

SEMFWE3-40 – SQA Unit Code HE94 04

Forming structural sections using machines



Overview

This standard identifies the competencies you need to bend and form rolled sectional material using presses, bending machines and power rolls in accordance with approved procedures. You will be required to select the most appropriate type and size of machine, based on the operations to be performed and the type and section of material being used. In producing the components you will be required to operate the equipment safely and correctly, or direct operations for its effective use to form the material to the required profile without flats or deformities. The operations to be performed will include bending beams, curved beams, circular sections, counter curved sections, twisted beams and straightening of beams.

Your responsibilities will require you to comply with organisational policy and procedures for the use of the machines and the process activities undertaken and to report any problems with the forming equipment, materials or forming activities that you cannot personally resolve, 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 carry out.

Your underpinning knowledge will provide a good understanding of your work, and provide an informed approach to forming structural section material using power machine procedures. You will understand the equipment being used, the forming principles, and their application, and will know about the processes involved and their limitations in sufficient depth to provide a sound basis for carrying out the activities, correcting any faults and ensuring the work output is produced 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.

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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 confirm that the equipment is set up correctly and is ready for use
 - P3 manipulate the machine controls safely and correctly in line with operational procedures
 - P4 produce components to the required specification
 - P5 carry out quality sampling checks at suitable intervals
 - P6 deal promptly and effectively with problems within your control and report those that cannot be solved
 - P7 shut down the equipment to a safe condition on conclusion of the machining activities

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Knowledge and understanding

You need to know and understand:

- K1 the specific safety precautions to be taken when working with power operated bending and forming equipment such as presses, bending machines and rolling machines in a fabrication environment
- K2 the general workshop and site safety requirements, statutory regulations; risk assessment procedures and COSHH regulations
- K3 the correct personal protective equipment (PPE) and handling precautions to be taken when working with structural section materials (such as gloves, eye protection, safety helmets, ear protection)
- K4 the handling precautions and correct methods of moving or lifting heavy structural section (such as RSJs)
- K5 the hazards associated with power operated bending processes and how they can be minimised (such as handling heavy structural materials and components; operating moving equipment; using faulty or badly maintained tools and equipment)
- K6 the safe working practices and procedures required for operating power operated bending and forming machines
- K7 how to obtain the necessary structural drawings and bending procedure specifications
- K8 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)
- K9 how to interpret first and third angle drawings, imperial and metric systems of measurement, workpiece reference points and system of tolerancing
- K10 marking out conventions applicable to the bending process (such as centre lines, bending lines)
- K11 the various types of power operated bending machines that are used for structural section materials, and typical applications
- K12 how to prepare and set up the machine for a range of different bends (angled bends, curved sections, twisted sections and straightening of sections)
- K13 the types of bending tools that are used for the various operations and how they are secured and set to the machine's tool holding device
- K14 ways of limiting distortion, marking and creases in the finished workpiece
- K15 the preparations that need to be carried out on the materials prior to bending them
- K16 the basic characteristics of the materials with regard to the bending operations undertaken
- K17 why some materials may require a heating process before bending begins

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- K18 the need to take care of the bending tools and equipment; how to recognise faulty or damaged forming tools; how bending and forming tools should be stored
- K19 the problems that can occur with the bending and forming activities, and how they can be avoided
- K20 the organisational quality control procedures that are used, and how to recognise defects in the bends that you produce
- K21 how to make dimensional and forming inspection checks, and the tools and equipment that can be used
- K22 accuracy and limitations of processes
- K23 the extent of your own responsibility and whom you should report to if you have problems that you cannot resolve

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Additional Information

Scope/range related to performance criteria

- You must be able to:*
1. confirm that the equipment is safe to use and fit for purpose by carrying out **all** of the following checks:
 - 1.1 the appropriate machine is selected for the operation being performed
 - 1.2 the machine guards and safety devices are in position and function correctly
 - 1.3 forming tools are appropriate and in a serviceable condition (secure, correct shape, free from damage)
 - 1.4 machine settings are suitable for the material thickness and operations to be performed
 2. use **one** of the following types of machines:
 - 2.1 power press
 - 2.2 hammer machines
 - 2.3 section bending machine
 - 2.4 powered rolls
 - 2.5 special purpose machines
 3. produce formed structural sections which contain **four** of the following features:
 - 3.1 right angled bends
 - 3.2 angular bends
 - 3.3 curved beams
 - 3.4 circular sections
 - 3.5 counter curved sections
 - 3.6 twisted section
 - 3.7 straightening
 4. bend and form structural components made from **three** of the following forms of material:
 - 4.1 rolled steel joists (RSJ)
 - 4.2 structural tubes/pipes
 - 4.3 angle section
 - 4.4 extrusions
 - 4.5 channel section
 - 4.6 other specific components
 5. produce structural components which meet **all** of the following quality and accuracy standards:
 - 5.1 bend position and dimensional accuracy is within the specification tolerances
 - 5.2 the form or sharpness of the bend conforms to best practice

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- and/or specification without deformation or cracking
- 5.3 the bend conforms to the required shape/geometry (to the template profile)

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