



Getting TPM & Lean to Work using the TPM³ Approach

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TPM³ is an Australasian version of TPM & Lean developed by CTPM recognising the critical role of finding and rectifying problems at the earliest possible time through the progressive engagement of the entire workforce.

The approach ultimately has all personnel involved about 5-10% of their normal work time in strategically driven on-going improvement activities through Cross-functional Teams and Area Based Teams resulting in significant improvements that are sustaining.

Some describe it as an Operations Excellence Improvement Strategy that also minimises operational risk by engaging and developing the skills of the frontline workforce (operators and maintainers) so that they can identify equipment, process and quality problems at the earliest possible time and ensure their prompt rectification. This results, not only in a more stable plant operation but most importantly maximises productivity and capacity, minimises costs and creates a safer workplace.

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History of TPM

TPM had its genesis in the Japanese car industry in the 1970s. It evolved at Nippondenso, a major supplier of the Toyota Car Company, as a necessary element of the newly developed Toyota Production System (later called Lean Production). It was not until 1989, with the publication in English of the first of two authoritative texts on the subject by Seiichi Nakajima, that the rest of the world recognised and started to understand the importance of TPM. It soon became obvious that TPM was a critical missing link in successfully achieving not only world class equipment performance to support Lean Manufacturing / Lean Production but was a powerful new means to improving overall company performance and minimising operational risk.

Originally known as Total Productive Maintenance, the words correctly interpreted mean Total (all personnel) Productive (creating greater return on investment) Maintenance (by caring for the plant and equipment so as to maximise its performance and output). To better reflect this correct interpretation the letters TPM now stand for a variety of words such as: Total Plant Management; Total Productive Manufacturing; Total Productive Mining; Total Process Management; or even Teamwork between Production and Maintenance.

Recognising our Challenges in the Workplace

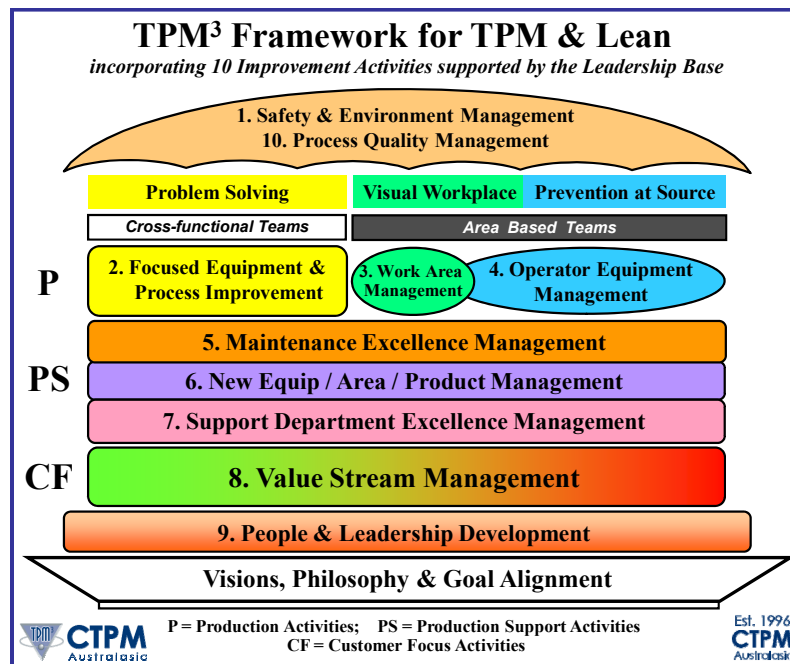
Implementing TPM & Lean needs an approach that is tailored to suit the specific situation, however in many cases we have found it often needs to:

- Break down barriers and build relationships between Production & Maintenance and Management & Shopfloor;
- Understand the entire equipment and process losses within the plant along with whether they relate to technical or people issues;
- Improve equipment performance to allow time for operator development through regular (eg weekly) education and training through Area Based Team based activities;
- Improve Communications between shifts to promote sharing of learnings;
- Establish agreed standards across all shifts to reduce variation in operation and sustain improvements;
- Establish stability of the production plan to enable regular allocated time for Improvement activities;
- Train the operators to identify at the earliest possible time safety, quality and equipment problems at the source;
- Change the equipment so it easy for operators to find the problems; and
- Create a maintenance support capability that can respond in a timely way to small problems and issues identified by the operators to encourage operators to continue to find problems.

Added to this we also need to understand any unique workplace cultural differences to Japan where TPM & Lean were developed. We have found for example in Australia there are 3 main workplace cultural differences when compared to Japan:

- We have a multi-cultural workforce;
- Our workforce is driven by ‘what’s in it for me’; and
- We are good at working around problems rather than addressing their root causes.

As such, to assist with the TPM & Lean journey in a non-Japanese workplace we have developed an Australasian version of TPM & Lean which we call TPM³. We have created a framework incorporating 10 integrated Improvement Activities supported by a Leadership Base of Visions, Philosophy & Goal Alignment so as to address all the above challenges and produce significant sustainable benefits for the workforce, shareholders, suppliers and customers.



The Basis of the TPM³ Approach

TPM³ is based on team improvement, recognising the need for both Cross-functional Teams and Area Based Teams.

The Cross-functional Teams focus on breakthroughs using effective Problem Solving and a range of ‘drivers’ to allow prioritising of opportunities. They also provide vertical development of your people.

Area Based Team improvement typically involves teams of 4-8 with a designated working Team Leader to systematically look at their workplace and identify and eliminate any imperfections or defects that can ultimately lead to poor performance and hence increased costs and frustrations. By providing everyone the opportunity and encouragement to not only ‘remove’ the imperfections or defects but to find out where they are coming from and implement changes to ‘avoid’ their reoccurrence, significant savings and performance improvement can be achieved along with a high degree of ownership to the solutions by the people who do the work. This approach of engagement is referred to as ‘pull’ culture change.

Key Benefits of the TPM³ Approach

- Provides ***rapid returns on investment*** through strategically driven cycles of Cross-functional and Area Based Team on-going improvement activity which lay the foundation for sustainability and operational risk minimisation;
- Recognises that if your equipment and processes aren't working well, frustrations run high and operational risk is significantly increased;
- Progressively engages all personnel so they can achieve and have ownership to the improvements and take better care of their workplace;
- Provides a significant positive impact on safety and morale;
- Provides a positive behaviour change of the whole workforce; and
- Takes the mystery out of integrating all the principles, tools and concepts from Lean, ***cutting through all the confusion***, and providing an approach that works.

Outline of the TPM³ Approach

To allow a strategically driven gradual roll-out of the improvement activities to different areas of the site, we have developed a 3 phase pathway as outlined below:

1. Awareness & Preparation Phase (2-4 weeks)

Create a critical mass of decision makers and key personnel with a common vision and agreement of the way forward.

2. Demonstration & Learning Phase (6-12 months)

Introduce the Production Activities to several (typically 2-4) pilot areas along with appropriate Production Support and People Development Activities to gain a greater understanding of the issues and have a positive impact on performance as you progress towards your Improvement Vision.

3. Cascading & Sustaining Phase (3-5 years)

Cascade TPM³ throughout the site so as to achieve your Improvement Vision, Operator Excellence Vision and Operations Vision.

1. Awareness & Preparation Phase (2-4 weeks)

This phase consists first of a two-day Getting TPM & Lean to Work workshop for decision-makers and key personnel at the site (typically 15-20).

Although TPM³ may seem a very bottom-up approach to improvement, for it to sustain it must be led by senior management. For this reason one of the critical starting points for the TPM³ improvement journey is the establishment of a Site Leadership Team which would normally include:

- Site Manager or Operations Manager;
- Production Manager(s);
- Maintenance / Engineering Manager;
- Technical / Quality Manager;

- Human Resources / Training Manager;
- Accountant; along with a designated
- TPM³ / Improvement Co-ordinator

It is essential that the Site Leadership Team have a good level of TPM³ (TPM & Lean) education in order to establish a common vision for improvement before developing their TPM³ Introduction Strategy or commencing any improvement activity. We therefore strongly recommend that all Site Leadership Team members attend a public or specially tailored in-house two-day **Getting TPM & Lean to Work (TPM³)** workshop.

The second component is the **TPM³ Introduction Strategy Planning** workshop (typically 5 hours run from 10.00am – 3.00pm) and is extremely important in order to finalise the objectives and ground rules for the Demonstration & Learning Phase.

A key part of this workshop is to reach consensus on the selection of the Pilot Areas such that sufficient Defined Production Areas are chosen to ensure an impact on the site performance.

To assist this process a High Level Flow Chart of the production process including all key equipment is created outlining where Overall Equipment Effectiveness (OEE) and / or Lead Time can be measured and where there are ideally at least 4 permanent personnel per shift (Defined Production Areas).

By identifying which Areas are causing the most pain / constraint (low OEE, long Lead Times, high energy usage, high safety problems, high cost etc), pilot areas can be chosen that will have a significant impact on site performance (basically it is using the 80:20 rule where 20% of the Defined Production Areas are probably causing 80% of the pain / constraint).

The next most neglected area that causes the most problems is not having some clear policies or guidelines established and not being able to communicate clearly to everyone why TPM³ (or you may wish to give it some other name) is being introduced along with why the pilot areas have been selected over other areas. The Site Leadership Team needs to attend and participate in the TPM³ Introduction Strategy Planning workshop.

The purpose of the workshop is to:

- Confirm Key Success Factors / Goal Aligned Performance Measures for the Site;
- Create Improvement Vision for the Site;
- Divide site into Defined Production Areas, Defined Maintenance Areas and Defined Support Areas;
- Select at least 2 Defined Productions Areas where there is the biggest opportunity to impact on site performance;
- Establish the Structure and Roles for Improvement (including TPM³ Co-ordinator);
- Establish the initial Policies or Guidelines for Improvement;
- Create a TPM³ Master Plan typically spanning 5 years to achieve the site's Improvement Vision;
- Select Team Members for Cycle 1;

- Create the Schedule for Cycle 1;
- Determine how best to establish the Baselines (site and pilot areas); and
- Plan initial briefings to all personnel at the site.

The final component of the Awareness & Preparation Phase is to conduct briefing sessions for all personnel to address the following questions:

- What is TPM & Lean (TPM³) and why are we introducing it?
- What will it mean for everyone? (by addressing the “what’s in it for me”)
- How is TPM³ going to be introduced?
- Who is responsible for the introduction of TPM³?
- When will everyone get involved?
- When can we expect to see the impact of TPM³?
- What are the initial key milestones for something to happen?

2. Demonstration & Learning Phase (6-12 months)

The first component is the one-day **TPM³ Awareness** workshop for anyone who did not attend the two-day Getting TPM & Lean to Work (TPM³) workshop and are involved in, or associated with, pilot area teams.

Our experience is that people who do not receive the Awareness training tend not to fully understand what is involved in progressing the TPM³ Journey and what the benefits for them personally will be, and hence may not fully support the improvement journey. This will be reflected in either their attendance (or lack of) at meetings or their ability to complete their allocated tasks. The Awareness training can be provided over 1 full day or 2 half-days however logistics implications may need to be considered.

The next component is kicking off your pilot area teams.

Cycle 1 (typically 12-14 weeks)

It is normally recommended that you start with a Cross-functional Macro Focused Equipment & Process Improvement (Macro FE&PI) Team in at least 2 Defined Production Areas in order to have an impact on the site performance and address a number of critical issues. The objectives of each team should be to:

- Establish a Baseline or “stake-in-the-ground” by documenting current performance and establishing an ongoing measurement system;
- Identify all equipment and process losses and wastes (including all unplanned interventions);
- Create a 3-year Vision of ‘Could-Be’ performance based on documented assumptions using the OEE Improvement Matrix template;
- Improve OEE by a significant amount (typically at least 20-25% depending on the current performance) while also improving or maintaining the Goal Aligned Performance Measures;

- Recommend further improvement initiatives involving Cross-functional Teams and Area Based Teams eg WAM / OEM so as to achieve the 3-year Vision identified; and
- Complete within 12 weeks after kick-off;

The intangible benefits from this approach include:

- Create a positive environment to allow people from different departments to gain a greater understanding of each others situation and build relationships;
- Create a positive environment to allow management and workforce to gain a greater understanding of each others situation and build relationships;
- Reduce the frustrations and free up time of all people in each pilot area so that there will be a desire (pull) to establish Area Based Teams and introduce formal on-going improvement activities involving all the workforce on all shifts through Work Area Management and Operator Equipment Management in production areas and Work Area Management in office / support areas;
- Provide a foundation of loss analysis to allow the Site Leadership Team the opportunity to create further Cross-functional Teams to address outstanding technical related losses or wastes; and
- Promote learning within the workplace and to allow everyone to experience the success and value of being Cross-functional Team members and develop their team work and problem solving skills.

Suggested make-up of the Pilot Area teams would be:

Macro Focused Equipment & Process Improvement Team (6 - 8 members) Focus: Defined Production Area	
1	Supervisor for Area (staff) – lead the Team
1	Team Leader for Area (wages) or Snr Operator
1	Operator
1-2	Maintainers responsible for Area (Mech & Elect)
1-2	Tech Support responsible for Area (provide horsepower for analysis)
1	Leadership Team Member (Manager)
<i>Plus each team would be facilitated by:</i> <i>TPM³ Co-ordinator</i> <i>CTPM Navigator</i>	

Our experience has been that due to the make-up of the pilot area teams, we recommend a **CTPM Navigator** provides facilitation / training support to each team. This ensures each team is given expert (been there and done it before) guidance and training to achieve their mandate (maximum return for the company), and your TPM³ Co-ordinator is rapidly developed along with, in some cases, to ensure the manager on each team is properly facilitated so he / she does not dominate any meeting.

The training for each team includes a half-day kick-off workshop to help each team understand the improvement process they will be following, how the team members are to

work together as a team, and an overview of the Team Member Manual which provides a detailed step-by-step process to follow, along with copies of helpful forms and templates to provide a structured approach to the meetings and activities. Further training is provided through 30 minute training sessions during each weekly 1.5 hour meeting.

Once the Macro Focused Equipment & Process Improvement (Macro FE&PI) Teams have completed their kick-off and 12 meeting cycle (typically within 3-4 months) and presented to the Site Leadership Team, the next cycle typically involves 2 streams of activity:

1. Further Cross-functional Teams to address technical loss issues identified; and
2. Introduction of Area Based Teams to address people loss issues identified.

However, before commencing Area Based Team activity we strongly recommend that the Area Based Teams across all shifts have good flexibility within their team members (good Base Skills). If this is not the case, we would suggest that Area Based Team improvement activity be deferred until good Base Skills have been established. This can often be accelerated through the People & Leadership Development activity of a Micro Education & Training Base Skills team or teams during Cycle 2.

Cycle 2 (typically 12-14 weeks)

To address technical loss issues impacting on OEE we recommend the use of Micro, Special Micro or Mini Micro Focused Equipment & Process Improvement Cross-functional Teams.

To address the people loss issues impacting on OEE we recommend engaging all personnel on all shifts within each pilot area through Work Area Management (WAM) once flexible Area Based Teams of some 4-8 have been created.

A key outcome from Work Area Management (WAM) apart from creating a workplace that has ‘a place for everything and everything in its place’ is to significantly improve both communications and standards between shifts. It should also improve productivity by at least 5% along with having a positive impact on reducing the variability of OEE performance.

Once initial losses have been addressed and relationships have been built between the different groups (ie production and maintenance) through the Macro Focused Equipment & Process Improvement cycle, and Area Based Teams have been established with basic formal improvement disciplines and all shifts have developed effective means to communicate with each other through the WAM cycle, we recommend the commencement of Operator Equipment Management (OEM).

As you progress production WAM activities, we would recommend that Maintenance Excellence Management activity be commenced in order to free up maintenance time to support Operator Equipment Management activities in Cycle 3.

Cycle 3 or 4 (typically 12-14 weeks)

To continue to address technical loss issues impacting on OEE we recommend the use of further Micro, Special Micro or Mini Micro Focused Equipment & Process Improvement Cross-functional Teams.

To address the people loss issues impacting on OEE we recommend further engaging the established Area Based Teams on all shifts within each pilot area through Operator Equipment Management Step 1 (OEM-1).

Maintenance Excellence Management activities would also continue with a focus on reducing Time Lost by Maintenance personnel.

3. Cascading & Sustaining Phase (3-5 years)

Based on the learning to date from Cycles 1-4, and the constraints of your facilitation, maintenance and people development support, cascade your improvement activities to other Defined Production Areas and Production Support Areas.

In order to sustain the improvement and reinforce the discipline of the new way of TPM³ thinking, many sites now use the 5 Level Milestone TPM³ Excellence Award to set annual goals and monitor progress towards their Improvement Vision, Operator Excellence Vision and Operations Vision.

Outline of TPM³ Production Area Based Team Improvement Activities

We see the role of an operator in a World Class workplace spanning:

- Frontline Safety (self and others in area) & Environment;
- Frontline Quality (input, process and output);
- Frontline Equipment Care;
- Frontline Energy Management;
- Achieve the Production Plan; and
- Formal On-going Improvement.

Formal On-going Improvement Area Based Team activities involve on-going 12-14 week cycles of structured improvement with each cycle building on the learning from the previous cycles. The activities focus on improving Safety, the Work Area, Equipment Performance and Reliability, and Product Quality and initially span some 10 cycles over 2-3 years as outlined below:

Work Area Management (1 Cycle then on-going)

- Develop the flexible team (4-8) including a designated working Team Leader;
- Standardise Work across all shifts;
- Establish discipline within the workplace so that everything is orderly, neat & tidy; and
- Improve communications across shifts.

Operator Equipment Management (7 Steps over typically 9-11 Cycles)

- Step 1 Identify & Rectify Equipment Defects

- Step 2 Address Sources of Contamination and Difficult to Access Areas
- Step 3 Establish Perfect Lubrication and Cleaning Standards
- Step 4 Understand Equipment Functioning (typically 6-10 modules over 3-5 cycles)
- Step 5 Finalise Inspection Standards
- Step 6 Understand Quality and Equipment relationships
- Step 7 Maintain Zero Breakdowns, Zero Quality Problems, Zero Accidents or Incidents

The aim of the Work Area Management and Operator Equipment Management activities is to have a positive impact on performance while significantly reducing operational risk by:

- Developing Area Based Teams with clear responsibilities and boundaries for agreed Improvement Areas for each shift;
- Establishing a communications process through TPM³ Improvement Sheets to support sharing of information between shifts to gain agreement and buy-in on improvements;
- Establishing a Scoreboard for each Area Based Team to provide feedback to the team and everyone else at site on the progress of their improvement activities;
- Creating a positive environment to allow maintenance and production to gain a greater understanding of each others situation and build relationships;
- Creating a positive environment to allow management and workers to gain a greater understanding of each others situation and build relationships;
- Creating time and reduce the frustrations of all Area Based Team members so that there will be a desire (pull) to support the on-going Operator Equipment Management steps;
- Creating a learning environment within the workplace to allow everyone to experience the success and value of being Area Based Team members and develop their team work and problem solving skills;
- Standardising practices for Work Area Management across all shifts / areas;
- Introducing the practice of Area Based Team self-assessments;
- Improving safety, productivity and morale by establishing “a place for everything and everything in it’s place” through Work Area Management activities;
- Engaging both the team members and the teams in working together to improve their work area and equipment so as to reduce their frustrations;
- Developing world class operators;
- Developing successful (synergistic) mature Area Based Teams recognising the 4 stages of team development;
- Providing everyone with the training, systems and opportunities to care for their own equipment and workplace;
- Ensuring Production and Maintenance work in harmony and practice synchronous maintenance;
- Making use of equipment as a means of teaching personnel new ways of thinking and working; and

- Creating a failure-free (Zero Breakdowns), trouble-free (Zero Quality Problems), safe (Zero Accidents and Incidents) workplace.

Recommended Path Forward

We suggest that you consider commencing your TPM³ (TPM & Lean) journey by completing the Awareness & Preparation Phase.

This would entail:

- Site visit to ensure workshop is tailored to your needs;
- Tailored in-house two-day Getting TPM & Lean to Work workshop for your decision-makers and key personnel (typically 15-20); followed about 1 or 2 weeks later with the
- TPM³ Introduction Strategy Planning workshop (typically 5 hours from 10.00am to 3.00pm) for the Site Leadership Team;
- 15-30 minute briefing to everyone on site;
- One-day TPM³ Awareness workshop for all pilot area team members who did not attend the 2-day workshop;
- One-hour Briefing for the Team Leaders of the pilot area teams;
- Half-day kick-off workshop for the pilot area teams;
- Weekly facilitation support for your pilot area teams; and
- Pre-cycle Strategy Planning Session for the Site Leadership Team at week 10 of the cycle (or 2 weeks before the conclusion of the cycle) to reflect on learnings and plan for Cycle 2 so that there is no significant delay between cycles.

For further information about TPM³, TPM & Lean, Operational Risk Minimisation, or the 5 Level Milestone TPM³ Excellence Award, please phone Ross Kennedy – President, CTPM Australasia on +61 2 4226 6184 or email him on ross.kennedy@ctpm.org.au, or visit the CTPM web page at www.ctpm.org.au