Quality Planning and Scheduling is the Foundation to Lean Maintenance

12/01/05

Kevin Lewton
Vice President
MET DEMAND, LLC

How does Maintenance planning and scheduling benefit initiatives, such as, Lean Manufacturing, Total Productive Maintenance (TPM) and Lean Maintenance?

This paper will review the development of these philosophies and the role of Maintenance planning and scheduling in achieving them.

Lean is a continuous improvement culture which involves the entire organization working to eliminate waste and increase value in the product. Most of the information written up about Lean is based on Toyota Production System (TPS). TPS (Lean) is built on two pillars: Just – in –time manufacturing and autonomation. Just –in – time manufacturing is producing only the product required to meet an actual demand. Autonomation is using machines with a human touch which are capable of preventing problems. These two pillars can not stand alone but are built on a foundation of an engaged work force using standard work, quality and maintenance practices.

One of the basics of Lean is to understand waste and value added activities.

Waste is anything beyond the absolute minimum amount of materials, labor and assets to provide a product or service. There are seven forms of waste.

> Overproduction waste- Overproducing is the mentality of making hay while the sun shines even though there is no demand for the product.
> Waiting Waste- This is people, assets, raw material being idle for one reason or another.
> Transportation Waste- This is extra movement of people, raw material and products.
> Over processing Waste- This is doing activities which are repetitive to the previous activities without changing the product.

Inventory Waste- Storing excess product consumes building space and leads to storing the wrong products which results in obsolescence and damage.
Motion Waste- Unnecessary motion at the work stations for people and/or equipment which results in lower productivity.
Defects Waste- If there is 2 % quality hold or rework, you have lost 2 % capacity.

A value added activity must meet all of the following criteria.

1. Must be important enough to the customer that they will pay to receive it.
2. Must alter the process output and change the product.
3. Must be done right the first time.

Many managers facing higher cost and global competition are looking for an answer. Many have spent thousands of dollars on training to implement Lean only to fall short of achieving the desired results. The reason they fall short is they have built their business structure before building a strong foundation.

In the book "Toyota Production System" we are told how to build a foundation for a Lean Culture. (Pages 101-102)

"For this reason, the Toyota production system stresses in all production processes the need for prevention. If we think to keep inventory in anticipation of machine problems, why not consider preventing trouble before it occurs.**"**

"As the Toyota production system gradually spread within and outside Toyota Motor Company, I asked everyone concerned to study how machine problems and process difficulties could be prevented. Thus, preventive, "medicine" or maintenance became an integral part of the Toyota production system.**"**

"In describing the complementary relationship between just-in – time and autonomation, Toyota's two supporting pillars, I emphasize their part in building a production line with a strong constitution. Toyota's strength does not come from its healing processes – it comes from preventive maintenance.**"**

In general, the Japanese industries were working with Total Quality Management and Preventive Maintenance from 1950's through the 1960's. These philosophies combined in late 1960's to be Total Productive Maintenance (TPM), which results in Zero Accidents, Zero

Unplanned Downtime and Zero Defects. This is the foundation Toyota used to build the Toyota production system.

Today, many senior managers desire the results that Toyota has accomplished but are struggling to understand how to achieve them. Toyota results did not occur over night but were achieved over time by adding value and eliminating waste. As Reliability professionals, our job is to educate senior management in the fundamentals of good preventive maintenance and failure elimination. The ultimate goal is to have everyone in the business being responsible for reliable asset capacity. This is TPM.

TPM has everyone focused on eliminating six types of capacity losses.

Breakdowns
Setups and Adjustments
Reduced Speed
Minor Stoppage
Defects and rework
Start up loss

With TPM, the operators have the ownership and responsibility for the machine performance and are supported by all the functions in eliminating these losses.

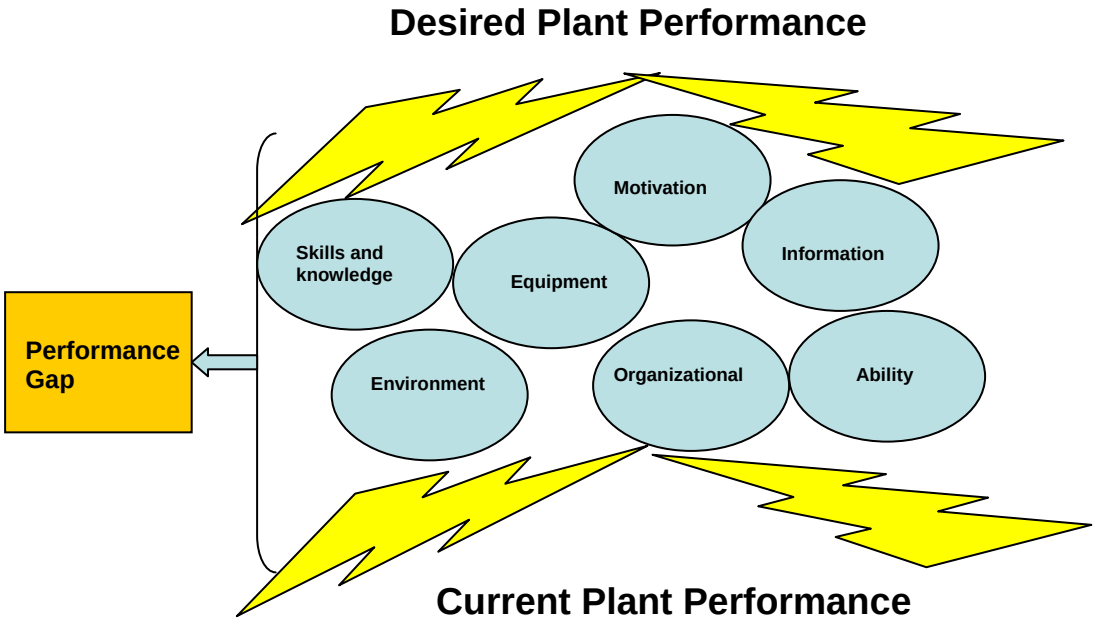
Lean Maintenance is the improvement activity for eliminating wasted effort in the Maintenance processes which lead to lost capacity. This is accomplished by identifying and benchmarking the current processes and developing an improvement plan.

This improvement plan is resourced by Maintenance, Reliability Engineering, Operation, and Storeroom. These partners work to coordinate all of their resources to ensure that a component failure is detected and repaired through planned work rather than unplanned work. Once the repair has been made, they work to prevent future failures. How do we ensure this planned work is performed effectively and efficiently? By Maintenance planning and scheduling.

Corrective and preventive maintenance activities are a key part of TPM. Maintenance planning and scheduling manages the work flow of these maintenance activities through standard and structured work processes.

Processes used by the Planner/ Scheduler are designed to prevent capacity losses caused by technician performance. They do this by managing planned work from work order approval to closure. They obtain approval, prepare a job plan defining material, labor and time requirement, follow up and get feedback to improve the plans and close the work order in the CMMS. Planner/ Schedulers will look for ways to eliminate anything which may cause the crew performing the work an issue.

There are seven specific human performance factors that result in adding value when done properly and cost when done improperly. They are skills and knowledge, equipment, environment, organizational, motivation, information and ability.



Let's see how the Planner / Scheduler role is used to minimize this performance gap for planned work.

- ***Motivation*-Assist the lead and supervisor to prepare work so expectations are clear and understood by all functions.**
- ***Information*-Ensure all drawings, manuals and information are available to successfully complete the job.**
- ***Environment*-Ensure proper lighting, ventilation, tools and PPE are identified in the job plan.**
- ***Equipment*- Ensure technicians have the proper tools and materials to complete the job as well as reviewing and improving MTBF.**

- ***Organizational*-Support and serve all functions through good communications and performance of the Planner/Schedule role.**
- ***Knowledge*- Provide strong craft knowledge and experience to determine safe and efficient job plans.**
- ***Ability*-Identify not just the crafts but the correct skill set required to complete each job safely and professionally.**

In a Lean business culture, everyone has a role to play in eliminating this performance gap which is described by TPM. TPM has everyone involved in preventing capacity losses through eliminating the root cause of issues. The root cause will be something contributing to one or more of the human performance factors. For planned maintenance activities, Maintenance Planner Schedulers are responsible for eliminating this performance gap by effective and efficient management of resources performing planned work.

References:

1.0 Taiichi Ohno, Toyota Production System, Productivity Press Inc., 1988.
2.0 Tokutaro Suzuki, TPM In Process Industries, Productivity Press Inc., 1994.
3.0 The Japan Institute of Plant Maintenance, TPM for Every Operator, Productivity Press, 1996.
4.0 The Japan Institute of Plant Maintenance, Focused Equipment Improvement for TPM Teams, Productivity Press, 1997
5.0 Don Nyman and Joel Levitt, Maintenance Planning, Scheduling and Coordination, Industrial Press Inc., 2001.