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An Overview of Total Productive Maintenance

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Abstract – *It can be considered as the medical science of machines. Total Productive Maintenance (TPM) is a maintenance program which involves a newly defined concept for maintaining plants and equipment. This paper discusses about the canvass of application of TPM for various sector. The various sectors are namely product oriented organizations, Public sector. Offices, Also focus on various Pillars of TPM likewise KAIZEN, 5S concept, maintenance types.*

The goal of the TPM program is to markedly increase production keeping employee morale and job satisfaction.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.

Keywords- *TPM, Kaizen, 5s*

INTRODUCTION

TPM is a innovative Japanese concept. The origin of TPM can be traced back to 1951 when preventive maintenance was introduced in Japan. However the concept of preventive maintenance was taken from USA. Nippondenso was the first company to introduce plant wide preventive maintenance in 1960. Preventive maintenance is the concept wherein, operators produced goods using machines and the maintenance group was dedicated with work of maintaining those machines, however with the automation of Nippondenso, maintenance became a problem as more maintenance personnel were required. So the management decided that the routine maintenance of equipment would be carried out by the operators. (This is Autonomous maintenance, one of the features of TPM). Maintenance group took up only essential motives of TPM

1. Adoption of life cycle approach for improving the overall performance of production equipment.
2. Improving productivity by highly motivated workers which is achieved by job enlargement.
3. The use of voluntary small group activities for identifying the cause of failure, possible plant and equipment modifications.

Uniqueness of TPM

The major difference between TPM and other concepts is that the operators are also made to involve in the maintenance process. The concept of "I (Production operators) Operate, You (Maintenance department) fix" is not followed.

TPM Objectives

1. Achieve Zero Defects, Zero Breakdown and Zero accidents in all functions.
2 More Involvement of people in all levels of Organization.
3. Form different teams to reduce defects and Self Maintenance.

Direct benefits of TPM

1. Increase productivity and OPE (Overall Plant Efficiency) by 1.5 or 2 times.
2. Rectify customer complaints.
3. Reduce the manufacturing cost by 30%.
4. Satisfy the customer's needs by 100 % (Delivering the right quantity at the right time, in the required quality.)
5. Reduce accidents.
6. Follow pollution control measures.

II STEPS IN INTRODUCTION OF TPM IN AN ORGANIZATION

Step A - Preparatory Stage:

STEP 1 - Announcement by Management to all about TPM introduction in the organization: Proper understanding, commitment and active involvement of

the top management in needed for this step. Senior management should have awareness programs, after which announce mentis made to all. Publish it in the house magazine and put it in the notice board. Send a letter to all concerned individuals if required.

Step 2-Initial education and propaganda for TPM: Training is to be done based on the need. Some need intensive training and some just an awareness. Take people who matters to places where TPM already successfully implemented.

Step 3-Setting up TPM and departmental committees: TPM includes improvement, autonomous maintenance, quality maintenance etc., as part of it. When committees are set up it should take care of all those needs.

Step 4- Establishing the TPM working system and target: Now each area is benchmarked and fix up a target for achievement.

Step 5 - A master plan for institutionalizing: Next step is implementation leading to institutionalizing .

Step B - Introduction Stage

This is a ceremony and we should invite all. Suppliers as they should know that we want quality supply from them. Related companies and affiliated companies who 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 C - 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.

D - Institutionalizing Stage

By all these activities one would has reached maturity stage. Now is the time for applying for PM award. Also think of challenging level to which you can take this movement

III - PILLARS OF TPM

PILLAR 1 – 5'S:

SEIRI - Sort out:

This means sorting and organizing the items as critical, important, frequently used items, useless, or items that are not need as of now. Unwanted items can be salvaged. Critical items should breakup for use nearby and items that are not be used in near future, should be stored in some place. For this step, the worth of the item should be decided based on utility and not cost. As a result of this step, the search time is reduced.

Priority Frequency of Use How to use Low Less than once per year, Once per year< Throw away, Store away from the Workplace Average At least 2/6 months, Once per month ,Once per week Store together but offline

High Once per Day Locate at the workplace

SEITON - Organize:

The concept here is that "Each item has a place, and only one place". The items should be placed back after usage at the same place. To identify items easily, name plates and colored tags as to be used. Vertical racks can be used for this purpose, and heavy items occupy the bottom position in the racks.

SEISO - Shine the workplace:

This involves cleaning the work place free of burrs, grease, oil, waste, scrap etc. No loosely hanging wires or oil leakage from machines.

SEIKETSU - Standardization:

Employees have to discuss together and decide on standards for keeping the work place /Machines / pathways neat and clean. These standards are implemented for whole organization.

SHITSUKE - Self discipline:

Considering 5S as a way of life and bring about self-discipline among the employees of the organization. This includes wearing badges, following work procedures, punctuality, dedication to the organization etc.

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.

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.

Kaizen is opposite to big spectacular innovations. Kaizen requires no or little investment. 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 data the same time, increasing detailed and thorough procedure we eliminate losses in a systematic method using various

Kaizen tools. These activities are not limited to production areas and can be implemented in administrative areas as well.

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.

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).A QM activity is to set equipment conditions that preclude quality defects, based on the basic concept of maintaining perfect equipment to maintain perfect quality of products. The conditions are checked and measure in time series to verify that measure values are within standard values to prevent defects. The transition of measured values is watched to predict possibilities of defects occurring and to take counter measures before hand.

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 or what is 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.

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. They are

1. Processing loss
2. Cost loss including in areas such as procurement, accounts, marketing, sales leading to high inventories
3. Communication loss
4. Idle loss at the same time, increasing.
5. Set-up loss
6. Accuracy loss
7. Office equipment breakdown
8. Communication channel breakdown, telephone and fax lines
9. Time spent on retrieval of information
10. Non availability of correct on line stock an overview of total productive maintenance status
11. Customer complaints due to logistics
12. Expenses on emergency dispatches/purchases

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.

IV-CONCLUSION

Today, with competition in industry at an all time high, TPM may be the only thing that stands between success and total failure for some companies. It has been proven as a program that works. It can be adapted to work not only in industrial plants, but in construction, building maintenance, transportation, and in a variety of other situations. Employees must be educated and convinced that TPM is not just another "program of the month" and that management is totally committed to the program and the extended time frame necessary for full implementation. If everyone involved in a TPM program does his or her part then an unusually high rate of return compared to resources invested may be expected.

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