

# SEMBIT3-12 - SQA Unit Code F9HX 04

## Applying total productive maintenance (TPM)



### Overview

This unit covers the competences required to apply total productive maintenance (TPM) principles to equipment and processes, and aims to prevent equipment problems by identifying potential causes rather than waiting for a problem to occur. It involves the measurement of the six classic hidden losses, assessment of potential and priorities for loss reduction. It covers the application of the TPM principles and processes to resources, such as plant and equipment, machines, office equipment, service equipment and utilities. It also concerns assessment of the equipment/process condition, the steps required to restore the equipment/process to good working order, and then to set a robust asset care regime to maintain this condition.

You will be required to apply the appropriate TPM techniques, and to use the data gathered on the resource to refine the working practices through the application of autonomous, condition based and planned maintenance. Working practice improvement will include cleaning and checking, early problem detection and process monitoring, and routine servicing. This will involve close working with both production and maintenance staff, and will include cross-shift implementation (if applicable to your organisation).

Your responsibilities will require you to comply with organisational policy and procedures for the activities undertaken, and to report any problems that you cannot solve, or that are outside your responsibility, to the relevant authority. You will also be responsible for ensuring that all tools and equipment used during the maintenance activities are correctly accounted for, and that all necessary job/task documentation is completed accurately and legibly. You will be expected to take full responsibility for your own actions within the activity, and for the quality and accuracy of the work that you carry out.

Your underpinning knowledge will provide a good understanding of your work, and will provide an informed approach to the TPM techniques and procedures used. You will need to understand the principles and procedures of TPM, and its application, in adequate depth to provide a sound basis for carrying out the activities to the required criteria.

Applying safe working practices will be a key issue throughout.

#### Performance criteria

*You must be able to:*

- P1 work safely at all times, complying with health and safety and other relevant regulations and guidelines
- P2 select the appropriate asset on which to carry out the Total Productive Maintenance activity
- P3 obtain the necessary information to carry out the activity
- P4 carry out the Total Productive Maintenance activity by applying the appropriate techniques
- P5 calculate and use the overall equipment effectiveness (OEE) measure and information to determine which elements of the OEE and their associated losses need improvement
- P6 develop and use an action plan which will reduce/eliminate the losses, and hence improve the overall equipment effectiveness
- P7 implement improvements to working practices through the Total Productive Maintenance activities

#### Knowledge and understanding

*You need to know and understand:*

- K1 the health and safety requirements of the area in which you are carrying out the Total Productive Maintenance activities
- K2 the principles of TPM, and how they can be applied in administration procedures, safety improvement and quality maintenance
- K3 how to select an asset on which to carry out the TPM activity (assets could be plant and equipment, machines, office equipment, service equipment, utilities)
- K4 how to implement a systematic and structured approach to carrying out autonomous, condition based and planned maintenance
- K5 the difference between a chronic and sporadic loss, and the countermeasures to both
- K6 how to calculate overall equipment effectiveness (OEE)
- K7 where to find the information required to calculate the OEE for the chosen asset
- K8 the benefits of having a total productive maintenance system
- K9 the importance of taking ownership of the TPM system, and the issues that can be expected to be resolved
- K10 the six major losses and how loss-reduction actions need to be prioritised
- K11 the use of standard operating procedures, single point lessons and machine/process start-up and shutdown procedures
- K12 an awareness of the improvement activities that will drive the implementation of the TPM activities (Kaizen and team working)
- K13 critical processes and early problem detection steps
- K14 loss areas and opportunities for improvement
- K15 standards of wear, and the ability to stabilise the component life
- K16 the techniques of visual management used to communicate the information and results obtained by this process (including TPM activity boards and checklists)
- K17 the integration with workplace organisation and improving OEE
- K18 contaminants and sources of contaminants
- K19 the extent of your own authority, and to whom you should report in the event of problems that you cannot resolve

### Additional Information

#### Scope/range related to performance criteria

You must be able to:

1. carry out the Total Productive Maintenance process on at least **two** assets from the following:
  - 1.1. plant and equipment
  - 1.2. machines
  - 1.3. office equipment
  - 1.4. service equipment
  - 1.5. utilities
2. carry out the Total Productive Maintenance process, and show how **one** of the following is undertaken:
  - 2.1. assess criticality of equipment/process condition and identify refurbishment needs
  - 2.2. identify an integrated asset care plan for both operator and maintenance staff
3. collect information relating to **all** of the following:
  - 3.1. load or demand
  - 3.2. capacity
  - 3.3. Takt time or bottleneck analysis
4. carry out **all** of the following Total Productive Maintenance activities:
  - 4.1. autonomous maintenance (front line asset care)
  - 4.2. condition based maintenance (predictive)
  - 4.3. planned maintenance steps (fixed interval)
5. show improvements to working practices through **three** of the following:
  - 5.1. initial cleaning
  - 5.2. countermeasures for cause and effect of dust and dirt
  - 5.3. cleaning and lubrication standards
  - 5.4. general inspection
  - 5.5. autonomous inspection
  - 5.6. workplace organisation
  - 5.7. full circle implementation of autonomous maintenance

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