

SEMFWE3-41 – SQA Unit Code HE95 04

Producing structural steel ancillary components



Overview

This standard identifies the competencies you need to cut and shape plate and section materials to produce structural steel components such as fish plates, gussets, brackets, support pads and bed plates in accordance with approved procedures. You will be required to interpret drawings, mark out simple shapes and hole positions, cut out and shape plate and sections, drill and prepare structural components ready for the assembly of major structural components.

Your responsibilities will require you to comply with organisational policy and procedures for the marking out, shaping and preparation activities undertaken and to report any problems with the interpretation, equipment used, materials or manufacturing activities that you cannot personal resolve, or are outside your permitted authority, to the relevant person. 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 structural steel shaping and fabrication procedures. You will understand the fabrication processes, the equipment and its application, and will know about the materials and how to produce structural component parts 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 fabrication tools and machinery. You will be required to demonstrate safe working practices throughout, and will understand the responsibility you owe to yourself and others in the workplace.

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Performance criteria

- You must be able to:*
- P1 work safely at all times, complying with health and safety and other relevant regulations and guidelines
 - P2 follow relevant specifications for the component to be produced
 - P3 obtain the appropriate tools and equipment for the shaping operations and check they are in a safe and usable condition
 - P4 shape the materials using appropriate methods and techniques
 - P5 check that all the required shaping operations have been completed to the required specification
 - P6 deal promptly and effectively with problems within your control and report those that cannot be solved

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Knowledge and understanding

You need to know and understand:

- K1 the specific safety precautions to be taken when working in a fabrication environment and when cutting plate or rolled sections to shape (general workshop and site safety, appropriate personal protective equipment (PPE), accident procedure; statutory regulations, risk assessment procedures and COSHH regulations)
- K2 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)
- K3 the correct methods of moving or lifting plate and rolled section materials
- K4 safe working practices and procedures that need to be observed when using manual and power operated tools
- K5 the hazards associated with fabrication work and how they can be minimised (such as using dangerous or badly maintained tools and equipment; operating shearing machines; handling plate and fabricated components; using hot metal techniques)
- K6 the procedures for obtaining the necessary drawings and specifications and how to check that they are the latest issue
- K7 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)
- K8 how to interpret first and third angle drawings, imperial and metric systems of measurement, workpiece reference points and system of tolerancing
- K9 how to produce a three dimensional shape from the two dimensional material
- K10 the preparations that need to be carried out on the material prior to marking out to enhance clarity, accuracy and safety
- K11 principles of marking out and the tools and equipment that are used
- K12 use of marking out conventions (such as datums, cutting detail, centre lines)
- K13 how to calculate and mark out true lengths, bend allowances and circumferences
- K14 ways of laying out the shapes/patterns to maximise the use of plate or sheet materials
- K15 marking out and transferring information from templates and how to transfer information to the underside of the plate
- K16 the tools and techniques available for cutting and shaping plate and section materials (such as shearing machines, saws, burning equipment, drills, presses and rolling machines)
- K17 the material characteristics and process considerations that need to be

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- taken into account when cutting and shaping plate and section materials
- K18 the use and care of tools and equipment including checks that need to be made to ensure that the tools are fit for purpose (cutting tools are sharp and undamaged; plugs and cables secure and free from damage; machine guards or safety devices operating correctly)
- K19 how to produce weld preparations and the type of preparations required for different joints and material thicknesses
- K20 setting and adjusting tools and equipment including the use of back stops on guillotines
- K21 the importance of using tools or equipment only for the purpose intended; the care that is required when using the tools or equipment; the proper way of preserving tools or equipment between operations
- K22 safety and control procedures for shaping plate and rolled steel sections
- K23 the problems that can occur with cutting and shaping plate and section materials, and how these can be avoided
- K24 the use of machine guards and safety protection equipment
- K25 inspection techniques that can be applied to check shape and dimensional accuracy is to specification and within acceptable limits
- K26 the extent of your own responsibility and whom you should report to if you have problems that you cannot resolve
- K27 reporting lines and procedures, line supervision and technical experts

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Additional Information

Scope/range related to performance criteria

- You must be able to:*
1. ensure that you carry out **all** of the following during the manufacturing activities:
 - 1.1 use the tools and equipment safely and correctly and only for its intended purpose
 - 1.2 mark out the components accurately using recognised conventions
 - 1.3 set up and hold the components firmly during the shaping operations
 - 1.4 produce the components to the correct size and shape
 - 1.5 ensure all holes are of the correct size and are at the correct centres for fixings
 2. cut and shape material to the marked out shape using **four** of the following methods:
 - 2.1 shearing/cropping
 - 2.2 sawing
 - 2.3 burning
 - 2.4 drilling
 - 2.5 bending
 3. produce structural steel components to include **three** of the following:
 - 3.1 fish tails
 - 3.2 flanges
 - 3.3 gussets
 - 3.4 bed plates
 - 3.5 brackets
 - 3.6 tie bars
 - 3.7 support pads
 - 3.8 stiffening plates
 4. produce structural steel components from **both** of the following:
 - 4.1 steel plate (3mm or more thickness)
 - 4.2 rolled steel section
 5. produce cut and shaped structural steel components which meet **all** the following quality and accuracy standards:
 - 5.1 company/customer standards requirements
 - 5.2 dimensionally accurate (to drawing or specifications)
 - 5.3 free from distortion
 - 5.4 free from sharp edges, slivers or burrs

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