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Contents

Total Productive Maintenance

1. What is Total Productive Maintenance (TPM)?

Total Productive Maintenance or TPM is a proven methodology used to optimise and increase machine productivity. It comprises a systematic maintenance program that involves an established process for maintaining plants and equipment. Originating from Japan, TPM involves employees at all levels and aims to make processes more reliable and non-wasteful. It also focuses primarily on manufacturing.

2. Why TPM?

The goal of TPM is to "continuously improve all operational conditions, within a production system, by stimulating the daily awareness of all employees". Through the implementation of TPM, it is hoped to maximise the total effectiveness of production system and markedly increase production. It brings maintenance into focus as a "necessary and vital" aspect of the business, and aims to prevent every type of loss (zero accidents, zero defects, and zero failures for the total life). TPM also plays a part in increasing employees' morale and job satisfaction, and should not be regarded as a non-profit activity. Down time for maintenance is scheduled as a part of the manufacturing day and, in some cases, as an integral part of the manufacturing process. Meanwhile, emergency and unscheduled maintenance should be kept to a minimum.

TPM's objectives include:

1. Avoiding wastage in a quickly changing economic environment
2. Producing goods without reducing product quality
3. Reducing costs
4. Producing a low batch quantity at the earliest possible time
5. Ensuring goods sent to customers are non-defective

2.1 Benefits of TPM

An accurate and practical implementation of TPM would lead to an increase in productivity within the organisation, where:

- A clear business culture is designed to continuously improve the efficiency of the total production system
- A standardised and systematic approach is used, where all losses are prevented and/or known
- All departments, influencing productivity, will be involved to move from a reactive to predictive mindset
- A transparent multi-disciplinary organisation is reaching zero losses
- Steps are taken as a journey, not as a quick menu

TPM will provide practical and transparent ingredients to reach operational excellence. Organisations can expect to reap in the following benefits:

- Increase in productivity
- Increase in rates of operation
- Decrease in breakdowns
- Decrease in defects
- Decrease in client claims
- Decrease in labour costs
- Decrease in maintenance costs
- Decrease in energy costs
- Reduction on inventory levels
- Increase in inventory turns
- Elimination of environmental and safety violations
- Increase in employees' morale
- Increase in employees' participation
- Increase in employees' job satisfaction

With all these benefits, it is vital for organisations to recognise the importance and value that TPM can bring to their organisations.

3. Six Basic Principles of TPM

TPM activities revolve around six simple principles that improve equipment productivity.

1. Minor defects are the root cause of most equipment failures. Hence, it must be completely eliminated from all equipment. Equipments with minor defects tend to find "new ways to fail", thus making any improvement activity difficult to keep pace with the failure rates of the machine.

2. Properly planned maintenance routines can prevent almost all sporadic equipment failure.

3. Cross-departmental teams can advance equipment performance with much greater ease than efforts made by any single department working alone. This is especially true for chronic failures and quality problems. Departments working independently will not produce world-class results. Nor can the task of improving machine productivity be placed entirely in the hands of the maintenance department.

4. Continuous learning is at the heart of continuous machine improvement. It is necessary to note that machines do only what people make them do, and can only perform better if the people taking care of them acquire new knowledge and skills regarding equipment care. Hence, equipment performance creates the equipment conditions.

5. Machines with effective preventive maintenance programs tend to produce more than those that are only repaired when they break down.

6. Effective preventive maintenance plans require less technician time than the time required to repair poorly maintained machines, contrary to common belief that the more comprehensive preventive maintenance plan becomes, the more technicians will be required to maintain the equipment.

4. TPM vs TQM

There are some similarities between TPM and the popular Total Quality Management (TQM). Many of the tools used in TQM, such as employee empowerment, benchmarking, documentation, etc., are also used to implement and optimise TPM.

The following are some similarities between the two:

- Total commitment to the program by upper level management is required in both programs;
- Employees must be empowered to initiate corrective action; and
- A long-range outlook must be accepted as TPM may take a year and beyond to implement and is an on-going process. Changes in employee mindset towards their job responsibilities must also take place.

Meanwhile, the differences between TQM and TPM is summarised below:

	TQM	TPM
Object	Quality (output and effects)	Equipment (input and cause)
Mains of attaining goal	Systematise the management. TQM is software oriented.	Employees participation and is hardware oriented.
Target	Quality for PPM	Elimination of losses and wastes.

Source: Venkatesh, J. (2009). *An introduction to Total Productive Maintenance (TPM)*. Retrieved November 15, 2010, from http://www.plant-maintenance.com/articles/tpm_intro.shtml

5. Types of Maintenance

The major categories of maintenance are:

(i) Breakdown maintenance
Breakdown maintenance involves repairing of equipment only when it fails and malfunctions. At times, some electronic equipment is replaced when it fails.

(ii) Preventive maintenance
Preventive maintenance is a periodic maintenance, which retains the condition of equipment and prevents failure through the prevention of deterioration, periodic inspection and equipment condition diagnosis. This type of maintenance includes periodic cleaning, inspection, lubrication and tightening.

Preventive maintenance is further divided into periodic and predictive maintenance.

- **Periodic maintenance**
  Periodic maintenance is time-based that involves periodically inspecting, servicing, and cleaning equipment and replacing parts to prevent problems.

- **Predictive maintenance**
  Predictive maintenance is condition-based that involves predicting the service life of important parts based upon inspection or diagnosis, to use the parts to the limit of their service life.

(iii) Autonomous maintenance

Autonomous maintenance is a daily preventive maintenance (cleaning, inspection, lubrication and re-tightening) performed by the equipment operator.

(iv) Corrective maintenance

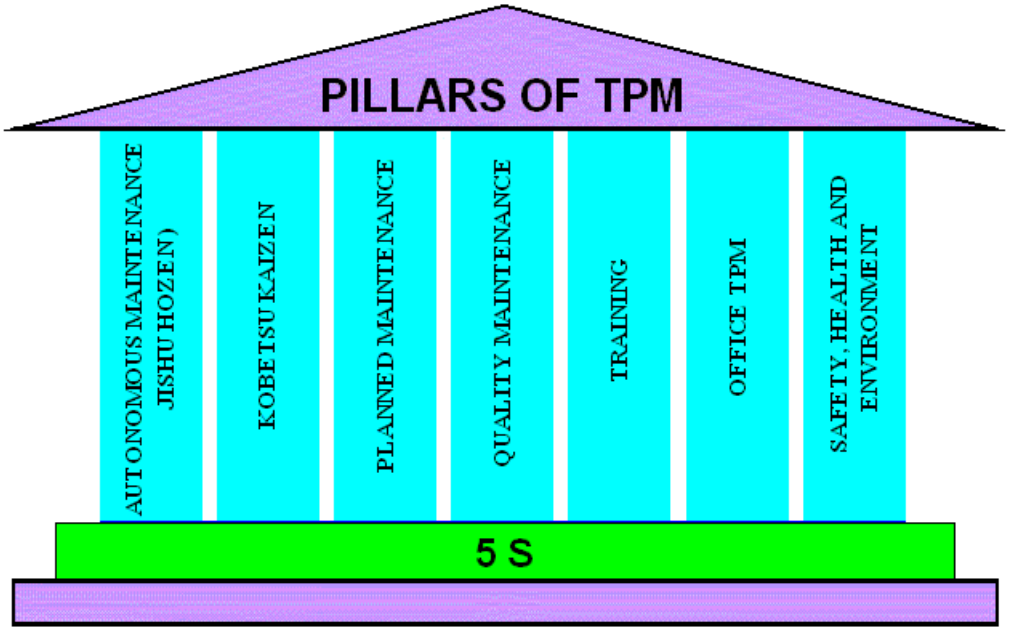
Corrective maintenance improves equipment and its components so that preventive maintenance can be performed reliably. Equipment with a design weakness is re-designed with corrective maintenance to improve reliability and maintainability.

(v) Maintenance prevention

Maintenance prevention deals with improving the design of new equipment. Current machine data (information leading to failure prevention, easier maintenance, prevention of defects, safety, and ease of manufacturing) are studied and designs are incorporated in new equipment.

6. Implementation

6.1 Pillars of TPM



Source: Venkatesh, J. (2009). *An introduction to Total Productive Maintenance (TPM)*. Retrieved November 15, 2010, from http://www.plant-maintenance.com/articles/tpm_intro.shtml

(i) 5S – The foundation of TPM

TPM starts with 5S. Problems cannot be clearly seen when the work place in unorganised. Cleaning and organising the workplace would help to uncover problems. Thus, making problems visible is the first step of improvement.

The 5S methodology is a Japanese methodology, comprising five Japanese words:

- Seiri (Sort)
- Seiton (Set in Order)
- Seiso (Shine)
- Seiketsu (Standardise)
- Shitsuke (Sustain)

It provides a methodology for organising, cleaning, developing and sustaining a productive work environment, and encourages workers to improve on their working environment and assist

them in reducing waste, unplanned downtime, and in-process inventory.

- **Seiri (Sort)**
  Sort or also known as organisation, focuses on "eliminating unnecessary items from the workplace that are not needed for current production operations". It involves using a visual method called "red tagging", which is an effective method in identifying unneeded items. Red tagging involves evaluating the necessity of each item in a work area and dealing with it appropriately. Items that are deemed not important for operations or that are not in the proper location or quantity will be classified under red tag items. These items are then moved to a central holding area for subsequent disposal, recycling or reassignment.

- **Seiton (Set in Order)**
  Set in order or also known as organise, focuses and maximises on efficiency. It focuses on creating "efficient and effective storage methods" to arrange items for easy usage and uses labels so that items can be easily located and put away. Set in order can only be carried out once unneeded items are identified and put away during the sorting.

- **Seiso (Shine)**
  Shine emphasises on the need to keep the workplace clean and neat, after the clutter in the work areas are eliminated and remaining items are organised. Daily follow-up cleaning is essential to sustain the improvement. A clean environment enables "workers to notice malfunctions in equipments such as leaks, vibrations, breakages, and misalignments". These changes, if left unattended, could lead to possible equipment failure or loss of production.

- **Seiketsu (Standardise)**
  Standardising the best practices in work area should be put in place after sorting, set in order and shine are implemented. Standardise involves standardising work

practices or operating in a consistent manner. The process involves the assignment of the 5S job responsibilities, integrating 5S duties into work duties, and checking on the maintenance of 5S. Some useful tools that could be used are; job cycle charts, check lists, visual cues, etc. The second part of standardise is prevention, which emphasises on the prevention of accumulation of unneeded items, and prevention of procedures from breaking down.

- **Shitsuke (Sustain)**
  Sustain involves sustaining the discipline, which refers to maintaining and reviewing standards. Staff should ensure that all correct procedures are undertaken and maintained at all times. Tools for sustaining the 5S include signs and posters, newsletters, pocket manuals, team and management check-ins, performance reviews, and department tours.

(ii) Autonomous maintenance

This pillar is geared towards developing operators to be able to undertake the small maintenance tasks, such as cleaning, inspecting and lubricating their equipments. This would free up the skilled maintenance people, and allow them to spend time on more value added activity and technical repairs. The operators are responsible for the upkeep of their equipment to prevent it from deteriorating.

Steps to be taken in autonomous maintenance:

1. Train the employees

   Educate the employees about TPM, and its advantages. Educate the employees about abnormalities in equipments.

2. Initial cleanup of machines

   - Supervisor and technician should discuss and set a date for implementing step1.

- Arrange all items needed for cleaning.
- On the arranged date, employees should clean the equipment completely with the help of maintenance department.
- Dust, stains, oils and grease has to be removed.
- After clean up, problems are categorised and suitably tagged. White tags are place where operators can solve problems. Pink tag is placed where the aid of maintenance department is needed.
- Contents of tag are transferred to a register.
- Make note of areas, which were inaccessible.

3. Tentative Standard

- Schedule has to be drawn up and followed strictly.
- It should include when, what and how to perform the cleaning, inspection and lubrication.

4. General Inspection

- The employees need to be trained in disciplines like pneumatics, electrical, hydraulics, lubricant and coolant, drives, bolts, nuts and safety.
- This is necessary to improve the technical skills of employees and to use inspection manuals correctly.
- Upon the acquisition of this new knowledge, employees should share this with their fellow workmates.
- Having new technical knowledge also ensures that the operators are now well aware of machine parts.

5. Autonomous Inspection

- New methods of cleaning and lubricating are used.
- Each employee prepares his own autonomous chart/schedule in consultation with the supervisor.
- Parts that have never given any problems or do not need any inspection

are removed from list permanently based on experience.
- The frequency of cleanup and inspection is reduced based on experience.

6. Standardisation

- In this step the surroundings of machinery are organised. Necessary items should be organised to reduce the time taken to search for items.
- Work environment is modified to ensure all items are easily accessible and can be obtained without difficulty.
- Necessary spares for equipments are also listed and procured.

7. Autonomous Management

- OEE and OPE and other TPM targets must be achieved by continuous improvement through Kaizen.
- PDCA (Plan, Do, Check and Act) cycle must be implemented for Kaizen.

(iii) Kaizen

Kaizen is opposite to big spectacular innovations. It is carried out on a continual basis and involves all employees in the organisation. This pillar is aimed at reducing losses in the workplace that affect efficiencies.

Kaizen policy includes; practising concepts of zero losses in every sphere of activity, relentless pursuit to achieve cost reduction targets in all resources, and relentless pursuit to improve all plant equipment effectiveness. Kaizen targets to achieve and sustain zero losses and aims to achieve at least 30% of manufacturing cost reduction.

(iv) Planned maintenance

The goal of planned maintenance is to have “trouble-free machines and equipments that produce defect-free products for total customer satisfaction”. Planned maintenance achieves and sustains availability of machines at an optimum maintenance cost, reduces spares

inventory and improves reliability and maintainability of machines.

Steps in planned maintenance include:

- Evaluate and record present equipment status
- Restore deterioration and improve weakness
- Build information management system
- Prepare time-based data system, select equipment, parts, and team and make a plan
- Prepare predictive maintenance system by introducing equipment diagnostic techniques
- Evaluate planned maintenance

(v) Quality maintenance

Quality maintenance is aimed towards delighting the customer with the highest quality and defect free manufactured products. It is focussed on eliminating non-conformances in a systematic manner. Through quality maintenance, an understanding of what parts of the equipment affect product quality is gained. It also eliminates quality concerns and highlights potential quality concerns.

Quality maintenance activities control equipment conditions to prevent quality defects, based on the concept of maintaining perfect equipment to maintain perfect quality of products. These conditions are checked and measured in time series to verify that measured values are within standard values to prevent defects. The transition of measured values is trended to predict possibilities of defects occurring and to take countermeasures before defects occur.

Quality maintenance activities support quality assurance through defect free conditions and control of equipment. The focus is on effective implementation of operator quality assurance and detection and segregation of defects at the source. Opportunities for designing Poka-Yoke (foolproof system) are investigated and implemented as practicable.

(vi) Training

The goal of training is to have multi-skilled revitalized employees whose morale is high and who are eager to come to work and perform all required functions effectively and independently. The focus is on achieving and sustaining zero losses due to lack of knowledge, skills or techniques.

Operators must upgrade their skills through education and training. It is not sufficient for operators to learn how to do something; they should also learn why they are doing it and when it should be done. Through experience operators gain “know-how” to address a specific problem, but they do so without knowing the root cause of the problem and when and why they should be doing it. Hence it becomes necessary to train operators on knowing why. This will enable the operators to maintain their own machines, understand why failures occur, and suggest ways of avoiding the failures occurring again.

(vii) Office TPM

Office TPM should be started after activating four other pillars of TPM. Office TPM must be followed to improve productivity, efficiency in the administrative functions, and identify and eliminate losses. This includes analysing processes and procedures towards increased office automation.

Office TPM addresses twelve major losses:

1. Processing loss
2. Cost loss including in areas such as procurement, accounts, marketing, sales leading to high inventories
3. Communication loss
4. Idle loss
5. Set-up loss
6. Accuracy loss
7. Office equipment breakdown
8. Communication channel breakdown, telephone and fax lines
9. Time spent on retrieval of information
10. Unavailability of correct on-line stock status
11. Customer complaints due to logistics

12. Expenses on emergency dispatches or purchases

Improving the office efficiency by eliminating the above-listed losses helps in achieving Total Productive Maintenance.

(viii) Safety, Health and Environment

The target of the Safety, Health & Environment pillar is:

- Zero accidents,
- Zero health damage, and
- Zero fires

The focus is on creating a safe workplace and surrounding areas that are not damaged by our processes or procedures. This pillar plays an active role in each of the other pillars on a regular basis.

6.2 Six Losses

TPM identifies six losses, which are costs to the organisation. The following presents six major losses that can result from faulty equipment or operation.

Unexpected breakdown losses	Results in equipment downtime for repairs. Costs can include downtime (and lost production opportunity or yields), labour, and spare parts.
Set-up and adjustment losses	Results in lost production opportunity (yields) that occurs during product changeovers, shift change or other changes in operating conditions.
Stoppage losses	Results in frequent production downtime from 0 to 10 minutes in length and that are difficult to record manually. As a result, these losses are usually hidden from efficiency reports and are built into machine capabilities but can cause substantial equipment downtime and lost production opportunity.
Speed losses	Results in productivity losses when equipment must be slowed down to prevent quality defects or minor stoppages. In most cases, this lost is not recorded because the equipment continuous to operate.
Quality defect losses	Results in off-spec production and defects due to equipment malfunction or poor performance, leading to output which must be reworked or scrapped as waste.
Equipment and capital investment losses	Results in wear and tear on equipment that reduces its durability and productive life span, leading to more frequent capital investment in replacement equipment.

Source: Total productive maintenance (TPM). (2010). Retrieved November 15, 2010, from http://www.epa.gov/lean/thinking/tpm.htm

6.3 Four Equipment Maintenance Techniques

(i) Efficient equipment

One of the best ways to increase equipment efficiency is to identify the losses that are hindering performance. Overall equipment effectiveness can be measured using a TPM index, Overall Equipment Effectiveness (OEE). OEE is calculated by "multiplying (each as a percentage) overall equipment availability, performance and product quality rate. With these figures, the amount of time spent on each of the six big losses, and where most attention needs to be focussed, can be determined. It is estimated that most companies can realise a 15-25% increase in equipment efficiency rates within three years of adopting TPM.

(ii) Effective maintenance

Thorough and routine maintenance is a critical aspect of TPM. Firstly, TPM trains equipment operators to play a key role in preventive maintenance by carrying out "autonomous maintenance" on a daily basis. Typical daily activities comprise precision checks, lubrication, parts replacement, simple repairs, and abnormality detection. Workers are also encouraged to conduct corrective maintenance, designed to further avoid the equipment from malfunctioning, and to facilitate inspection, repair and use. Corrective maintenance includes recording the results of daily inspections, and regularly considering and submitting maintenance improvement ideas.

(iii) Mistake-proofing

Mistake-proofing involves the application of simple "fail-safing" mechanisms designed to make mistakes impossible or at least easy to detect and correct. Known as poka-yoke, the device falls into two major categories; prevention and detection.

A prevention device is one, which makes it impossible for a machine or machine operator to create an error. For example, many automobiles have "shift locks" that prevent a driver from shifting into reverse unless their foot is on the break.

A detection device signals to the user when a mistake has been made. This allows the user to quickly correct the problem. An example would be the warning buzzer that indicates keys have been inadvertently left in the ignition in automobiles.

(iv) Safety management

The fundamental principle behind TPM safety and environmental management activities is addressing potentially dangerous conditions and activities before they result in accidents, damage and un-anticipated costs. Similar to maintenance, safety activities under TPM should be enforced and carried out continuously and systematically.

Among the focus areas include:

- Development of safety checklists (e.g. to detect leaks, unusual equipment vibration or static electricity)
- Standardisation of operations (e.g. materials handling and transport, use of protective clothing, etc.)
- Coordinating non-repetitive maintenance tasks (in particular those involving electrical hazards, toxic substances and open flames, etc.)

6.4 The TPM Culture Change

The implementation of TPM changes the maintenance culture of an organisation in many ways. However, the task of changing people's thinking and behaviour makes a successful TPM implementation difficult to achieve. People naturally resist change. They tend to think of TPM only as a project tool, instead of an ongoing process that becomes part of their normal work routine.

However, while any human skill can always be improved to a higher standard, it is not feasible to expect people to achieve a high level of performance at their first undertaking of a new activity. Hence, a realistic time frame needs to be given for them to advance their skills. Elevating people's knowledge and skill is the key to making TPM successful and achieving improved factory productivity. The following

table presents some of the culture changes that successful TPM implementation brings about.

Old Culture	New Culture Created with TPM Activities
Only the top few problems are resolved, using any means possible to make improvements.	All minor defects in a machine are eliminated. Machine performance is continually improved with the methodical and repeated application of TPM steps.
Individuals or teams in any way that they see fit implement improvement methods.	Improvement methods are rigorously defined and are expected to be implemented precisely.
Improvements in the organisation's work methods and processes are localised by each team as they desire.	Improvements in the organisation's work methods and managers coordinate processes, so the entire organisation is learning and benefiting from improved techniques. Even improvement methods themselves are continually being improved.
Machine problems are resolved one at a time, reactively. Ultimately improvements only occur in systems that have failed.	A reliable and systematic improvement process is applied to a machine to address all productivity losses proactively. Failures are prevented before they occur.
Only results are measured by managers.	Both results and the process used to obtain the results are measured by managers.
Improvements steps are taken as absolute – once completed they are not revisited.	Improvement steps are revisited as people's skills improve and expectations for their performance are raised.

Source: Leflar, J. A. (2001). *Practical TPM: Successful equipment management at Agilent Technologies*. Portland: Productivity Press.

6.5 Keys to TPM Success

There are three basic requirements for TPM success.

- Knowing the TPM steps and following them.
  Trying to re-invent TPM wastes time and other resources. It is critically important to learn from others who have succeeded at creating and developing a factory with world-class levels of productivity. The implementation of TPM requires beyond just reading a book or attending seminars.

- An organisation must have management commitment and competency to lead the change.
  Managing the day-to-day operations of a factory varies greatly from leading people through changes in the nature of their work. TPM machine

improvement teams need to be guided through the improvement steps on their machines, which require significant and permanent behaviour changes on their part. These changes will not occur with the absence of knowledge guidance from their leaders, hence the old way of operating and maintaining the equipment will prevail.

- TPM requires the participation of everyone in the organisation.
  It is a crucial mistake to assign some people to be involved in TPM and not others. TPM is a factory operating system change program that affects the way all employees perform their routine jobs. It is also important to note that employees will not change how they work because a TPM consultant or TPM program office manager wants them to. Employees change only when their own managers want them to and reinforce the changed behaviour properly.

Case Study

MRC Bearings, Inc.

MRC Bearings is a unionised aerospace industry supplier. It engages in the design and manufacture of ball and roller bearings. Its products include single row deep groove ball bearings, single row maximum capacity filling notch ball bearings, single row angular contact ball bearings, double row ball bearings, split ring bearings, high precision bearings, and specialty bearing products.

In 1996, they recognised they had a problem – they were behind on their orders. Their customers were pushing for shorter lead times and cost reductions.

MRC realised that around 80% of their maintenance hours were dedicated to emergency works. In October of 1997, 660 hours were consumed by unplanned maintenance in just one area. Less than a year later, the number fell to less than 30 hours, a decrease of more than 99%. They were also able to achieve almost 98% decrease in the number of unplanned maintenance hours in an eight-month period. Their Manager of Continuous Improvement, Greg Folts, attributed their remarkable success to “having a hardworking, dedicated maintenance team and implementing a Total Productive Maintenance Program”.

MRC’s journey in the TPM program began with identifying a small area that was critical to their process, but was experiencing chronic problems. In the beginning, many of its workers were disinterested and sceptical in getting involved with TPM. They sought help from Marshall Institute to organise their TPM efforts and to change the mindset of the workers. One of MRC's customers, Pratt-Whitney, also supported their efforts by facilitating MRC's first TPM event and sharing their TPM practices with MRC.

MRC began with a week long TPM event. Folts explained they would begin by cleaning, inspecting, lubricating, and performing corrective work on a piece of machinery. Once a machine was cleaned, it would be painted. In the beginning, workers were rather reluctant to participate in TPM events. However, as time went on, the workers began to notice what improvements were being accomplished under the TPM events. They began to realise that through TPM, the physical changes are easy to see. Machines are more reliable, the area is cleaner and they are presented with a lot more pleasant atmosphere to work in. Several workers, who were totally

against TPM at the start, have now willingly participated in TPM workouts or equipment improvement teams. The culture change was slow, but happening.

MRC formed Equipment Improvement Teams (EITs) to work on resolving equipment-related issues. Folts credits the EITs with a success that was critical in their adoption of TPM. He explained they had a piece of equipment with chronic problems. It was breaking down monthly requiring three or four days each time to fix.

The Equipment Improvement Team took on this problem and discovered the original manufacturer had used a sub-spec coupling on a drive unit. Upgrading to the proper coupling solved the problem. This fix alone increased the efficiency on this piece of equipment by 16%. Folts pointed out that “by taking the time to find the root of the failures, rather than just fixing the symptoms, they were able to solve this problem”. In the years following this repair, the problem was completely eliminated. That success showed a lot of people in the company that TPM can make everyone's daily life easier as well as improving productivity.

After the initial success, followed by eight TPM events, MRC expanded their TPM efforts to their second facility. They created a TPM Steering Committee at their second site and also created a Policy group to coordinate the efforts of both facilities. The President of MRC Bearings, Bengt Nilsson joined the Policy group as an active member. Having the company president working together to drive TPM sent a clear message to everyone how serious the management was in TPM for the success of the company.

MRC later trained ten TPM Area Coordinators who are dedicated to TPM one week each month. These TPM Coordinators organised TPM events in their areas, also lead EITs, and make sure the process keeps working. MRC also began to create full-time TPM teams. One such team, comprised Jeff Franklin, an electrician and Jim Klugh, a mechanic, and Jeff Johnson, an operator, were able to correct a long-standing equipment problem which reduced the scrap produced by that equipment to almost zero.

The areas that MRC focused on were:

Preventative maintenance

1. Putting predictive maintenance process in place (i.e., vibration analysis equipment)
2. Cleaning the machines, resulting in inspection
3. Creating standards on the equipment for cleaning, lubrication, and daily checks

4. Collecting data on downtime
5. Creating Equipment Improvement Teams
6. Creating TPM Area Coordinators

From this experience, Russell suggested organisations beginning TPM programs start small and keep it simple. Folts highlighted that one the key lessons they learnt from implementing TPM is that “training is a key to being successful with TPM”. He credited the successful implementation of TPM at MRC to the support of their management, the hard work of the workers and the support of their customers.

Articles can be retrieved from NLB's e-Resources – http://eresources.nlb.gov.sg

Books are available at the Lee Kong Chian Reference Library.

Recommended Readings

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THE CERTIFIED PRODUCTIVITY PRACTITIONER COURSE

PRODUCTIVITY • COMPETITIVENESS • PROFITS

- What keeps you awake at night?
- Is it the constant pressure to generate a greater yield?
- Problems with leading productivity changes in the workplace?
- Need to improve the quality of your products and services?

Productivity is the answer to all these burning issues.

Entailing efficiency and effectiveness, productivity is crucial in fulfilling the raison d'être of all companies – delivering ever-growing business goals. It is imperative for business leaders to be constantly committed to productivity improvement and take the lead in driving productivity and innovation to sharpen the company's competitive edge by ensuring the most efficient utilization of resources at all times and consistently creating optimum value for customers.

Capabilities have to be developed to deliver higher productivity and training and education is required to develop those credentials and keep the cycles of improvement rolling.

The **Certified Productivity Practitioner** course is the answer to developing the awareness, concepts, skills and techniques, and most importantly, mindset, required to build up those capabilities.

"These sessions provided excellent insight into the fundamentals of productivity, history and importance of productivity in Singapore" – Neil Todd, Courts

Why CPP?

- It is focused on solving productivity issues **at the enterprise.**
- A **diagnostic approach** is taken, so that Strengths and Areas for Improvement are identified and interventions can be decided easily.
- It **teaches** productivity techniques , tools and methodologies.
- Participants will undertake a company project for their own company on a previously identified productivity issue, for which **project guidance** is provided.

"I recommend this course to those who want to know the overview of productivity implementation and its framework. Very experienced trainers make this course a must to attend before engaging on productivity journey." – Ng Lye Kiat, Acco Technology

About the Course

At the Singapore Productivity Association, we recognise that there may be specific industries that face different sets of KPIs from others. As such, the course content for the CPP will be contextualized for these industries. Currently, we have developed a general CPP course that will be suitable for most industries, as well as the CPP (Retail), which we have contextualized specially just for the Retail sector. The course content can be found below:

CPP (General)	CPP (Retail)

Module 1: Understanding Productivity (Duration: 1 day)
• Introduction to Productivity and Quality Concepts
• Factors Affecting Enterprise Productivity
• Productivity Movement in Singapore
• Productivity Promotion in Companies
• Productivity Challenges
 	
Module 2: Productivity Tools, Techniques & Management Systems (Duration: 3 days)
• Business Excellence
• Productivity Measurement & Analysis
• Process management:
  ▪ Cost of Quality
  ▪ Lean Six Sigma
  ▪ Process Mapping & Analysis
• Integrated Management Systems
 	
Module 3: Innovation & Service Excellence (Duration: 3 days)
• Knowledge Economy & Innovation
• Service Excellence
• Team Excellence
 	
Module 4: Critical Success Factors (Duration: 1 day)
• Management Commitment
• Managing & Sustaining Change
• Overcoming Resistance to Change
• Training and Education
• Planning for Implementation and Control of Productivity Improvement Programme
• Briefing on project assignment & Role of Productivity Practitioner
	Module 1: Understanding Productivity (Duration: 1 day)
	• Introduction to Productivity and Quality Concepts
	• Factors Affecting Enterprise Productivity
	• Productivity Movement in Singapore
	• Productivity Promotion in Companies
	• Productivity Challenges
	
	Module 2: Productivity Tools, Techniques & Management Systems (Duration: 3 days)
	• Delivering Service Excellence
	• Productivity Measurement & Analysis
	• Process management:
	  ▪ Cost of Quality
	  ▪ Lean Six Sigma
	  ▪ Process Mapping & Analysis
	
	Module 3: Service Excellence & Sales Productivity (Duration: 3 days)
	• Introduction to Service Ecellence & Sales Productivity
	• Store Management & the Roles of a Store Manager
	• Minimising Operational Constraints & Focusing on Sales
	• Setting Goals & Analysing Statistics
	• Coaching & Motivating Sales Staff
	• Service Behaviours that Encourage Business
	
	Module 4: Critical Success Factors (Duration: 1 day)
	• Management Commitment
	• Managing & Sustaining Change
	• Overcoming Resistance to Change
	• Training and Education
	• Planning for Implementation and Control of Productivity Improvement Programme
	• Briefing on project assignment & Role of Productivity Practitioner

As part of the CPP curriculum, participants are required to implement a productivity improvement project upon completion of the in-class component. Project guidance will be provided by a professional consultant assigned for this purpose and is for a total of 2 man-days.

Funding & Payment

The course is supported by the Singapore Workforce Development Agency (WDA). Funding is available at 70% and 50% of the course fees respectively for SMEs and MNCs/LLEs/Statutory Boards. Please find the prices payable in the net fee table below:

For SMEs:	Net Fee	Nett Fee with GST
SPA Member (S$3,700)	S$1,110	S$1,187.70
Non-Member (S$3,950)	S$1,185	S$1,267.95
For MNCs/LLEs/Statutory Boards	**Net Fee**	**Nett Fee with GST**
SPA Member (S$3,700)	S$1850	S$1979.50
Non-Member (S$3,950)	S$1975	S$2113.25

Funding applicable for up to 2 participants (Singaporeans/PRs only) from any single company.

Course Schedule

The schedule for the first quarter of 2011 is appended below:

Run 4: CPP (Retail)		
Date	**Module**	**Time**
Tuesday, 11 January 2011	Module 1	9-5 pm
Thursday, 13 January 2011	Module 2	9-5 pm
Tuesday, 18 January 2011		9-5 pm
Thursday, 20 January 2011		9-5 pm
Tuesday, 25 January 2011	Module 3	9-5 pm
Thursday, 27 January 2011		9-5 pm
Tuesday, 1 February 2011		9-5 pm
Tuesday, 8 February 2011	Module 4	9-5 pm

Run 5: CPP (General)		
Date	**Module**	**Time**
Wednesday, 12 January 2011	Module 1	9-5 pm
Friday, 14 January 2011	Module 2	9-5 pm
Wednesday, 19 January 2011		9-5 pm
Friday, 21 January 2011		9-5 pm
Wednesday, 26 January 2011	Module 3	9-5 pm
Friday, 28 January 2011		9-5 pm
Wednesday, 9 February 2011		9-5 pm
Friday, 11 February 2011	Module 4	9-5 pm

Run 6: CPP (Retail)		
Date	**Module**	**Time**
Tuesday, 22 February 2011	Module 1	9-5 pm
Thursday, 24 February 2011	Module 2	9-5 pm
Tuesday, 1 March 2011		9-5 pm
Thursday, 3 March 2011		9-5 pm
Tuesday, 15 March 2011	Module 3	9-5 pm
Thursday, 17 March 2011		9-5 pm
Tuesday, 22 March 2011		9-5 pm
Thursday, 24 March 2011	Module 4	9-5 pm

Run 7: CPP (General)		
Date	**Module**	**Time**
Wednesday, 23 February 2011	Module 1	9-5 pm
Friday, 25 February 2011	Module 2	9-5 pm
Wednesday, 2 March 2011		9-5 pm
Friday, 4 March 2011		9-5 pm
Wednesday, 9 March 2011	Module 3	9-5 pm
Friday, 11 March 2011		9-5 pm
Wednesday, 16 March 2011		9-5 pm
Friday, 18 March 2011	Module 4	9-5 pm

Run 8: CPP (Retail)		
Date	**Module**	**Time**
Tuesday, 5 April 2011	Module 1	9-5 pm
Thursday, 7 April 2011	Module 2	9-5 pm
Tuesday, 12 April 2011		9-5 pm
Thursday, 14 April 2011		9-5 pm
Tuesday, 19 April 2011	Module 3	9-5 pm
Thursday, 21 April 2011		9-5 pm
Tuesday, 26 April 2011		9-5 pm
Thursday, 28 April 2011	Module 4	9-5 pm

8th Run (Target Participants - 25)		
Date	**Module**	**Time**
Wednesday, 30 March 2011	Module 1	9-5 pm
Friday, 1 April 2011	Module 2	9-5 pm
Wednesday, 6 April 2011		9-5 pm
Friday, 8 April 2011		9-5 pm
Wednesdsay, 13 April, 2011	Module 3	9-5 pm
Friday, 15 April 2011		9-5 pm
Wednesday, 20 April 2011		9-5 pm
Wednesday, 27 April 2011	Module 4	9-5 pm

Core Faculty Members

MR. WONG KAI HONG
MBA IN STRATEGIC MARKETING (HULL), BSC (NUS)

Kai Hong is a business consultant, management trainer and company director. He has spent almost 2 decades in the consumer products industry, having worked with retailers like Isetan, Metro, Royal Sporting House, The Athlete's Foot and Sunglass Hut; brands like Reebok and Doc Martens; and technology group Wearnes Technology. He has been involved with various functions including operations, business development, project management, human resource, training, marketing, logistics, budgeting and general management. He has developed businesses in Singapore and many Asia cities such as Seoul and Beijing.

MR. LAM CHUN SEE
B. ENG IN INDUSTRIAL & SYSTEMS ENGINEERING (UNIVERSITY OF SINGAPORE)

Chun see manages his own consultancy practice, Hoshin Consulting and is also an associate consultant/trainer to the PSB Corporation and Singapore Productivity Association. Prior to running his own practice, he has had years of experience as an industrial engineer with Philips, and trainer and consultant with the then National Productivity Board, APG Consulting and Teian Consulting, He was conferred the Triple-A Award in 1989 for helping to transfer Japanese know-how, particularly in the area of 5S, into local programmes and packages. Throughout his years of consultancy experience, Chun See has assisted many companies in analyzing their productivity and quality objectives and performance; primarily through the application of the PDCA technique and basic QC tools.

MR. LEE KOK SEONG
M.SC. IN CHEMICAL ENGINEERING (IMPERIAL COLLEGE, LONDON UNIVERSITY), B.SC. IN CHEMICAL ENGINEERING (NATIONAL TAIWAN UNIVERSITY)

Kok Seong has accumulated vast experience in the areas of productivity training and management consultancy throughout his 30 years of experience with the Standards, Productivity and Innovation Board (SPRING). He has provided consultancy assistance and training for numerous organizations both within and outside of Singapore in the areas of Productivity Management, Operation and Production Management, total Quality Management, Total Productive Maintenance, Shopfloor Management, Occupational Safety Management, Industrial Engineering Applications and Supervisory Management. He has also been grewatly involved in the pinnacle Singapore Quality Award (SQA) initiave since its inception in 1993. his track records include the assessments and site visits of award recipients like Micron Semiconductor (formerly Texas Instruments), Motorola, Baxter Healthcare, Philips Tuner Factory and Teck Wah Industrial Corporation Ltd. Mr. Lee is currently a certified SQA Senior Assessor, as well as a resource person for Basic and Advanced Training Courses for Productivity Practitioners, a position he has taken on since 2007.

MR. LOW CHOO TUCK
M.SC. IN INDUSTRIAL ADMINSITRATION (UNIVERSITY OF ASTON, UK); B.SC. IN PHYSICS (NUS); DIP IN QUALITY CONTROL INSTRUCTORS (INTERNATIONAL QUALITY CENTRE, NETHERLANDS); CERTIFICATE IN PRODUCTIVITY DEVELOPMENT (JAPAN PRODUCTIVITY CENTRE); CERTIFICATE IN ADVANCED MANAGEMENT DEVELOPMENT (INSEASD)

Choo Tuck currently provides training and advisory services in productivity and quality management to companies and government in the Asean region and Middle East. He was previously the Executive Director of the Restaurant Association of Singapore as well as the Singapore Productivity Association, and was also the Director for Strategic Planning in SPRING Singapore. During his many years of service with SPRING Singapore, he gained wide experience in productivity training, management consultancy and productivity promotion, and has helped more than a 100 cmpannies in improving productity, quality control and business excellence, including organizations such as Cycle & Carriage, Motorola, PUB and DBS. On top of that, he has also served as an Asian Productivity Organisation (APO) exOn top of that, he has also served as an Asian Productivity Organisation (APO) expert on Productivity for several APO member countries, and was part of a team of experts engaged by the Singapore cooperation Enterprise to provide productivity expertise to the Government of Bahrain in 2007 and 2008.

MR. QUEK AIK TENG
B.ENG (HON.) IN MECHANICAL ENGINEERING (UNIVERSITY OF SHEFFIELD); DIP. IN BUSINESS EFFICIENCY (INDUSTRIAL ENGINEERING_ (PSB-ACADEMY); CERTIFIED MANAGEMENT CONSULTANT (CMC); PRACTISING MANAGEMENT CONSULTANT (PMC); MEMBER, INSTITUTE OF MANAGEMENT CONSULTANTS (IMC) SINGAPORE

Aik Teng currently manages his own consultancy, AT Consulting Services. Ne of his most recent projects includes being the LEAD Project Manager for the Singapre Logistics Association. Prior to running his own consultancy, he has been with SPRING Singapore for 20 years, and was the Head of the Organisation Excellence Department from 2004-05. he was also SQA Lead Assessor and Team Leader up till 2008 and has been involved in the SQA initiative since its inception in 1993. tasked to start up the consultancy unit within the then Productivity & Standards Board (PSB) to provide training and consultancy services to rganisations, his consulting team assisted close to 30 organisations during that period. He was also involved in a project coordinated by the Singapore Cooperatioini Enterprise (SCE) to assist the Bahrain Labour Fund in their Labour Reform strategy, which included helping the Bahrain government to initiate a Productivity Movement as well as develop the productivity of the local enterprises. In addition, he was appointed as Project Manager to assist the Government of Botswana to implement a national Productivity Movement, from 1994 to 2003. Botswana is currently held as a model of Productivity in the Pan-Africa region.

For more information on the course, please visit the Singapore Productivity Association at www.spa.org.sg, or write to us at CPP@spa.org.sg. Alternatively, you could also contact our secretariat:

Ms. Leanne Hwee DID: 6375 0938
Mr. Ashton Chionh DID: 6375 0940

The Singapore Productivity Association Productivity Seminar

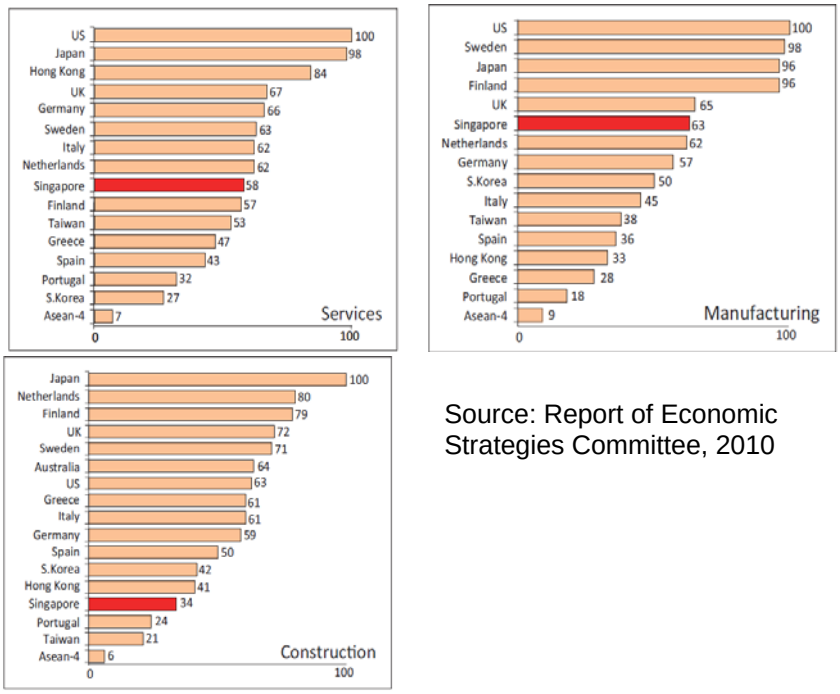
BASICS OF PRODUCTIVITY

Why a Productivity Seminar?
Singapore businesses and the workforce are gearing up to address productivity challenges that have arisen in the past decade.

Key findings from the recently disseminated Report of the Economic Strategies Committee highlighted that:

"In absolute levels, Singapore's productivity in manufacturing and services are only 55 to 65 percent of those in the US and Japan (see Figure 1). In the retail sector for example, our average level of productivity is about 75 percent of that in Hong Kong and one-third that of the US. In construction, productivity levels are half that of the US and one-third that of Japan."

Figure 1: Cross Country Productivity Comparisons[5]



Source: Report of Economic Strategies Committee, 2010

What is the Seminar about?

The Singapore Productivity Association has developed this Seminar for the purpose of providing information to all parties on the basics of productivity. Specifically, the seminar aims to:

- Refresh – everyone on the meaning and concepts of productivity
- De-myth – explain what productivity is and is not, especially in the current day context
- Inform – about the Tools, Techniques and Methodologies

What would you learn?

At the end of the seminar, you would understand:

- the key productivity concepts, including how productivity is measured
- the relevance and types of tools available to improve productivity
- the way forward to implementing productivity in your company.

Who should attend?

This seminar is targeted at employee that needs to understand the importance and relevance of productivity at work. They may be involved in developing and managing; or are part of teams that implement Productivity initiatives.

Targeted employee could include:

- Managers
- Senior Executives
- Supervisors
- Senior workers with team leadership responsibilities.

When and Where would this be held?

Please look out for our schedule on our website: www.spa.org.sg or contact Ms Leanne Hwee at DID: 6375 0938; Email: leanne.hwee@spa.org.sg

How to register?

To register, please fill out our Registration Form here:
http://www.spa.org.sg/images/events/downloads/RegistrationForm-PS.doc

Contact us

For more information about the seminar or future runs, please contact:
Ms Leanne Hwee at DID: 6375 0938; Email: leanne.hwee@spa.org.sg