Maintenance Prevention

By Drive, Inc.

TOTAL PRODUCTIVE MAINTENANCE

Typically, Total Productive Maintenance (TPM) is depicted as a house with pillars. The number of pillars and the classification on each pillar can differ widely. At Drive, we see TPM as shown in figure one below.

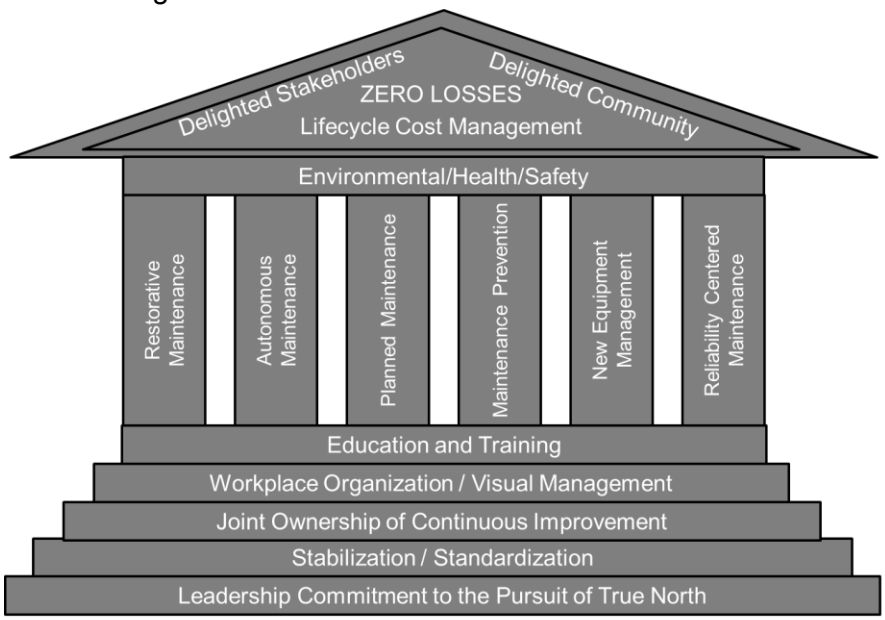

Figure 1: Drive's TPM House

What we typically see with most companies that claim to do TPM is that they are actually working in the first three pillars and partially in the Reliability Centered Maintenance (RCM) pillar with Predictive Maintenance (PdM). An essential element that is typically missing is the Maintenance Prevention (MP) pillar.

MAINTENANCE PREVENTION

So, what is MP and why is it important? While MP is very complex and has many definitions, we will focus on the following definition:
Maintenance prevention is the use of improved technology to reduce or eliminate all forms of maintenance activity by ensuring that the design of the equipment enables standard maintenance practices to be performed faster, cheaper, and more effectively.

To accomplish maintenance prevention, we have determined that the following features must be present:

- Maintenance reduction and elimination must be built into the design.

- The cost of maintenance practices must be reduced because of the design features of the equipment.
- The design must ensure that equipment failure or product defect production is automatically shown to exist within the cycle time of a single part. This is the deployment of Jidoka and mistake proofing.
- The design must enhance the equipment life cycle and lower the life cycle cost.

For example, the average Time Between Overhaul (TBO) on a propeller aircraft engine is 1,800 hours. The average TBO on a jet aircraft engine is >25,000 hours. Also, the difference in lifetime planned maintenance between the two engines is over 20,000 hours! One can easily see the changes in the automotive industry by looking at how much consumer maintenance is required for today's vehicles compared to vehicles of the past. This same MP focus can and should be applied to the products that manufacturers build as well as the equipment that build the products.
So, how do we replicate these results in our businesses? We utilize improvement tools to focus on these three elements of MP:

- MP Design must improve accessibility and ease to perform maintenance activity.
- Design must reduce maintenance activity.
- Design must eliminate maintenance activity by utilizing new technologies.

TOOLS

While the intent of this article is not to provide an in-depth review of the tools/methods, we will list many of them below:

- Data sources and metrics that provide data on equipment reliability and performance
- Failure Modes and Effects Analysis (FMEA) methods to assess all reliability risks and failures created by insufficiently deployed maintenance to correct/prevent in future
- Value Analysis/Value Engineering (VA/VE)
- Quality Function Deployment (QFD) to utilize the voice of the customer in MP improvement prioritization
- Jidoka/autonomation methods to build-in mistake proofing devices as well as prevention and failure signaling devices to alert operators of potential failure
- Life Cycle Costing as a method to predict total life cycle costs
- Design Standardization methods

We realize that a newsletter isn't the best place to teach this highly complex topic, which is why we are partnering with the Association of Manufacturing Excellence (AME) to offer a two-day introductory workshop to be held in Oklahoma City, Oklahoma, on April 5, 2017, and April 6, 2017. If you are interested in attending please click here.

Also, DRIVE is pleased to announce that we are hosting Japan study tours to AVEX, Toyota, and other manufacturers in Japan. The next trip is the week of May 7, 2017, with an October 2017 trip following. If you are interested in this facilitated learning event click here, or for more information. You can also contact Paul Eakle at 865-323-3491 or via e-mail at Paul.Eakle@DriveInc.com.