

Repairing and modifying mechanical assemblies

Overview

This standard identifies the competences you need to carry out modifications on mechanical assemblies, in accordance with approved procedures. The assembly may have to be modified for a number of reasons, which could include performance out of specification, inherent design problems, changes to customer specification, or assembly problems. You will be required to prepare the work area, ensuring it is safe and free from hazards, to check the correct component parts requiring modification are available, to obtain all relevant and current documentation, and to obtain the tools and equipment required for the modification, checking that they are in a safe and usable condition. In carrying out the modification, you will be required to follow the appropriate company procedures and specified techniques.

The assembly and its components could be modified using a number of methods and techniques including, where appropriate, adjusting, removing and replacing, or repairing, or by manufacturing new components by machining, welding, fabricating or bonding. Component parts that are modified must be checked for accuracy, security, completeness, and that they function as per the specification.

Your responsibilities will require you to comply with organisational policy and procedures for the modification activities undertaken, and to report any problems with the modification activities, materials or equipment that you cannot personally resolve, or are outside your permitted authority, to the relevant people. You will be expected to ensure that all tools, equipment and materials used in the modification are correctly accounted for on completion of the activities, and to complete all necessary job/task documentation accurately and legibly. You will be expected to work with a minimum of 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 the modification methods, techniques and procedures. You will understand the mechanical product being modified, including its application and reason for the modification, and will know about the tools and equipment required, in adequate depth to provide a sound basis for carrying out the activities to the required specification.

You will understand the safety precautions required when carrying out the modification activities. You will be required to demonstrate safe working practices throughout, and will understand the responsibility you owe to yourself and others in the workplace.

Repairing and modifying mechanical assemblies

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. obtain the relevant specification and job instructions for the modification being performed
3. confirm and agree what modification is to be carried out to meet the specification
4. determine how the assembly will be prepared for the modification
5. check that any materials and equipment required are available and that they are suitable for the work to be carried out
6. carry out the modification to achieve the required changes, in line with agreed instructions and specifications
7. complete relevant documentation in accordance with organisational requirements
8. deal promptly and effectively with problems within your control and report those that cannot be solved

Repairing and modifying mechanical assemblies

Knowledge and understanding

You need to know and understand:

1. how to work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines
2. regulations with regard to the substances used in the modification process
3. the hazards associated with modifying mechanical assemblies, and how to minimise them and reduce any risks
4. the personal protective equipment and clothing (PPE) to be worn during the modification activities
5. the various types of drawing and specifications that are used during the modification
6. how to extract and use information from engineering drawings and related specifications (to include symbols and conventions to appropriate standards) in relation to work undertaken
7. how to interpret first and third angle drawings, imperial and metric systems of measurement, workpiece reference points and system of tolerancing
8. the reasons why mechanical assemblies may require modification
9. preparations to be undertaken on the components prior to carrying out the modification
10. the various methods that could be used to modify assemblies (such as adjust, remove and replace, repair, modify or manufacture new parts)
11. the basic concepts and techniques that can be used, where appropriate, to modify the assembly
12. the quality control procedures to be followed during the modification, and the importance of adhering to them
13. how to conduct any necessary checks to ensure the accuracy, position, security, function and completeness of the modification
14. the methods and equipment used to transport, lift and handle components and assemblies
15. how to check that the tools and equipment to be used are correctly calibrated and are in a safe and serviceable condition
16. the importance of ensuring that all tools are used correctly and within their permitted operating range
17. the importance of ensuring that all tools, equipment and components are accounted for and returned to their correct location on completion of the modification activities
18. problems associated with carrying out modifications on mechanical assemblies, and the importance of informing appropriate people of non-conformances
19. the extent of your own responsibility and to whom you should report if you have problems that you cannot resolve

Scope/range related to performance criteria

1. Carry out all of the following during the modification activities:
 1. obtain and use the appropriate documentation
 2. adhere to procedures or systems in place for risk assessment, personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work
 3. follow safe practice/approved modification and repair techniques at all times
 4. check that all cables, extension leads or air supply hoses are in a serviceable condition
 5. check that all tools and measuring equipment are within current calibration/certification dates
 6. use lifting and slinging equipment in accordance with health and safety guidelines and procedures
 7. ensure that all components to be assembled are free from damage, foreign objects, dirt or other contamination before assembling them
 8. return all tools and equipment to the correct location on completion of the assembly activities
 9. leave the work area and assembly in a safe and appropriate condition on completion of the activities
2. Carry out the modification, using two of the following methods:
 1. adjustment
 2. modify existing components
 3. remove and replace with new components
 4. manufacture of new components
3. Complete the modification, using two of the following techniques:
 1. dismantling and re-assembling
 2. fluid power fitting and assembly
 3. welding
 4. hand fitting
 5. bonding
 6. fabrication
 7. electrical fitting and assembly
 8. adjusting
 9. machining
4. Carry out modifications on one of the following parts of the assembly:
 1. holding mechanism
 2. drive mechanism
 3. transfer system
 4. operating system
 5. fluid power system
 6. pipework system
 7. control mechanism

Repairing and modifying mechanical assemblies

8. delivery system
9. safety mechanism
10. assembly structure (such as framework, casings, panels)
11. other specific assembly
5. Carry out the quality checks, to include eight from the following, using appropriate equipment:
 1. dimensions
 2. orientation
 3. bearing end float
 4. positional accuracy
 5. alignment
 6. function
 7. freedom of movement
 8. completeness
 9. earth bonding and electrical continuity
 10. operating/working clearances
 11. component security
 12. free from damage or foreign objects
6. Ensure that the repairs and modifications comply with one of the following quality and accuracy standards:
 1. BS, ISO or BSEN standards and procedures
 2. company standards and procedures
 3. customer standards and requirements
 4. specific system requirements

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