SEMEM306

Maintaining mechanical equipment

Overview

This standard identifies the competences you need to carry out corrective maintenance activities on mechanical equipment, in accordance with approved procedures. You will be required to maintain a range of mechanical equipment, such as gear boxes, pumps, machine tools, conveyor systems, workholding arrangements, engines, processing plant and equipment, and other organisation-specific equipment. This will involve dismantling, removing and replacing faulty equipment at component or unit level on a variety of different types of mechanical assemblies and sub-assemblies.

You will be expected to apply a range of dismantling and assembling methods and techniques, such as proof marking to aid reassembly, dismantling components requiring pressure or expansion/contraction techniques, setting, aligning and adjusting components, torque loading components and making `off-load' checks before starting up the maintained equipment.

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 or the tools and 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 activities, 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 a good understanding of your work, and will provide an informed approach to applying mechanical maintenance procedures. You will understand the dismantling and reassembly methods and procedures, and their application. You will know how the equipment functions and the purpose of the individual components and associated defects, in adequate depth to provide a sound basis for carrying out the maintenance activities, correcting faults and ensuring the repaired equipment functions to the required specification and remains compliant with all standards and regulations. In addition, you will have sufficient in-depth knowledge of these components to ensure that they are fit for purpose and meet the specifications, thus providing a sound basis for carrying out reassembly.

You will understand the safety precautions required when carrying out the maintenance 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.

Performance criteria

You must be able to:

1. work safely at all times, complying with health and safety legislation and other relevant regulations, directives and guidelines
2. follow the relevant maintenance schedules to carry out the required work
3. carry out the 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 and store all relevant maintenance records accurately in accordance with organisational requirements
7. dispose of waste materials in accordance with safe working practices and approved procedures and leave the work area in a safe condition

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. the isolation and lock-off procedures or permit-to-work procedure that applies
3. the specific health and safety precautions to be applied during the maintenance procedure, and their effects on others
4. hazards associated with carrying out mechanical maintenance activities (such as handling oils, greases, stored pressure/force, misuse of tools, using damaged or badly maintained tools and equipment, not following laid-down maintenance procedures), and how to minimise these and reduce any risks
5. the importance of wearing protective clothing and other appropriate safety equipment (PPE) during maintenance process
6. how to obtain and interpret drawings, specifications, manufacturers' manuals and other documents needed in the maintenance process
7. the procedure for obtaining replacement parts, materials and other consumables necessary for the maintenance activities
8. organisational policy on repair/replacement of components during the maintenance process
9. the sequence to be adopted for the dismantling/re-assembly of various types of assemblies
10. the methods and techniques used to dismantle/assemble mechanical equipment (such as release of pressures/force, proof marking, extraction, pressing, alignment, torque loading)
11. methods of checking components are fit for purpose, and how to identify defects and wear characteristics
12. the basic principles of how the equipment functions, operation sequence, the working purpose of individual units/components and how they interact
13. the identification, application, fitting and removal of different types of bearings (such as ball, roller, ring, thrust)
14. methods and techniques of fitting keys and splined components
15. identification, application, fitting and removal of different types of gears
16. how to correctly tension and align belts and chains
17. the identification and application of different types of locking devices

18. methods of checking that removed components are fit for purpose, and the need to replace `lifed' items (such as seals and gaskets)
19. the uses of measuring equipment (such as micrometers, Verniers, run-out devices and other measuring devices)
20. how to make adjustments to components/assemblies to ensure they function correctly (such as setting working clearance, setting travel, setting backlash in gears, preloading bearings)
21. the importance of making `off-load' checks before running the equipment under power
22. how to check tools and equipment are free from damage or defects, are in a safe and usable condition, are configured correctly for the intended purpose and are all accounted for
23. the importance of maintenance documentation and/or reports following the maintenance activity, and how to generate them
24. the equipment operating and control procedures to be applied during the maintenance activity
25. how to use lifting and handling equipment in the maintenance activity
26.
the problems associated with the maintenance activity, and how they can be overcome
27.
the organisational procedure(s) to be adopted for the safe disposal of waste of all types of materials
28.
the extent of your own authority and to whom you should report if you have a problem that you cannot resolve

Scope/range

1.

Carry out all of the following during the maintenance activity:

1.1 plan and communicate the maintenance activities to cause minimal disruption to normal working
1.2 obtain and use the correct issue of organisational and/or manufacturer's drawings and maintenance documentation
1.3 adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work
1.4 ensure the safe isolation of equipment (such as mechanical, electricity, gas, air or fluids) and safe release of stored energy
1.5 provide and maintain safe access and working arrangements for the maintenance area
1.6 carry out the maintenance activities using appropriate techniques and procedures
1.7 record the results of the maintenance activity and report any defects found
1.8 re-connect and return the system to service on completion of activities and ensure all tools and components are accounted for
1.9 dispose of waste materials in accordance with safe working practices and approved procedures and leave the work area in a safe condition

2.

Carry out maintenance activities on three of the following types of equipment:

2.1 gearboxes
2.2 engines
2.3 transfer equipment
2.4 machine tools
2.5 pumps
2.6 mechanical structures
2.7 conveyors/elevators
2.8 lifting and handling equipment
2.9 process control valves
2.10 workholding devices
2.11 processing plant
2.12 compressors
2.13 organisational-specific equipment

3.

Carry out all of the following maintenance techniques, as applicable to the equipment being maintained:

3.1 dismantling equipment to unit/sub-assembly level
3.2 setting, aligning and adjusting replaced components
3.3 proof marking/labelling of components

3.4 dismantling units to component level
3.5 checking components for serviceability
3.6 replacing all lifed items (such as seals, bearings, gaskets)
3.7 replacing damaged/defective components
3.8 tightening fastenings to the required torque
3.9 replenishing oils and greases
3.10 safety system checks
3.11 making `off-load' checks before starting up
3.12 functionally testing the completed system

4.

Replace/refit a range of mechanical components, to include ten of the following:

4.1 shafts
4.2 brakes
4.3 cams and followers
4.4 wire ropes/cables
4.5 couplings
4.6 bearing and seals
4.7 chains & sprockets
4.8 housings
4.9 gears
4.10 seals
4.11 pulleys and belts
4.12 actual mechanisms
4.13 clutches
4.14 fitting keys
4.15 levers and links
4.16 structural components
4.17 valves and seats
4.18 springs
4.19 slides
4.20 locking and retaining devices (such as circlips, pins, lock nuts)
4.21 pistons
4.22 diaphragms
4.23 rollers
4.24 splined components
4.25 blades
4.26 pumps
4.27 pipework
4.28 flanges/gaskets
4.29 other specific components

5.

Maintain mechanical equipment which complies with one of the following:

5.1 organisational guidelines and codes of practice
5.2 equipment manufacturer's operation range
5.3 BS, ISO and/or BSEN standards

6.

Complete and store all relevant maintenance records accurately in accordance with organisational requirements, using one of the following:

6.1 job cards
6.2 permit to work/formal risk assessment and/or sign-on/off procedures
6.3 maintenance log or report
6.4 organisational-specific documentation
6.5 electronic reports

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