

## Overview

This unit identifies the competences you need to locate faults on mechanical equipment, in accordance with approved procedures. You will be required to locate faults on equipment such as machine tools, gearboxes, portable tools, engines, pumps, process control valves, compressors, process plant, conveyers and elevators, lifting and handling devices, transfer equipment, mechanical structures, workholding devices and other company-specific equipment. You will be expected to use a variety of fault location methods and procedures, such as gathering information from the person who reported the fault, using recognised fault finding techniques and diagnostic aids, measuring, inspecting and operating the equipment.

Your responsibilities will require you to comply with organisational policy and procedures for the fault location activities undertaken, and to report any problems with these activities, or with the tools and equipment used, that you cannot personally resolve or are outside your permitted authority, to the relevant people. You will be expected to work to instructions, alone or in conjunction with others, taking full responsibility for your own actions, and for the quality and accuracy of the work that you carry out.

Your underpinning knowledge will be sufficient to provide a sound basis for your work, and will provide an informed approach to applying fault location procedures on mechanical equipment. You will have an understanding of the basic fault location methods and techniques used, and their application. You will also know how to interpret information obtained from fault finding aids and equipment, in adequate depth to provide a sound basis for carrying out the activities.

You will understand the safety precautions required when carrying out the fault location activities, especially those for isolating the equipment. You will also understand your responsibilities for safety, and the importance of taking the necessary safeguards to protect yourself and others in the workplace.

## SEMEMI2-05 - SQA Unit Code H2AK 04

### Carrying out fault location on mechanical equipment

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#### 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 review and use all relevant information on the symptoms and problems associated with the products or assets
- P3 investigate and establish the most likely causes of the faults
- P4 select, use and apply diagnostic techniques, tools and aids to locate faults
- P5 complete the fault diagnosis within the agreed time and inform the appropriate people when this cannot be achieved
- P6 determine the implications of the fault for other work and for safety considerations
- P7 use the evidence gained to draw valid conclusions about the nature and probable cause of the fault
- P8 record details on the extent and location of the faults in an appropriate format

#### Knowledge and understanding

*You need to know and understand:*

- K1 the health and safety requirements of the area in which the fault location is to take place, and the responsibility these requirements place on you
- K2 the isolation and lock-off procedure or permit-to-work procedure that applies in the work area
- K3 the importance of wearing protective clothing and other appropriate safety equipment during fault location activities
- K4 hazards associated with carrying out fault location on mechanical equipment (such as moving machinery, handling oils and greases, stored pressure/force, misuse of tools), and how they can be minimised
- K5 the procedure to be adopted to establish the background of the fault
- K6 how to use the various diagnostic aids to help identify the location of the fault
- K7 the various fault location techniques that can be used, and how they are applied (such as half-split, input-to-output, function testing, unit substitution, and equipment self-diagnostics)
- K8 how to evaluate sensory information (such as sight, sound, smell, touch)
- K9 how to assess evidence and evaluate the possible causes of faults/problems
- K10 how to use a range of fault diagnostic equipment to investigate the problem
- K11 the care, handling and application of mechanical measuring/test equipment (such as measuring instruments, dial test indicators, flow meters, torque measuring devices, pressure/force detectors)
- K12 how to check that mechanical measuring/test equipment is within calibration, and that it is free from damage and defects
- K13 how to obtain and interpret information from job instructions and other documents needed in the fault location process (such as drawings, charts, specifications, manufacturers' manuals, history/maintenance reports, graphical symbols)
- K14 the basic principles of how the mechanical equipment functions, its operating sequence, the purpose of individual units/components and how they interact
- K15 the problems that can occur during the fault location activity, and how they can be minimised
- K16 how to evaluate the likely risk to yourself and others, and the effects the fault could have on the overall process or system
- K17 the importance of completing the correct documentation following the fault locating activity
- K18 the extent of your own authority and to whom you should report if you have a problem that you cannot resolve

### Additional Information

#### Scope/range related to performance criteria

*You must be able to:*

1. carry out **all** of the following during the fault locating activity:
  - 1.1. plan the fault location methods and procedures in conjunction with others
  - 1.2. obtain and use the correct issue of maintenance documentation (such as drawings, manuals, maintenance records)
  - 1.3. adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment and other relevant safety regulations
  - 1.4. ensure the safe isolation of equipment (such as mechanical, electricity, gas, air or fluids)
  - 1.5. ensure that safe access and working arrangements have been provided for in the fault finding area
  - 1.6. carry out the fault location activities, using approved procedures
  - 1.7. identify the fault, and consider appropriate corrective action
  - 1.8. in conjunction with others, take actions to resolve the problem
  - 1.9. dispose of waste items in a safe and environmentally acceptable manner
  - 1.10. leave the work area in a safe and tidy condition
  
2. carry out fault location on **two** of the following types of mechanical equipment:
  - 2.1. gearboxes
  - 2.2. machine tools
  - 2.3. lifting and handling devices
  - 2.4. transfer equipment
  - 2.5. portable power tools
  - 2.6. engines
  - 2.7. pumps
  - 2.8. process control valves
  - 2.9. compressors
  - 2.10. process plant
  - 2.11. workholding devices
  - 2.12. conveyers and elevators
  - 2.13. mechanical structures
  - 2.14. company-specific equipment
  
3. use **four** of the following diagnostic techniques, tools and aids to assist in locating the fault:
  - 3.1. information gathered from the person that reported the fault
  - 3.2. fault finding techniques (such as six point, half-split, input/output, unit substitution, emergent sequence)

## SEMEMI2-05 - SQA Unit Code H2AK 04

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---

- 3.3. diagnostic aids (such as manuals, flow charts, troubleshooting guides, maintenance records)
  - 3.4. inspecting (such as checking for breakages, wear/deterioration, overheating, missing parts, loose fittings)
  - 3.5. operating (such as manual switching off and on, running equipment, condition of end product)
4. use **two** of the following types of instruments to assist in locating faults:
  - 4.1. measuring instruments/devices
  - 4.2. dial test indicators
  - 4.3. torque measuring devices
  - 4.4. flow meters
  - 4.5. alignment devices
  - 4.6. self-diagnostic equipment
  - 4.7. pressure/force indicators
  - 4.8. other specific test/measurement instruments
5. locate faults that have resulted in **two** of the following breakdown categories:
  - 5.1. intermittent problem
  - 5.2. partial failure/out-of-specification output
  - 5.3. complete breakdowns
6. complete **one** of the following maintenance records, and pass it to the appropriate person:
  - 6.1. scheduled maintenance report
  - 6.2. corrective maintenance report
  - 6.3. company-specific report

## SEMEMI2-05 - SQA Unit Code H2AK 04

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<b>Developed by</b>	SEMTA
<b>Version number</b>	1
<b>Date approved</b>	August 2008
<b>Indicative review date</b>	December 2014
<b>Validity</b>	Current
<b>Status</b>	Original
<b>Originating organisation</b>	SEMTA
<b>Original URN</b>	05
<b>Relevant occupations</b>	Engineering Professionals; Engineering; Manufacturing technologies; Engineering Technicians; Process Operatives; Plant and Machine Operatives; Assemblers and Routine Operatives
<b>Suite</b>	Engineering Maintenance And Installation Suite 2 2008
<b>Key words</b>	Engineering, manufacturing, maintenance, fault location, mechanical, gearboxes, process plant, engines, pumps