SEMFWE322

Marking out components for metalwork

Overview

This standard identifies the competencies you need to mark out sheet and plate work (including simple templates), and rolled sections in accordance with approved procedures. You will be required to select the required materials to use and the appropriate marking out tools and equipment based on the information presented to you and the accuracy to be achieved. Marking out will be the preparation required for cutting, shaping and forming sheet materials, plate and sections as is appropriate to the application and will include marking out workpiece datums, centre lines, angles and curved details, cutting and bending details including bending allowances and hole centring and outlining details.

Materials to be marked out may include ferrous and non-ferrous. Certain materials will require you to take the grain flow or rolling direction into account to avoid later production process problems.

Your responsibilities will require you to comply with organisational policy and procedures for the marking out activities undertaken and to report any problems with the materials, equipment or marking out activities that you cannot resolve yourself, or are outside your permitted authority, to the relevant people. You will be expected to work with minimum supervision, taking personal responsibility for your own actions and the quality and accuracy of the work that you produce.

Your underpinning knowledge will provide a good understanding of your work, and provide an informed approach to applying marking out procedures. You will understand the marking out process, and its application, and will know about the materials as well as the care and use of tools in adequate depth to provide a sound basis for carrying out the activities to the required specification. You will understand the safety procedures required when using marking mediums, and when carrying out the marking out activities. You will be required to demonstrate safe working practices throughout, and will understand the responsibilities 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. obtain and use the correct information for marking out
3. obtain the appropriate marking out equipment and check that it is in a usable condition
4. prepare suitable datums and marking out surfaces
5. produce marked out components using appropriate methods
6. check that the marking out complies with the specification
7. complete relevant paperwork in accordance with organisational requirements
8. deal promptly and effectively with problems within your control and report those that cannot be resolved

Knowledge and understanding

You need to know and understand:

1. the specific safety precautions to be taken when working in a fabrication environment with sheet, plate or rolled section materials (general workshop and site safety, appropriate personal protective equipment (PPE), accident procedure; statutory regulations, risk assessment procedures and COSHH regulations)
2. the personal protective clothing and equipment that needs to be worn when carrying out the fabrication activities (such as leather gloves, eye/ear protection, safety helmets)
3. the correct methods of moving or lifting sheet, plate and rolled section materials
4. the hazards associated with marking out fabricated components and how they can be minimised (such as working in a fabrication environment, lifting and handling sheet/fabricated components, slivers/burrs on sheet materials, using marking out mediums, using laser marking out equipment)
5. the procedures to be adopted to obtain the necessary drawings and job 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. how to interpret first and third angle drawings, imperial and metric systems of measurement, workpiece reference points and system of tolerancing
8. visualising how to produce a three dimensional shape from the two dimensional material
9. the preparations that need to be carried out on the material prior to marking out to enhance clarity and accuracy, and safety
10. principles of marking out, developing basic shapes (flat, rectangular and cylindrical) from flat sheet, plate or rolled section materials
11. the effective use and care of tools/instruments
12. use of marking out conventions (such as datum edges/lines, centre lines)
13. the material characteristics and process considerations that need to be taken into account when marking out sheet, plate or rolled section materials
14. how to calculate and mark out true lengths, bend allowances and circumferences
15. geometrical construction methods for straight and radius bends, curved or circumference sections, pyramid or cone sections

16. ways of laying out the shapes/patterns to maximise the use of plate or sheet material
17. setting and adjusting tools, such as squares and protractors
18. methods of marking out large or long shapes
19. marking out and transferring information from templates
20. how to transfer information to the underside of the sheet or plate
21. the importance of using tools only for the purpose intended, the care that is required when using the equipment and tools, the proper way of preserving and storing tools and equipment between operations.
22. the need for clear and dimensional accuracy in marking out to specifications/drawings
23. the problems that can occur in marking out fabrication components, and how these can be avoided
24. the extent of your own responsibility and whom you should report to if you have problems that you cannot resolve
25. reporting lines and procedures, line supervision and technical experts

Scope/range related to performance criteria

1.

Mark out sheet, plate or section materials on **two** materials from the following:

1.1 hot rolled mild steel
1.2 aluminium
1.3 lead
1.4 cold rolled mild steel
1.5 brass
1.6 titanium
1.7 coated mild steel (such as primed, tinned or galvanised)
1.8 copper
1.9 stainless steel
1.10 non-metallic materials

2.

Mark out sheet or plate for **three** of the following forms/shapes of component:

2.1 flat covers and plates
2.2 fish plates, gussets
2.3 square and radial bends
2.4 brackets
2.5 square/rectangular/box sections
2.6 structural support pads, bed plates
2.7 cylindrical sections (such as trunking, pipes, tanks)
2.8 columns, beams or struts
2.9 frames or structures
2.10 simple seatings (such as boiler saddles, tank cradles)

3.

Mark out directly onto sheet or plate from drawings using **six** of the following tools and instruments:

3.1 scriber
3.2 protractor
3.3 centre punch
3.4 dividers or trammels
3.5 rule and tape
3.6 chalk, bluing or paint
3.7 straight edge
3.8 etching
3.9 laser
3.10 square

4.

Mark out material to include **five** of the following features:

4.1 datum and centre lines
4.2 curved profiles

4.3 square/rectangular profiles
4.4 cutting and bending detail (including allowances)
4.5 angles
4.6 hole centring and outlining (circular and linear)
4.7 circles

5.

Produce marked out component which meet **all** of the following quality and accuracy standards:

5.1 company/customer standards and codes of practice
5.2 dimensionally accurate (to drawing or specification)
5.3 clearly defined for required processes
5.4 uses recognised marking out conventions

6.

Complete the relevant paperwork, to include **one** from the following and pass it to the appropriate people:

6.1 build records
6.2 log cards
6.3 job cards
6.4 quality documentation
6.5 other specific recording methods

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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