

Overview

This standard identifies the competences you need to operate computer numerically controlled (CNC) fabrication machines, such as shearing machines, gas, laser, plasma or water jet cutting, punching, bending and forming machines, in accordance with approved procedures. You will be expected to take charge of the prepared machine and to check that it is ready for the machining operations to be performed. This will involve checking that all the required materials and consumables are present, and that the machine has been approved for production. In operating the machine, you will be expected to follow the correct procedures for calling up the operating program, dealing with any error messages, and executing the program activities safely and correctly.

You will be required to monitor the cutting or forming operations continuously, making any necessary adjustments to machine parameters in line with your permitted authority. Meeting production targets will be an important issue, and your production records must show consistent and satisfactory performance.

Your responsibilities will require you to comply with organisational policy and procedures for the CNC activities undertaken, and to report any problems with the equipment, tooling, program, materials or activities that you cannot personally resolve, or 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 produce.

Your underpinning knowledge will be sufficient to provide a good understanding of your work, and will enable you to adopt an informed approach to applying CNC fabrication procedures. You will have an understanding of the CNC machining process used, and its application, and will know about the machine, tooling, materials, machining activities and consumables, in adequate depth to provide a sound background to machine operation and for carrying out the activities to the required specification.

You will understand the safety precautions required when working with the machine, and with its 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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Operating CNC Fabrication Equipment

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 and ready for operation
 - P3 follow the defined procedures for starting and running the operating system
 - P4 deal promptly and effectively with error messages or equipment faults that are within your control and report those that cannot be solved
 - P5 monitor the computer process and ensure that the production output is to the required specification
 - P6 shut down the equipment to a safe condition on conclusion of the activities

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Knowledge and understanding

You need to know and understand:

- K1 the specific safety precautions to be taken when operating CNC fabrication machines and equipment
- K2 the safety mechanisms on the machine, and the procedures for checking that they are operating correctly
- K3 the hazards associated with working on CNC cutting and forming machines (such as moving machinery, automatic machine operation, handling of tooling/cutting media, lifting and handling workholding devices, handling materials) and how they can be minimised
- K4 how to start and stop the machine in both normal and emergency situations
- K5 the importance of wearing the appropriate protective clothing and equipment (PPE), and of keeping the work area clean and tidy
- K6 the application of the CNC machine, and the range of operations it can perform
- K7 where to obtain component drawings, specifications and/or job instructions required for the components being machined
- 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 how to interpret the visual display and the various messages displayed
- K11 the function of error messages, and what to do when an error message is displayed
- K12 how to find the correct restart point in the program when the machine has been stopped before completion of the program
- K13 the operation of the various hand and automatic modes of machine control (such as program operating and control buttons)
- K14 how to operate the machine using manual operation, single block run, full program run and feed/speed override controls
- K15 how to make adjustments to the program operating parameters
- K16 how to set and secure the workpiece to the machine; the effects of clamping the workpiece; and how material shaping/removal can cause warping/distortion of the finished workpiece
- K17 the problems that can occur with the cutting/forming activities, and how to prevent them
- K18 the quality control procedures used, inspection checks that need to be carried out and the equipment to be used
- K19 the extent of your own responsibility and whom you should report to if

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you have problems you cannot resolve

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Additional Information

Scope/range related to performance criteria

- You must be able to:*
1. ensure that the machine is ready for operation, by carrying out **all** of the following:
 - 1.1 checking that the correct operating program is loaded and is at the correct start point
 - 1.2 ensuring that machine guards are in place and correctly adjusted
 - 1.3 positioning and securing material/components without damage and distortion
 - 1.4 checking that cutting tools/tooling are in a suitable condition
 - 1.5 setting plate/section datum's and positioning the machine
 - 1.6 update the program tool data, as applicable
 - 1.7 ensuring that start-up procedures are observed
 - 1.8 adjusting machine settings as required to maintain accuracy
 2. operate **one** of the following CNC fabrication machines:
 - 2.1 shearing machine
 - 2.2 punching machine
 - 2.3 forming machine
 - 2.4 bending machine
 - 2.5 plasma cutting
 - 2.6 laser cutting
 - 2.7 gas cutting
 - 2.8 water jet cutting
 3. position and secure the workpiece, using two of the following holding methods/device:
 - 3.1 jigs and fixtures
 - 3.2 clamps and stops
 - 3.3 pneumatic clamps
 - 3.4 other workholding devices
 4. produce components which combine several different operations, which cover **five** of the following:
 - 4.1 straight cuts
 - 4.2 square/rectangular profiles
 - 4.3 curved profiles
 - 4.4 internal profiles
 - 4.5 angular profiles
 - 4.6 holes linearly pitched
 - 4.7 holes radially pitched
 - 4.8 louvers
 - 4.9 swages

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- 4.10 bends at 90 degrees
- 4.11 bends of various angles
- 4.12 multi-bend platework
- 4.13 curved plates
- 4.14 slots and apertures
- 4.15 circles/ellipses
- 4.16 other specific features
- 5. produce components using **one** of the following types of material:
 - 5.1 ferrous
 - 5.2 non-ferrous
 - 5.3 stainless steel
 - 5.4 special alloys
 - 5.5 other appropriate material
- 6. carry out the necessary checks during production for accuracy of **four** of the following:
 - 6.1 linear dimensions
 - 6.2 vertical dimensions
 - 6.3 position of features
 - 6.4 accuracy of hole/slot dimensions
 - 6.5 accuracy of profiles
 - 6.6 flatness/freedom from excessive distortion
 - 6.7 accuracy of louvers and swages
- 7. produce components which meet **all** of the following standards:
 - 7.1 dimensional accuracy is within the tolerances
 - 7.2 components conforms to the required shape/geometry or profile
 - 7.3 components are free from deformity, burrs and sharp edges

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Developed by SEMTA

Version number 1

Date approved December 2011

Indicative review date December 2016

Validity Current

Status Original

Originating organisation SEMTA

Original URN SEMFWE3-66

Relevant occupations Engineering and manufacturing technologies; engineering; Metal Forming, Welding and Related Trades

Suite Fabrication and welding suite 3

Key words engineering; welding; fabrication; shearing machine; punching machine; forming; machine; bending machine; machine cutting; laser cutting; plasma cutting; gas cutting; water jet cutting machine; CNC; profiles; angular profiles