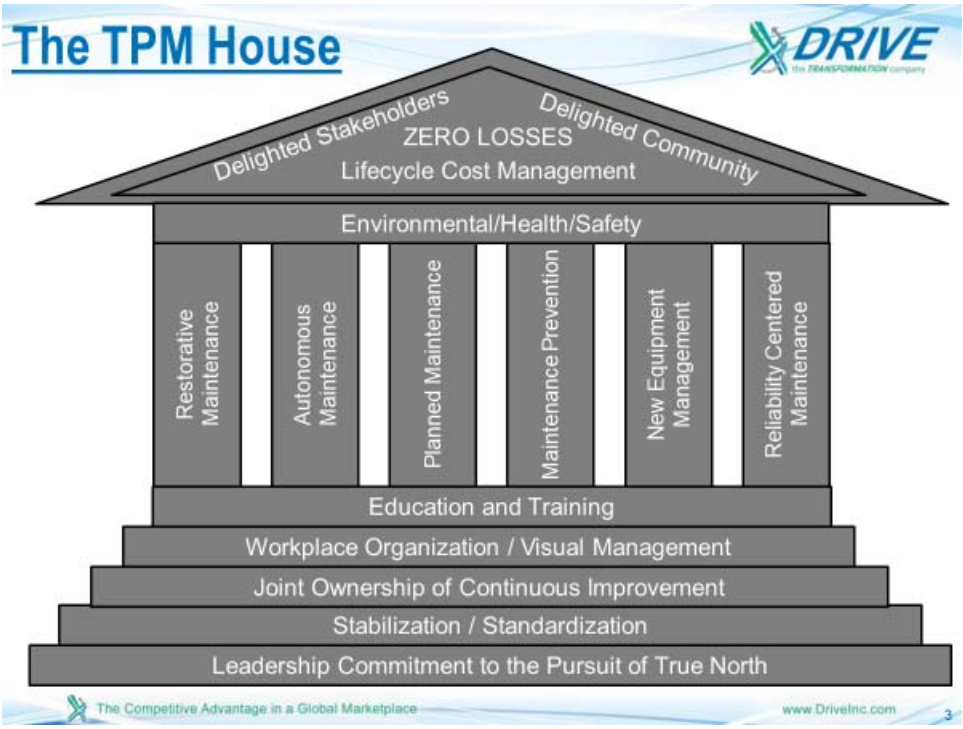
Equipment Performance Part 2
TPM Overview

In last month's issue, we defined Total Productive Maintenance (TPM), its impact on business metrics, and how to measure Overall Equipment Effectiveness (OEE). In this issue, we will outline the steps of TPM.

THE TPM HOUSE

TPM is typically described as a house. Globally, there are various versions of the TPM house. Here is our version:



FOUNDATION

Foundationally, we cannot create a culture of continuous improvement in our equipment, where everyone is focused on operating, maintaining, and improving our equipment performance, without leadership's commitment to pursue True North. True North is a concept of perfection where no further improvement can occur. True North, the ideal state for equipment, would be zero losses or 100% OEE.

We also must drive toward stability (predictability, reliability) and standardization (reduced variability) of our equipment performance. In many cases, we must stabilize before improving. A major aspect of stability is ensuring there is a planned maintenance program versus simply "running to failure."

The next foundational step is joint ownership of Continuous Improvement. It is always interesting to ask the following questions in any organization:

Who is responsible for safety? (everyone, I am, we are, etc.)

Who is responsible for quality? (everyone, I am, we are, etc.)

Who is responsible for uptime? (crickets…maintenance? I don't know, etc.)

Thus, there is a need for production, maintenance, and engineering to collaborate on improving equipment performance.

Equipment performance must be visual. We need to be able to know whether we are winning or losing "at a glance." We need to be able to identify deviations from the standard, such as a leak, immediately. Thus, workplace organization and visual management are also foundational.

As part of being a learning organization, we must use every non-optimal condition as an opportunity to learn and improve. So, we must coach reflection and we must constantly update our knowledge via one-point-lessons and updates to the machine Failure Modes and Effects Analysis (mFMEA).

PILLARS

Once we establish the proper foundation, we can focus on the pillars used to improve our equipment performance. While a great amount of detail exists in each of these pillars, a simple overview is provided below.

We always start with restorative maintenance to ensure that our equipment is restored to like-new condition as much as possible. Oftentimes, organizations believe that their equipment is passable and that this first pillar can be skipped. However, this is a fallacy. We always learn surprising information during this first step. This is also where we allow the production, maintenance, and engineering teams to collaborate on improving equipment performance, sometimes for the very first time. So, we inspect the equipment thoroughly (inside and out) while also cleaning it. We find that most of the inspection findings come during this deep cleaning process. Remember, "Cleaning is Inspection." We're identifying all non-optimal conditions and implementing countermeasures on the spot. Typically, this comes in the form of "eliminating sources of contamination."

The crux of Autonomous Maintenance is transferring about 20-25% of the "maintenance tasks" from the maintenance department to those that operate the equipment daily. This is typically the cleaning, inspecting, lubricating, and adjusting/tightening tasks. Usually, there is a great deal of process standardization that is done here to ensure that the operators can conduct these tasks with excellence. The time freed up within the maintenance department allows for steps we typically never had time for, such as overhauls, redesigns, maintenance prevention (fourth pillar), predictive maintenance (third pillar), and training.

Planned Maintenance is something that almost all organizations have to some extent. If not, then we are in a reactive mode and "running to failure." We assume that planned maintenance is part of the foundational step of stability and standardization. So, in this pillar, we ensure world-class planned maintenance. Here, we confirm that our maintenance steps are actually improving our equipment

performance, and we use condition-based monitoring to provide the proper intervals/frequencies of tasks. We utilize predictive tools such as oil analysis, thermography, vibration analysis, ultrasound, and data analysis. Every downtime event is an opportunity to improve our planned maintenance. Therefore, we have a reflect questionnaire that we utilize for all major downtime events.

Click here for a copy of our downtime reflection sheet

Maintenance Prevention is not Preventive Maintenance! Maintenance Prevention reduces the effort required to secure optimal equipment performance. Part of this is improving accessibility, as well as all aspects of equipment redesign. Examples are items like auto-lubrication devices and sealed bearings.

New Equipment Management is about incorporating the foundation and the pillars to all of our new equipment: entering the asset into our Computerized Maintenance Management Software (CMMS), creating a PM schedule, ensuring autonomous maintenance and maintaining the equipment so well that restorative maintenance is never necessary. This starts with initial equipment specifications and having production and maintenance personnel be a part of the design and try-out of the equipment. Lessons learned from similar processes and equipment are incorporated into the new equipment design as well.

Reliability Centered Maintenance, or RCM, is the pillar focused on constantly reducing the risk of losses (downtime). Typically, one will utilize a machine Failure Mode and Effects Analysis (mFMEA) to prioritize risk reduction efforts, ultimately reducing the severity and occurrence of failures while improving the detection and prevention of failure modes. We typically measure and improve the Mean Time Between Failures (MTBF) in this pillar. This has been utilized in the aviation industry, where the severity of a downtime issue can be quite extreme.

When the foundation and pillar work is a major activity driver in an organization, one can lower overall maintenance costs, delay capital expenditures, and absorb business growth quickly. In any capital-intensive organization, equipment performance should be the key focus for sustainable competitive advantage. Stay tuned for next month's issue where we will address another opportunity to maximize equipment performance, called SMED.

Do you have sub-optimal equipment performance? Do you struggle with engaging all people in operating, maintaining, and improving equipment performance? Are you hiding your equipment performance issues with excess capacity and excess inventory? Many of our consultants have decades of experience in equipment performance improvements including TPM and RCM implementation. For a no-obligation introduction meeting, please contact Paul Eakle at paul.eakle@driveinc.com or 865-323-3491.