

What's the 'M' in TPM?

Part 2

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As we discussed in Part 1, “Total” and “Productive” are the methods by which your organization implements the solutions designed to resolve issues associated with Machines, Manpower, Materials, and Money. In Part 2, we will explore the focus of improving each of the “M’s” within TPM. But first, let’s remind ourselves where TPM falls within the maturity continuum of the world class production system.

TPM and the World Class Production System

For many companies, TPM is a sole improvement strategy to increase productivity while reducing the overall cost of manufacturing, however, this way of thinking is a catalyst for failure. TPM, although a very dynamic improvement strategy, is neither the beginning nor the end of the continuous improvement continuum. To be successful in your endeavors to implement TPM, focusing on 1) engaging senior leadership to own productivity (the process, not just the results), 2) efforts to improve Overall Equipment Effectiveness (OEE), 3) empowering operators to perform autonomous maintenance, and 4) creating a culture of continuous improvement, your organization must first be in a maintainable state. An organization that is truly reactive in its maintenance practices is unable to manage the improvements identified through TPM. With that said, Proactive Maintenance is the foundation for TPM. Building on the platform of maintenance process stability, TPM is implemented in order to create standards of practice geared towards stabilizing the manufacturing process. Once your organization and its manufacturing process are stabilized through Proactive Maintenance and TPM, Lean Manufacturing methodologies should be implemented to eliminate waste and inefficiencies caused by excessive Work-In-Progress (WIP), human error or inconsistency of operating practices, and less than optimum manufacturing schedules.

What's the 'M' in TPM

Regardless if the focus is holistically centered upon improving the manufacturing business, or if the scope is reliability-centric, focused only on driving out repetitive failures, Machines, Manpower, Materials, and Money are always the fundamental issues.

Machines

Focusing on improving “machines” is probably the most common strategic goal of TPM implementations. The obvious intent is to eliminate failures, breakdowns, which impacts single-pass production capacity and drives higher manufacturing costs. The mistake that many

organizations make is having too much maintenance in their Total Productive “Machines” strategy. Remember, TPM is based on a total-plant focus. When designing solutions for greater machine reliability, your organization must consider the impact of each function, be that how the machine is designed, how maintenance and repair materials are procured and stored, or the practices in place to operate and maintain the machine throughout its life cycle. Be cautious not to slip into the reactive culture of simply trying to add more maintenance, or respond faster to breakdowns. Instead, focus proactively on failure elimination using techniques such as Failure Modes Effects Analysis (FMEA) to determine the types of failures common to like machines, the severity of impact when a failure occurs, the frequency of failure, and the controls required to mitigate the risk of failure. One form of control is found in preventive and predictive maintenance, where by routine inspections, cleanings, or tests are performed to 1) identify the potential for failure, and 2) determine the integrity of the machine. Additionally, developing a culture of root-cause will provide a total focus on improving machine reliability. Establishing formalized Root-Cause Analysis (RCA) business processes to record, trend, investigate, and correct failures at the source of defect (cause) is a good starting point.

Manpower

This is not to say that TPM is designed to reduce headcount, to the contrary, it means that your organization is focusing on creating additional value through greater effective utilization of manpower. Within the Toyota Production System (TPS), value-added work is defined as any task which is performed in order to progress the “product” to final assembly. In saying that, we must also reflect on the concept of efficiency, which can be defined as reducing the cost of production per unit in one of two ways, 1) increasing production capacity, or 2) reducing the cost of manufacturing. Therefore, systematic improvements in manpower should be focused on ensuring that “work” continually adds value by manufacturing more product or manufacturing the same amount of product at lower costs. Again, this is not a head-counting exercise. If you add full-time-equivalents (FTE) to make more product, then you add cost, and if you reduce FTE’s and offset manpower with automation to maintain existing capacity you will certainly incur additional cost in technology. In TPM, the “manpower” focus is accomplished through standardization of work, elimination of non-value adding tasks, and through continued training to improve labor skills to minimize defects caused by human error. This same approach applies to maintenance manpower. If maintenance costs are the focus of your TPM effort, then focused improvements in maintenance business processes geared towards determining the right work to perform at the right time, and improving labor utilization, through Planning and Scheduling, is the key. For example, if your existing workforce is managed at less than 30% direct-labor utilization (i.e. “wrench time”), which is found in most “reactive” organizations, then they are adding value to your business only 3.5 hours out of 10. Focusing on detailed maintenance planning, and coordinating maintenance and production schedules will allow your organization to increase labor utilization to 65%, consistent with world-class best practices, in affect doubling the value maintenance manpower adds to your organization. The easiest way to control costs is to formalize the approval and prioritization process for requested work. Identifying the right work to do, and allowing an adequate amount of time to prepare for that work, significantly contributes to reducing the total cost of repair.

Materials

One of the biggest contributors to increased manufacturing costs is poor material control. Whether it's the result of having insufficient raw material specification and quality, excess production work-in-progress (WIP), or the result of excess, obsolete, and/or non-fit for service maintenance and repair materials, "materials" should be considered as part of your TPM effort. Often times it simply the methods by which materials are managed. Having assessed more than twenty manufacturing facilities in North America and Australia, I have witnessed the affects of poor materials management, ranging from millions of dollars of raw material which, having been stored improperly, was no longer adequate for manufacturing, to forty-year-old obsolete MRO (maintenance, repair, operating) supplies, having a book value of more than \$10MM, creating additional, and recurring carrying costs to the tune of \$2.4MM in a single location. Again, included in your TPM should be a focus on developing business processes to manage and control inventories, from the point of procurement to point of use. Investigate the performance of your vendors and the affect they have on your organizations ability to ensure reliable and consistent performance, either in manufacturing or in maintenance. Quantify excess and obsolete inventories, looking for the "hidden" or "reserve" stores, and consolidate materials where possible to reduce carrying costs, capital expenditures, and the purchase of redundant spares.

Money

As you have read thus far, it all comes down to money. So, within the spirit of Total Productive "Money", how conscience is your organization of minimizing manufacturing costs? Are Planners and Maintenance Supervisors permitted to purchase directly from MRO vendors using credit cards and without reconciliation to a work order? Are Production and Maintenance Supervisors encouraged to procure contract labor in order to satisfy production and maintenance work schedules? How often are material inventories counted, physically, to identify shrink (depleted stock without record) and reconcile inventory value? Does Procurement source materials based on lowest price, or lowest total cost of ownership?

"Money" can be found in everything we do throughout the process of manufacturing, however, most companies I visit focus narrowly on headcount, raw material and utilities, after all, these are our "controllable" costs. But more often then not, improvements in money can be driven by focusing on the processes by which your organization manages assets (machines). Much like defects, cost is compounded based on the decisions made from the point when the asset is designed, through the procurement and installation phase, and within your operating and maintenance practices. Part of the goal of your TPM effort should be to reduce the total cost of ownership, focusing holistically on Reliability, Availability, and Maintainability (RAM). Engaging your Reliability and Maintenance Engineering staff to closely analyze life cycle costs and challenging them to re-engineer the strategies that ensure higher levels of machine reliability, availability to production and ease of maintainability (i.e. better accessibility, fewer maintenance activities, reduced time to repair) will provide savings over the life of your plant.

So the next time you are asked to define TPM, try "Total Productive Machines", or "Total Productive Manpower" and I think you'll find that your peers will understand more clearly the intent of your efforts. Then, challenge your organization to remain focused on the concepts of "Total" and "Productive" while tackling the 'M' issues and you will greatly improve the success of your TPM implementation.

For more information on how to implement TPM in your organization, or to receive more information regarding the improvement methods described in this article, contact Darrin Wikoff at DWikoff@LCE.com or contact Life Cycle Engineering at www.LCE.com.