
Overview

This standard identifies the competences you need to cut and shape sheet materials to produce components for experimental vehicle development activities, in accordance with approved procedures. You will be required to select the appropriate tools and equipment, and to check that they are in a safe and serviceable condition to use. You will be expected to use a range of different sheet materials, including existing vehicle components, ensuring efficient use of them. In carrying out the cutting and shaping activities, you will need to use a range of hand tools, portable power tools and simple machines to produce a variety of shapes, profiles and forms.

Your responsibilities will require you to comply with organisational policy and procedures for the sheet metal cutting and shaping activities, and to report any problems with the activities, materials, tools or equipment that you cannot personally resolve, or that are outside your permitted authority, to the relevant people. 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 sheet metal cutting, shaping and forming procedures and instructions. You will understand the cutting and shaping methods and techniques used, and their application, and will know about the tools, equipment, materials and consumables, 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 working with the sheet metal cutting and shaping equipment. You will be required to demonstrate safe working practices throughout, and will understand the responsibility you owe to yourself and others in the workplace.

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. follow relevant specifications for the component to be produced
3. obtain the appropriate tools and equipment for the cutting and shaping operations and check they are in a safe and usable condition
4. cut and shape the metal using appropriate methods and techniques
5. check that all the required shaping operations have been completed to the required specification
6. deal promptly and effectively with problems within your control and report those that cannot be solved
7. ensure that work records are completed, stored securely and available to others as per organisational requirements
8. leave the work area in a safe condition on completion of the activities, as per organisational and legal requirements

Knowledge and understanding

You need to know and understand:

1. the specific safety precautions to be taken whilst carrying out the activities (including any specific legislation, regulations or codes of practice relating to the activities, equipment or materials)
2. the health and safety requirements of the work area and the activities, and the responsibility these requirements place on you
3. the hazards associated with the activities, and how to minimise them and reduce risks
4. the personal protective equipment and clothing (PPE) to be worn during the activities
5. the procedure for obtaining the required drawings, sketch, development sheets job instructions and other related specifications, and how to interpret them correctly
6. the range of hand and power-operated tools to be used for the cutting and shaping operations
7. the shaping methods and techniques that can be used to produce a range of shapes/profiles on the various sheet materials (sawing, shearing, drilling, filing, abrading)
8. the range of bending and forming machines to be used (such as fly presses, bending machines, rolling machines, flanging machines)
9. the formulae and calculations involved in bend and flange development
10. how to set up a bending machine to produce a range of forms (such as right-angled bends, angled bends, tray sections, channel sections)
11. how to set up simple presses to produce a variety of forms (such as bends, profiles)
12. how to set up pinch/pyramid forming rolls to produce a variety of forms (such as curved profiles, cylinders, cones, flattening of plates)
13. how to produce flanges on curved/cylindrical components using machines and hand tools
14. how to identify the materials to be used, and their characteristics when shaping and bending
15. how to check that the tools and equipment to be used are in a safe, tested and serviceable condition
16. the quality control procedures to be followed; how to conduct any necessary

checks to ensure the accuracy and quality of the components produced

17. the importance of ensuring that all tools and equipment are used in the correct manner and within their permitted operating range

18. how to select saw blades for different applications and materials; methods of setting saw blades for cutting externally and internally (such as hand saws, mechanical saws, band saws)

19. the various shearing methods that can be used (such as tin snips, bench shears, guillotines, cropping machines and nibbling machines)

20. methods of drilling and finishing holes in sheet and stock materials (such as drills, reamers, countersinks, hole saws)

21. the types of files that are available; the cut of files for different applications; the importance of ensuring file handles are safe and free from embedded foreign bodies

22. the problems that can occur with the cutting and shaping operations, and how these can be overcome

23. the extent of your own responsibility and to whom you should report if you have problems that you cannot resolve

24. how to access, use and maintain information to comply with organisational requirements and legislation

Scope/range related to performance criteria

1.

Carry out all of the following during the sheet metal shaping activities:

- 1.1 obtain and use the appropriate documentation (such as job instructions, component drawings, quality control documentation)
- 1.2 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
- 1.3 check that all cables, extension leads or air supply hoses are in a safe, tested and serviceable condition
- 1.4 check that all tools and equipment to be used are within current calibration/certification dates
- 1.5 obtain appropriate materials for the work in hand
- 1.6 mark out the components accurately, using industry standards and conventions
- 1.7 set and hold the components firmly during the cutting and shaping operations
- 1.8 use safe and approved sheet metal cutting and shaping techniques and procedures
- 1.9 return all tools and equipment to the correct location on completion of the activities
- 1.10 leave the work area in a safe and appropriate condition on completion of the activities

2.

Produce components for experimental vehicle development purposes, to include both of the following:

- 2.1 modifying existing vehicle components
- 2.2 producing components from new material

3.

Cut and shape the materials using four of the following:

- 3.1 saws (hand or mechanical)
- 3.2 tin snips
- 3.3 punch/cropping machines
- 3.4 guillotines
- 3.5 drills and hole saws
- 3.6 files
- 3.7 nibblers
- 3.8 trepanning tools
- 3.9 abrasive discs
- 3.10 laser/water cutting tools

4.

Produce components with features that include five of the following:

- 4.1 edges/faces that are square to each other
- 4.2 internal profiles
- 4.3 edges/faces that are parallel
- 4.4 external profiles
- 4.5 edges/faces that are angled
- 4.6 holes linearly pitched
- 4.7 curved or circular forms
- 4.8 radially pitched holes

5.

Cut, shape and form materials using four of the following:

- 5.1 bench folding machines
- 5.2 shrinking techniques
- 5.3 rolling machines
- 5.4 stretching techniques
- 5.5 presses

6.

Produce components with a range of features that include five of the following:

- 6.1 right-angle bend
- 6.2 curved/circular flanges
- 6.3 conical
- 6.4 angled bend
- 6.5 curved profile
- 6.6 dished
- 6.7 square flanges
- 6.8 cylinder shape
- 6.9 multi-profiled
- 6.10 tray section and channels

7.

Use two types of material from:

- 7.1 mild steel
- 7.2 stainless steel
- 7.3 brass
- 7.4 alloy steel
- 7.5 aluminium
- 7.6 composite material
- 7.7 other specific material

8.

Check that components which meet all of the following quality and accuracy standards:

- 8.1 meet company standard requirements
- 8.2 meets job requirements
- 8.3 dimensionally accurate within specification tolerance
- 8.4 free from distortion, false tool marks or damage
- 8.5 free from sharp edges, slivers or burrs

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