SEMFWE223 - SQA Unit Code J4M2 04

Forming sheet metal using hand and machine tools

Overview

This standard identifies the competencies you need to form sheet metal (up to and including 3mm) using hand tools and machine tools, in accordance with approved procedures. You will be required to select the appropriate equipment to use, based on the operations required, material to be formed and the accuracy to be achieved, and this will include such equipment as hammers and stakes, formers, bending machines and rolling machines. The components/shapes to be produced will include bends, folds, cylinders, curved sections, ducting or trunking.

Your responsibilities will require you to comply with organisational policy and procedures for the forming activities undertaken, and to report any problems with the tools and equipment, materials or activities that you cannot personally resolve, or are outside your permitted authority, to the relevant people. You will be expected to work to instructions, 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 be sufficient to provide a good understanding of your work, and will provide an informed approach to applying sheet metal forming procedures. You will have an understanding of the forming processes, the equipment used and its application, and will know about the materials and forming techniques, in adequate depth to provide a sound basis for carrying out the activities and producing the components to the required specification.

You will understand the safety precautions required when working with the forming machines and their associated tools and 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 the correct component drawing and any other related specifications for the component to be produced
3. determine what has to be done and how this will be achieved
4. use the appropriate tools and equipment for the metal shaping operations and check that they are in a safe and usable condition
5. shape the materials to the required specification using appropriate methods and techniques
6. check that all the required shaping operations have been completed to the required standard
7. deal promptly and effectively with problems within your control and report those that cannot be solved

Knowledge and understanding

You need to know and understand:

1. the specific safety precautions to be taken when working with sheet metal equipment and materials in a fabrication environment (general workshop and site safety, appropriate personal protective equipment (PPE), accident procedure; statutory requirements, risk assessment procedures and relevant requirements of HASAWA, COSHH and Work Equipment Regulations; safe disposal of waste materials)
2. the personal protective clothing and equipment (PPE) to be worn when carrying out the fabrication activities (such as leather apron and gloves, eye/ear protection, safety helmets)
3. the correct methods of moving or lifting sheet or plate materials
4. the hazards associated with sheet metalwork (such as handling sheet/fabricated components, using machinery, using dangerous or badly maintained tools and equipment), and how they can be minimised
5. how to obtain the necessary drawings, specifications and work instructions
6. how to use and extract information from engineering drawings and related specifications (to include symbols and conventions to appropriate British, European or relevant International standards in relation to work undertaken)
7. marking out conventions used in sheet metalwork, and how to recognise cutting detail and bending and folding lines
8. hand tools are used in sheet metal forming activities, and typical operations that they are used for (such as a range of hammers, stakes, formers)
9. the various machine-tool forming equipment that can be used to produce a range of shapes (such as bends, cylinders and curved sections)
10. how the materials are to be prepared for the forming operations
11. tool and equipment care and maintenance procedures
12. dimensional and forming inspection checks that need to be carried out, and the tools and equipment to be used
13. the problems that can occur with forming sheet metal, and how these can be avoided
14. limitations of the various forming processes, and accuracy that may realistically be achieved

15. ways of avoiding inaccuracies in forming activities
16. the extent of your own authority and whom you should report to if you have problems that you cannot resolve
17. reporting lines and procedures, line supervision and technical experts

Scope/range related to performance criteria

1. Ensure that the tools and equipment to be used are appropriate to the application and are in a safe and usable condition, by carrying out all of the following checks:
    1. hand tools are in a usable condition (hammer shafts secure; stakes, formers and striking faces free from defects and damage)
    2. the appropriate machine is selected for the operation being performed
    3. the machine guards and safety devices are in position and function correctly
    4. forming tools are appropriate and in a serviceable condition (secure, correct shape, free from damage)

2. Use two of the following types of forming equipment/techniques:
    1. hammers
    2. stakes and formers
    3. bending machine (hand or powered)
    4. rolling machine (hand or powered)
    5. other specific equipment

3. Carry out forming operations which produce three of the following shapes:
    1. bends
    2. folds
    3. curved panels
    4. cylindrical sections
    5. ducting or trunking
    6. other specific shape

4. Produce components made from two different materials from the following:
    1. mild steel
    2. tinned steel
    3. galvanised plate
    4. stainless steel
    5. aluminium
    6. brass
    7. copper
    8. other specific material

5. Produce components which meet all of the following quality and accuracy standards:
    1. company/customer specifications
    2. dimensional accuracy is within specification tolerances
    3. finished components meet the required shape
    4. completed components are free from excessive tooling marks, deformation or cracking

Behaviours

Additional Information

You will be able to apply the appropriate behaviours required in the workplace to meet the job profile and overall company objectives, such as:

- strong work ethic
- positive attitude
- team player
- dependability
- responsibility
- honesty
- integrity
- motivation
- commitment

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