SEMAUT3071

Marking out motorsport components for fabrication

Overview

This standard identifies the competences you need to mark out sheet and platework (including simple templates), and tubular sections, in accordance with approved practices and procedures within a motorsport environment. You will be required to select the correct materials to be used, 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 and shaping sheet materials, plate and tubular sections, as 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.

Items to be marked out may include ferrous, non-ferrous and non-metallic materials. Certain materials will require you to take the grain flow 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 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 be sufficient to provide a good understanding of your work, and will provide an informed approach to applying marking out procedures. You will have an understanding of the marking out process, and its application, and will know about the materials as well as the care and use of the tools used, 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 datum and marking out surfaces
5. mark out using appropriate methods
6. check that the marking out complies with the specification
7. deal promptly and effectively with problems within your control and report those that cannot be resolved
8. ensure that work records are completed, stored securely and available to others, as per organisational requirements
9. 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 correct methods of moving or lifting sheet, plate and tubular materials
6. the procedures to be adopted to obtain the necessary drawings and job instructions
7. how to extract and use information from engineering drawings and related specifications (to include symbols and conventions to current industry standards and codes of practice)
8. how to interpret first and third angle drawings, imperial and metric systems of measurement, workpiece reference points, and system of dimensional and geometric tolerancing
9. visualise how to produce a three dimensional shape from the two dimensional material
10. the preparations to be carried out on the material, prior to marking out, to enhance clarity, accuracy and safety (de-burring, using marking mediums)
11. the principles of marking out, developing basic shapes (flat, rectangular and cylindrical) from flat sheet, plate or tubular materials
12. the effective use and care of tools/instruments
13. use of marking out conventions, datum edges/lines and centre lines
14. the material characteristics and process considerations to be taken into account when marking out sheet, plate or tubular materials
15. how to calculate and mark out true lengths, bend allowances and circumferences
16. geometrical construction methods for straight and radius bends, curved or circumference sections, pyramid or cone sections

17.
ways of laying out the shapes/patterns to maximise the use of plate or sheet material and minimise waste
18.
setting and adjusting tools (squares, protractor and laser marking out equipment)
19. methods of marking out large or long shapes
20. marking out and transferring information from templates
21. how to transfer information to the underside of the sheet or plate
22. 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
23. the need for clear and dimensional accuracy in marking out to specifications/drawings
24. the problems that can occur when marking out motorsport-specific fabricated components and how these can be avoided
25. the extent of your own authority and to whom you should report if you have problems that you cannot resolve
26. 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 marking out activities:

1.1 obtain and use the appropriate documentation (such as job instructions, component drawings, specifications, quality control documentation)
1.2 adhere to procedures or systems in place for risk assessment, hazardous substances, personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work
1.3 check that all tools and equipment to be used are within current calibration/certification dates
1.4 use safe and approved marking out techniques and procedures at all times
1.5 return all tools and equipment to the correct location on completion of the marking out activities
1.6 leave the work area in a safe and appropriate condition on completion of the activities

2.

Mark out components to be used in one of the following types of motorsport vehicle:

2.1 single seater
2.2 kart
2.3 motorcycles (such as circuit and off road)
2.4 rallying
2.5 historic
2.6 sports car
2.7 other specific approved competition vehicle

3.

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

3.1 mild steel
3.2 aluminium
3.3 lead
3.4 stainless steel
3.5 brass
3.6 titanium
3.7 inconel alloys
3.8 copper
3.9 non-metallic materials
3.10 other specific material

4.

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

4.1 flat covers and plates
4.2 fishplates, gussets
4.3 square and radial bends

4.4 brackets
4.5 square/rectangular/box sections
4.6 square-to-round
4.7 cylindrical sections (such as pipes, tanks)
4.8 frames or structures
4.9 wraps

5.

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

5.1 scriber
5.2 straight edge
5.3 dividers or trammels
5.4 blueing or paint
5.5 punch
5.6 square
5.7 parallel markers
5.8 laser (where applicable)
5.9 rule/tape
5.10 protractor
5.11 odd leg callipers

6.

Mark out material to include five of the following features:

6.1 datum and centre lines
6.2 curved profiles
6.3 square/rectangular profiles
6.4 cutting and bending detail (including allowances)
6.5 angles
6.6 hole centring and outlining (circular and linear)
6.7 circles

7.

Mark out materials to produce four of the following motorsport/performance vehicle components:

7.1 wishbones
7.2 swirl pots
7.3 heat exchangers
7.4 uprights
7.5 panels
7.6 pedals
7.7 water or oil coolers
7.8 wings/bodywork
7.9 brackets
7.10 roll cages
7.11 header tanks
7.12 space frames
7.13 radiator tanks

7.14 other specific components

8.

Check marked out components comply with all of the following quality and accuracy standards:

8.1 company/customer codes of practice
8.2 dimensionally accurate (to drawing or specification)
8.3
uses recognised marking out conventions
8.4
clearly defined for required processes

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