 - INSTITUTIONALISING STAGE

By all their activities one would have reached maturity

Stage. Now is the time for applying for PM award. Also think of challenging level to which you can take this movement.

VI. BENEFITS OF TOTAL PRODUCTIVE MAINTENANCE

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Productivity Improvement - Productivity is improved through fewer losses in the company.

Quality Improvement - Quality is improved as a result, that the failures and malfunctions is reduced.

Cost Reduction - The cost is reduced because the losses and other not value added work is reduced.

Employee Ownership - Ownership of equipment by operators through Autonomous Maintenance

Employee Confidence - "Zero failure", "zero defect" and "zero accident" conditions builds employee self-confidence.

Improved working environment - Clean working conditions provides a good working environment.

Increased Plant Reliability *Customer Satisfaction* - TPM leads to high delivery performance and customer satisfaction

VII. CONCLUSION

To day in the competitive world the industrial scenario is Rapidly change and the production system having a lot of force improve productivity and enriching the Quality, performance and profit the Total productive Maintenance is one of the tool to fulfill the conditions

And achieving the organization goals

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