

## Total Productive Maintenance: A Contextual View for Quality Assurance and Control for Innovative Object of TPM

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### ABSTRACT:

The Research paper aims at to present TPM in quality reassurance. While Total Productive Maintenance TPM has been uphold for its plainness and its reimbursement to the maintenance delivery system, both the intellectual and practitioner literature has failed to identify the contextual issues that influence TPM adoption.

This paper presents a concise exploit for implementation of total productive maintenance (TPM). From a practical study, it is naked that challenging superiority in maintenance practices is still a far cry. Need of sympathetic of the technique and implementation rule emerge to be the major factors accountable for this state. Therefore, it is strappingly felt that TPM justify more attention both in practices and research.

**Keywords:** *Tpm, Execution of Tpm,*

### I. INTRODUCTION:

**Total productive maintenance (TPM)** invent in Japan in 1971 as a method for enhanced machine accessibility through enhanced consumption of maintenance and production resources. Whereas in mainly production settings the operator is not viewed as a member of the preservation team, in TPM the machine operator is taught to perform many of the day-to-day errands of simple continuation and fault-finding. Teams are shaped that contain a technical expert (often an engineer or maintenance technician) as well as operators. In this setting the operators

are enabled to appreciate the machinery and recognize potential troubles, righting them before they can collision production and by so doing, reduce downtime and decrease costs of production.

TPM is a critical attachment to lean manufacturing. If machine uptime is not predictable and if process capability is not sustained, the process must keep extra stocks to buffer against this uncertainty and flow through the process will be episodic. Unreliable uptime is caused by breakdowns or badly performed maintenance. Correct maintenance will permit uptime to recover and speed manufacture through a given area allowing a machine to run at its intended capacity of production.

One way to think of TPM is "deterioration prevention": deterioration is what happens naturally to anything that is not "taken care of". For this reason many people refer to TPM as "total productive manufacturing" or "total process management". TPM is a **proactive** approach that essentially aims to identify issues as soon as possible and plan to prevent any issues before occurrence. One motto is "zero error, zero work-related accident, and zero loss" TPM is a management process developed for improving productivity by making processes more dependable and less wasteful. TPM is an addition of TQM (Total Quality Management). The objective of TPM

is to preserve the plant or equipment in good condition without intrusive with the daily process. To realize this objective, preventive and predictive maintenance is required.

**Innovative object of total productive management:**

*“Continuously improve all operational conditions, within a production system; by stimulating the daily awareness of all employees” (by Seiichi Nakajima, Japan, JIPM)*

TPM focuses mainly on industrialized (although its benefits are appropriate to nearly any "process") and is the first method *Toyota* used to improve its global position (1950s). After TPM, the center was prolonged, and also suppliers and customers were concerned (Supply Chain), this next slant was called lean manufacturing. This sheet gives an overview of TPM in its unique form.

A precise and practical execution of TPM, will augment output within the total organization, where:

- (1) An obvious business culture is intended to incessantly progress the competence of the total production system.
- (2) A consistent and methodical advance is used, where all wounded are banned and/or known.
- (3) All departments, power efficiency, will be concerned to move from a unthinking- to a predictive mind set.
- (4) A clear multidisciplinary association in reaching zero losses.
- (5) Steps are taken as a journey, not as a quick menu.

Lastly TPM will offer sensible and translucent element to reach operational excellence.

In order to correctly appreciate the history and impact of total productive maintenance, it is essential to set up a definition. Total Productive

Maintenance (TPM) is maintenance behavior that is creative and implement by all employees. TPM engage everyone in the organization from operator to senior management in tackle development. It encompasses all departments including:

Preservation, Operations, Facilities, Design Engineering, Project Engineering Construction Engineering, Inventory and Stores, Purchasing, Accounting and Finance Plant and Site Management Goals of TPM

TPM has the following five goals (some texts call these pillars):

1. Civilizing equipment efficiency
2. Improving maintenance efficiency and value
3. Premature equipment management and maintenance prevention
4. Training to improve the skills of all people involved
5. Involving operators (occupants) in routine maintenance

**Improving Equipment Efficiency:**

This aim, which insures that the utensils perform to intend stipulation, is the true edge of TPM. All remaining goals for TPM are worthless unless they sustain improving utensils value. The focus must be that nowhere in the world can another company have the same asset and make it construct more than your company can create. If it does, then it is better at organization its resources than your company and will always be the lower cost creator or provider.

The tackle must operate at its design speed, create at the design rate, and produce a quality product at these speeds and rates. A major problem occurs because many companies do not know the design speed or rate of production for their equipment. In the Absence of knowing the design criteria, management will set arbitrary production quotas. A second major problem develops over time when small problems cause operators to

change the rate at which they run equipment. As these problems continue to build, the

Equipment output may only be half of that for which it was designed. This inefficiency then leads to the investment of additional capital in equipment, trying to meet the required production output.

#### **Precede conservation capability and effectiveness:**

This goal attention on cover that conservation performance that are agreed out on the tackle are carry out in a way that is cost successful. Studies have shown that nearly one-third of all maintenance actions are wasted. Therefore, this goal of TPM is significant to lowering the cost of preservation. It is significant for all to appreciate that basic preservation planning and development are vital to realize low-cost maintenance. The goal is to cover bend maintenance, with no waste in the maintenance process.

A secondary goal is to make sure that the maintenance actions are conceded out in such a way that they have negligible contact on the up time or unavailability of the equipment. Planning, scheduling, and backlog control are again all important if unnecessary continuation downtime is to be avoided. At this stage, maintenance and operations must have outstanding announcement in order to avoid downtime due to confusion.

Developing a precise database for each piece of equipment's continuation history is also the liability of the maintenance department. These olden times will allow the maintenance section to give correct data for decisions connected to the plant or Facility equipment. For example, the maintenance department can give input to equipment design and purchase decisions, assuring that tackle consistency is considered. This aspect

alone can give important financial savings to the company.

Consistency decrease list levels, training requirements, and start-up times. Correct equipment histories also help stores and purchasing not only reduce downtime, but also avoid carrying too much inventory.

#### **Timely utensils Management and Maintenance avoidance:**

The reason of this objective is to decrease the amount of maintenance obligatory by the equipment. The analogy that can be used here is the dissimilarity in the maintenance requirements for a car built in 1970 compared to a car built in 2000. The 1970 car was tuned up every 3040,000 miles. The 2000 car is guaranteed for the first 100,000 miles. This change was not brought about by accident. The design engineers carefully studied the maintenance and engineering data, allowing changes to be made in the automobile that reduce the amount of maintenance. The same can be true of equipment in a plant or Facility. Unfortunately, most companies do not keep the data necessary to make these changes, either internally or through the equipment vendor. As a result, unnecessary maintenance is performed on the equipment, raising the overall maintenance cost.

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#### **II. LITERATURE SURVEY:**

Above the previous few decades and even today, developed machines/equipment has been mainly

uphold after a reported breakdown – the customary form of repair. External preservation crews are hired to mend a machine that often face tight work schedules. They are busy to do the repair work after an incidence while the manufacture line had to put off. This is too expensive as it often cause release slippage and affects the product quality. The cost of developed is often on the rise under this environment. Certainly, it diminishes workers’ morale.[1]

At the present, the comparatively new attitude in this area is termed as Total Productive Maintenance (TPM). It rationally assumes that in many occasion or brainpower and problem-solving aptitude of the employees (human treasure/capability) are underutilized or unused. The situation in case of utensils might be similar. TPM is to tap into those opportunity or resources. TPM is thus always a positive approach as it aims to solve problems through the contribution of employees. Suitable execution of total productive maintenance (TPM) offers marvelous latent in improving, not only the equipment efficiency and value, but in areas of excellence, flexibility and employee-work friendliness as well. Bester field et al., (1999) wrote, “TPM is keeping the current plant and apparatus at its highest productive level through cooperation of all areas of an organization”. The TPM attitude is that each piece of apparatus is giving some signals before it comes to a halt.[1]

Now, if the tools user (worker) is accomplished sufficient to receive and interpret the signal(s), the accidental downtime of gear could be circumvent or kept to a minimum. For this the worker has to be well acquainted with his equipment/machine and should be endorsed to exercise some power to take the necessary actions. Another idea is that if the equipment is used in

a clean and tidy condition, what is really easy to maintain, a lot of maintenance works can be prevented.

The domain of TPM is viewed into three interrelated areas: preventive maintenance, predictive maintenance, and autonomous maintenance. Preventive maintenance is the process of periodically performing activities on the equipment to keep it on running. Predictive maintenance is the action of using data to determine potential failure time of a piece of equipment. The main features of TPM are “total” employee participation, in quest of continuous improvement and good equipment conditions. TPM actions are proactive in nature. Therefore, a TPM organization cannot be a traditional one with application of just in case (JIC) traditional action. TPM implementation brings new ways of thinking, idea generation, communication, and work environment. It requires horizontal type of organizational structure armed with a few authority levels instead of conventional vertical type having too many authorities.

### **III. EXECUTION OF TPM**

In a non-TPM organization, a group of changes are request in order to have a full-blown TPM system. So, it cannot be conquer overnight. Depending on the size of the association in terms of number of equipment, complexity of equipment handling, and accessibility of skilled manpower, it takes 1-3 years to create a “total” TPM association. However, a calculated plan is required for its proper completion. The major elements of its execution in order are the sympathetic and expansion of awareness about TPM, recognition and classification of problems, expansion of human resources and formation of small groups, collection of data on losses and flow of information, identification of engineering methods for their minimization, execution of

those methods and evaluation by statistical analysis and construal, documentation, and measures for further improvement[4]. The major

functions involved in development of a TPM system are listed in Table 2.

Table 2: Major function involved in TPM development

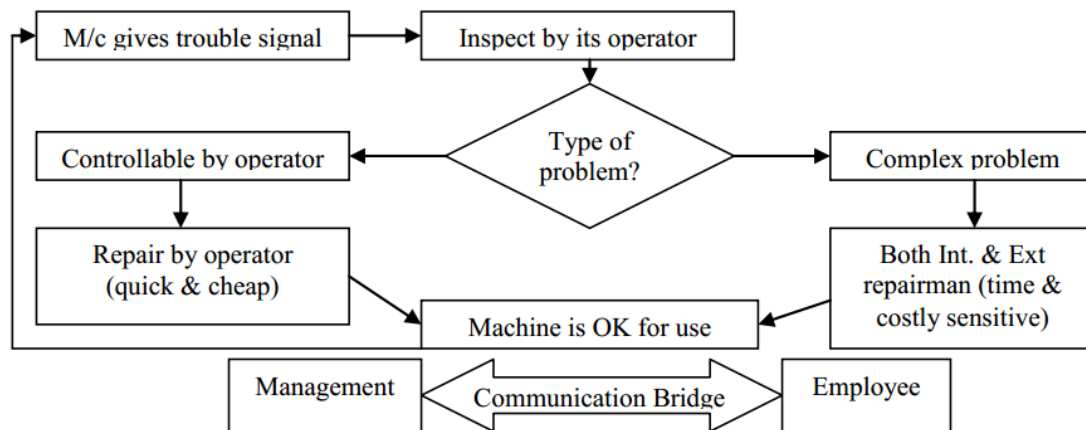
Type	Phase 1	Phase 2	Phase 3	Phase 4
Preventive maintenance	Reduce variability of life span – restore neglected equipment  Eliminate inferior equipment – adhere to condition of use	Lengthen life span - Correct design weakness  Eliminate unexpected breakdowns – external repair and maintenance of equipment	Make occasional repair – project life span and plan periodic renovation  Identify symptoms of deterioration	Predict life span – use equipment diagnostic techniques  Do technical analysis of major breakdowns
Autonomous maintenance	a. Basic cleaning, b. address sources of problems, c. set cleaning & lubrication standards	d. general inspection of equipment	e. autonomous inspection	f. organization & orderliness, g. autonomous activities
Education & training	Basic training on cleanliness, use of nuts & bolts etc.	Training in handling keys & bearings, power transmission system, hydraulics pneumatics & sealing	Training in operations and maintenance methods: loss calculations	Training in analysis and evaluations
Startup	Startup maintaining	Functional analysis; cost	Maintenance prevention	Evaluate economic
maintenance & economic evaluation	records	reduction analysis; design standards	analysis: standardization of practices	efficiency

Preservation plans for different terms (short, medium and long) can cover these phases. Large-scale revamp, overhaul of specific machine, and re-engineering type of Maintenance actions could be put under long-term planning. In case of short-term plan, starting from daily continuation work, it could be annual plan in question. Based on an annual plan, month-wise and weekly preservation plans could be ready in advance. For example, maintaining tackle reliability over its forecast lifetime from installation to scraping may be bringing under the annual plan. However, avoidance of breakdowns and development of functionality could be placed within the monthly plan. Different activities can be collection in order to ease work project to a personality or a team. Activities, like sanitation and discipline should be followed every day[5].

#### **The method of management: conventional vs. present need:**

TPM system cannot work inside a framework of traditional technical style of management. Conventional “I operate and you fix” preservation strategy encourage external repair squad to bring back the machine in operative condition after its breakdown. The Communication channel is one directional from the management to employees. Delegation of authority through small groups that would commensurate with the desired responsibilities is an important bearing for a TPM type management. The conventional can be replaced by “I operate and I repair” style which is exhibited (Figures 2). A typical division of responsibilities of different tires of management is also shown in a pyramidal diagram.[5]





**Figure 2: “I operate and I fix” confidence strategy and both way communications**

#### 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 to be 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, an unusually high rate of return compared to resources invested may be expected.

#### REFERENCES:

[1] Kathleen E. McKone, Roger G. Schroeder, Kristy O. “CuaTotal productive maintenance: a contextual view” *Journal of Operations Management* 17 1999 123–144

[2] Ahmed, S. and Masjuki, H.H. (2001), “State of implementation of TPM in SMIs: an empirical study”(unpublished),

Prepared for (international) Journal of Quality in Maintenance Engineering.

[3] Besterfield, D.H., Besterfield-Michna, C., Besterfield, G.H. and Besterfield-Sacre, M. (1999), *Total Quality Management*, 2nded., Prentice Hall International, Inc

[4] Dunn, R. (1987), “Advanced maintenance technologies”, *Plant Engineering*, Vol. 40, pp.80-82.

[5] Jonsson, P. (1997), “The status of maintenance management in Swedish manufacturing firms”, *Journal of Quality in Maintenance Engineering*, Vol. 3, No. 4, pp. 233-258.