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Robert M. Williamson, Strategic Work Systems, Inc. Total Productive Maintenance (TPM) can be defined in many ways to suit the unique needs of a company or industry. But most of the universally accepted definitions of TPM build on the basic five pillars of TPM from the Japan Institute for Plant Maintenance. For TPM to be successful ALL of the pillars, or key elements, must be used to eliminate equipment losses in a sustainable manner.

TPM Key Element 1: Improving equipment effectiveness by targeting the major losses. TPM activities should focus on results. One of the fundamental measures used in TPM is Overall Equipment Effectiveness (OEE) which includes the major losses that TPM seeks to eliminate. OEE = Equipment Availability x Performance Efficiency x Rate of Quality.

TPM Key Element 2: Involving operators in daily maintenance of their equipment. Operator involvement must be defined in ways that make sense in your work culture. There are tasks that operators can do without using any tools: Clean and inspect equipment. In every company that I have studied or visited or worked for, the thing that they get the most return on investment in the early stages of TPM is operators learning how to inspect their equipment and pay attention to key things. It doesn't take any tools or special skills; you just have to know what to look for. Maintenance people can teach the operators what to look and listen for.

TPM Key Element 3: Improving maintenance efficiency and effectiveness. This means improving all aspects of maintenance including spare parts, computerized maintenance management system, preventive maintenance, predictive maintenance, maintenance tools, work order system, planned and scheduled maintenance, and equipment histories. These are all part of TPM. They can't be separate or on the side. They must

be woven in. For example, production, maintenance, purchasing, and shipping and receiving should use a computerized maintenance management system. It's not just a maintenance management system anymore; it's an equipment information management system.

TPM Key Element 4: Training to improve the skills of everyone involved. This means maintenance training, operations training, leadership training, training about root cause analysis of the major losses, reliability training, etc. The training should first address the very basic needs of the people and the equipment targeted for TPM. One of the most important basic training needs for TPM is designed to help the people involved understand what TPM is and why it is so important for the equipment and the business.

TPM Key Element 5: Life-cycle equipment management and maintenance prevention design. If you're going to design and develop new equipment or a major modification, involve those who are going to operate it and maintain it for the next 5, 10, or 15 years in the process. Use their ideas to make it easier to operate and easier to maintain.

Based on the past ten years' experience with TPM in America, a sixth key element is needed to truly recognize what is making TPM work. It is:

TPM Key Element 6: Wining with teamwork focused on common goals. Even with all of the emphasis on high-performing equipment the best equipment cannot consistently perform well without teamwork focused on common goals using common processes. In some facilities "Team" is a four-letter word that is often misunderstood. In TPM the sense of teamwork centers around the targeted equipment, then expands through all areas using TPM to improve their performance.

One of the biggest misunderstandings about the pillars of TPM deal with the first pillar–Improving Equipment Effectiveness by Targeting the Major Losses—and its relationship to the other pillars. All TPM activities, including the remaining pillars, are designed and developed to be measured by the first pillar. If a TPM activity does not result in, or contribute to, improved equipment effectiveness then we need to ask "Why are we doing it?"

TPM is a powerful but often misunderstood strategy for eliminating equipment-related losses. In Lean Manufacturing this translates into eliminating equipment-related

"wastes." Go for sustainable bottom line results with TPM and change the culture along the way by using all of the pillars of TPM the way they are intended to be used. **MT**

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