

SEMFWE3-35 – SQA Unit Code HF3A 04

Bending and forming plate using press brakes or bending machines



Overview

This standard identifies the competencies you need for bending and forming plate (of 3mm and above) for fabrications using power operated equipment such as press brakes, bending machines and power presses in accordance with approved procedures. You will be required to select the appropriate bending and forming equipment and set it up for the operations being performed. This will involve setting up appropriate backstops or plate positioning devices, fitting of appropriate bending tools/formers taking account of material thickness and the accuracy required to be achieved. You will also need to ensure that all the required safety devices are operating correctly and that the machine guards are in place and correctly adjusted.

Materials to be bent and formed may include ferrous and non-ferrous, and tasks will include producing bends of various angles, producing box and tray sections, setting plate ends for rolling operations, and producing curved sections. This will call for care in selecting the right tools so as to avoid damage to the tools and danger to oneself.

Your responsibilities will require you to comply with organisational policy and procedures, seeking out relevant information for the activities undertaken and to report any problems with the equipment, materials, tooling or bending activities that you cannot personally resolve, or are outside your personal 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 the power pressing procedures required. You will understand the processes, and will know about the equipment and its application, the tooling and materials, in adequate depth to provide a sound basis for carrying out the activities to the required specification. You will need to understand the safety precautions required when working with power operated presses and the safeguards necessary for undertaking the activities safely and correctly. You will be required to demonstrate safe working practices and procedures throughout, and will understand the responsibilities 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 press brakes or/and bending machines in a fabrication environment (general workshop and site safety, appropriate personal protective equipment (PPE), accident procedure; statutory regulations, risk assessment procedures and COSHH regulations)
- K2 the correct protective clothing, and handling precautions to be taken, when working with heavy platework
- K3 the correct methods of moving or lifting sheet or plate materials
- K4 the hazards associated with power operated bending and forming processes, and how they can be minimised (such as handling heavy sheet materials and components; operating moving equipment; using faulty or badly maintained tools and equipment)
- K5 the safe working practices and procedures required for operating power operated bending machines
- K6 how to obtain the necessary drawings and bending specifications
- 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 marking out conventions applicable to the bending process (such as centre lines, bending lines)
- K10 the various types of power operated bending machines that are used and typical applications
- K11 how to prepare and set-up the machine for a range of different bends (angled bends; box sections; plate edge setting; curved sections)
- K12 the types of bending tools that are used for the various operations and how they are secured and set to the machines tool holding device
- K13 ways of limiting distortion, marking and creases in the finished workpiece
- K14 the preparations that need to be carried out on the materials prior to bending them
- K15 the basic characteristics of the materials with regard to the bending operations undertaken
- K16 why some materials may require a heating process before bending begins
- K17 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

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- K18 the sort of problems that can occur with the bending and forming activities, and how they can be avoided
- K19 the organisational quality control procedures that are used, and how to recognise defects in the bends that you produce
- K20 how to make dimensional and forming inspection checks, and the tools and equipment that can be used
- K21 accuracy and limitations of processes
- K22 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. operate **one** of the following types of power operated bending equipment:
 - 2.1 press brakes
 - 2.2 powered bending machine
 - 2.3 power press
 3. perform operations that produce **all** of the following :
 - 3.1 bends at 90°
 - 3.2 bends of various angles using various bend radii
 - 3.3 set plate ends
 - 3.4 box square and rectangular sections
 - 3.5 curved plates
 4. bend and form metal plate of 3mm or more thickness for **one** appropriate material and **two** thicknesses:
 - 4.1 mild-steel
 - 4.2 stainless steel
 - 4.3 aluminium
 - 4.4 special metals
 5. produce components that conform to **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 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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Suite Fabrication and Welding Engineering Suite 3

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