

Total Productive Maintenance

Total Productive Maintenance (**TPM**) is a new way of looking at maintenance, or conversely, a reversion to old ways but on a mass scale. In TPM the machine operator performs much, and sometimes all, of the routine maintenance tasks themselves. This auto maintenance ensures appropriate and effective efforts are expended since the machine is wholly the domain of one person or team. TPM is a critical adjunct 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 interrupted.. One way to think of TPM is "deterioration prevention" and "maintenance reduction", not fixing machines. 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 prevent any kind of slack before occurrence. Its motto is "zero error, zero work-related accident, and zero loss."

TPM is a Japanese idea that can be traced back to 1951 when preventive maintenance was introduced into Japan from the USA. Nippondenso, part of Toyota, was the first company in Japan to introduce plant wide preventive maintenance in 1960. In preventive maintenance operators produced goods using machines and the maintenance group was dedicated to the work of maintaining those machines. However with the high level of automation of Nippondenso maintenance became a problem as so many more maintenance personnel were now required. So the management decided that the routine maintenance of equipment would now be carried out by the operators themselves. (This is Autonomous maintenance, one of the features of TPM). The maintenance group then focused only on 'maintenance' works for upgrades.

The maintenance group performed equipment modification that would improve its reliability. These modifications were then made or incorporated into new equipment. The work of the maintenance group is then to make changes that lead to maintenance prevention. Thus preventive maintenance along with Maintenance prevention and Maintainability Improvement were grouped as Productive maintenance. The aim of productive maintenance was to maximize plant and equipment effectiveness to achieve the optimum life cycle cost of production equipment.

Nippondenso already had quality circles which involved the employees in changes. Therefore, now, all employees took part in implementing Productive maintenance. Based on these developments Nippondenso was awarded the distinguished plant prize for developing and implementing TPM, by the Japanese Institute of Plant Engineers (JIPE). This Nippondenso of the Toyota group became the first company to obtain the TPM certifications.

TPM has five goals:

1. Maximize equipment effectiveness.
2. Develop a system of productive maintenance for the life of the equipment,
3. Involve all departments that plan, design, use, or maintain equipment in implementing TPM.
4. Actively involve all employees.
5. Promote TPM through motivational management.

TPM identifies the 16 types of waste (Muda) and then works systematically to eliminate them by making improvements (Kaizen). TPM has 8 pillars of activity, each being set to achieve a “zero” target. These pillars are:

1. Focused improvement (Kobetsu-Kaizen): for eliminating waste.
2. Autonomous maintenance (Jishu-Hozen): in autonomous maintenance, the operator is the key player. It involves daily maintenance activities carried out by the operators themselves that prevent the deterioration of the equipment.
3. Planned maintenance: for achieving zero breakdowns
4. Education and training: for increasing productivity
5. Early equipment/product management: to reduce waste occurring during the implementation of a new machine or the production of a new product
6. Quality maintenance (Hinshitsu-Hozen): This is actually “maintenance for quality”. It includes the most effective quality tool of TPM: “poka-yoke”, which aims to achieve zero loss by taking necessary measures to prevent loss.
7. Safety, hygiene, and environment: for achieving zero work-related accidents and for protecting the environment.
8. Office TPM: for involvement of all parties to TPM since office processes can be improved in a similar manner as well.

TPM Success Measurement - A set of performance metrics which is considered to fit well in a Lean/TPM environment is Overall Equipment Effectiveness, or OEE.