

## Overview

This standard identifies the competences you need to lead maintenance activities by carrying out corrective maintenance activities on mechanical equipment within an engineered system, in accordance with approved procedures. You will be required to maintain a range of mechanical equipment, such as gearboxes, pumps, machine tools, conveyor systems, workholding arrangements, engines, processing plant and equipment, which are working in an integrated system involving two or more of the following interactive technologies: electrical, fluid power or process controllers. You will also be required to identify and implement a systematic approach to improving the equipment maintenance activities undertaken and ensure that the maintenance team have to appropriate skills, knowledge and understanding to maintain the equipment efficiently, effectively and safely.

You will be expected to isolate and disconnect items and components of the interactive technologies in order to gain access to and remove the mechanical units and components that require replacing or repair. This will involve dismantling and reassembling a variety of different types of assemblies and sub-assemblies which, in some instances, will need to be dismantled to component level.

Your responsibilities will require you to comply with organisational policy and procedures for the maintenance activities undertaken, and to report any problems with the maintenance activities, tools or equipment used that you cannot personally resolve, or that are outside your permitted authority, to the relevant people. You must ensure that all tools, equipment and materials used in the maintenance activities are removed from the work area on completion of the work, and that all necessary job/task documentation is completed accurately and legibly. You will be expected to work with minimal supervision, taking personal responsibility for your own actions, and for the quality and accuracy of the work that you carry out.

Your underpinning knowledge will provide an in depth understanding of your work, and will provide an informed approach to applying mechanical maintenance procedures within an engineered system. You will know about the integrated technology assemblies and sub-assemblies, and their properties, functions and associated defects, in adequate depth to provide a sound basis for carrying out the dismantling and reassembly process safely and effectively. You will also understand the maintenance methods and procedures used, and their application within the

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engineered system, in sufficient depth to be able to carry out the maintenance activities, correct faults, and ensure that the maintained equipment functions to specification and remains compliant with all standards and regulations. You will also know about the interaction of the other associated integrated technologies and have sufficient knowledge to carry out the dismantling and reassembly safely and effectively.

You will understand the safety precautions required when carrying out the maintenance activities, especially those for isolating the equipment and taking the necessary safeguards to protect yourself and others in the workplace. You will be required to demonstrate safe working practices throughout.

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## Performance criteria

### *You must be able to:*

1. work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines
2. produce and update relevant maintenance schedules and plans
3. lead maintenance activities within the limits of your personal authority
4. carry out the maintenance activities in the specified sequence and in an agreed timescale
5. report any instances where the maintenance activities cannot be fully met or where there are identified defects outside the planned schedule
6. complete relevant maintenance documentation accurately
7. dispose of waste materials in accordance with safe working practices and approved procedures
8. identify and lead on making improvements to maintenance processes and procedures
9. update management information and systems to support the activities of the maintenance department

## Knowledge and understanding

### *You need to know and understand:*

1. the health and safety requirements of the area in which the maintenance activity is to take place, and the responsibility these requirements place on you
2. how to prioritise your own and the team's workload to ensure that targets are met
3. how to communicate effectively, listen, question, support and coach others to work towards the departmental targets
4. the importance of ensuring that teams have the required skills, knowledge and understanding in order to maintain equipment to the required standards
5. how to complete a skills audit of team members
6. how maintenance teams can access the appropriate training and development programmes once a need training need has been identified
7. the isolation and lock-off procedure or permit-to-work procedure that applies to the system
8. the specific health and safety precautions to be applied during the maintenance activity, and their effects on others
9. how to recognise and deal with victims of electric shock (to include methods of safely isolating the power source and methods of first aid resuscitation)
10. the importance of wearing protective clothing and other appropriate safety equipment during the maintenance activities
11. hazards associated with carrying out maintenance activities on an integrated system (such as handling fluids, stored pressure/force, electrical supplies, process controller interface, using damaged or badly maintained tools and equipment, not following laid-down maintenance procedures) and how to minimise these and reduce any risks
12. how to obtain and interpret drawings, charts, specifications, manufacturers' manuals, history/maintenance reports and other documents needed for the maintenance activities
13. the basic principles of how the system functions, its operation sequence, the working purpose of individual units/components, and how they interact
14. the various fault finding techniques that can be used, and how they are applied (such as half-split, input/output, emergent problem sequence, six point technique, functional testing, unit substitution, injection and sampling techniques, and equipment self-diagnostics)
15. how to evaluate the various types of information available for fault diagnosis

(such as operator reports, monitoring equipment, sensory inputs, machinery history records, and condition of the end product)

16. how to evaluate sensory information from sight, sound, smell, touch

17. the procedures to be followed to investigate faults, and how to deal with intermittent conditions

18. how to use the various aids and reports available for fault diagnosis

19. the types of equipment that can be used to aid fault diagnosis (such as mechanical measuring instruments, electrical measuring instruments, test rigs, and pressure and flow devices), and how to check the equipment is calibrated or configured correctly for the intended use, and that it is free from damage and defects

20. the application of specific fault finding methods and techniques that are best suited to the problem

21. how to analyse and evaluate possible characteristics and causes of specific faults/problems

22. how to make use of previous reports/records of similar fault conditions

23. how to evaluate the likely risk of running the equipment with the displayed fault, and the effects the fault could have on the overall process

24. the procedure for obtaining replacement parts, materials and other consumables necessary for the maintenance

25. company policy on repair/replacement of components during the maintenance activities

26. the sequence to be adopted for dismantling and reassembling the equipment, to both sub-assembly and individual component level

27. methods of removing components that have interference fits (expansion, contraction or pressure)

28. the techniques used to dismantle/assemble integrated equipment (such as release of pressures/force, proof marking to aid assembly, plugging exposed pipe/component openings, dealing with soldered joints, screwed, clamped and crimped connections)

29. methods of attaching identification marks/labels to removed components or cables, to assist with re-assembly

30. methods of checking that components are fit for purpose, and the need to replace 'lived' items (such as seals, gaskets and bearings)

31. how to make adjustments to components/assemblies, to ensure they function correctly

32. how to check that tools and equipment are free from damage or defects, are in

- a safe and usable condition, and are configured correctly for the intended purpose
33. the importance of making 'off-load' checks before proving the equipment with the electrical supply on
  34. the generation of maintenance documentation and/or reports on completion of the maintenance activity
  35. the equipment operating and control procedures to be applied during the maintenance activity
  36. how to use lifting and handling equipment safely and correctly in the maintenance activity
  37. the problems that can occur during the maintenance activity, and how they can be overcome
  38. the organisational procedure to be adopted for the safe disposal of waste of all types of material
  39. how to conduct a systematic plan, do, check, act (PDCA) approach to problem-solving and business improvement
  40. how to evaluate improvement ideas in order to select those that are to be pursued
  41. how improvements to the process are achieved by engaging the knowledge and experience of the people working on the process
  42. how to create or update Standard Operating Procedures (SOP's) maintenance schedules and plans.
  43. the techniques required to communicate information using visual control systems (such as card systems, colour coding, floor footprints, graphs and charts, team boards, tool/equipment shadow boards)
  44. the extent of your authority and to whom you should report if you have a problem that you cannot resolve

SEMEM445

Carrying out maintenance activities on mechanical equipment within an engineered system



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## Scope/range related to performance criteria