SEMME3060

Operating CNC fabrication machines

Overview

This standard identifies the competences you need to operate computer numerically controlled (CNC) fabrication machines, such as shearing machines, gas, laser, water jet or plasma 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 machining 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 machining 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.

Note: Setting up of the machine, its tooling and associated workholding devices are the subjects of other standards.

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. confirm that the equipment is set up and ready for operation
3. follow the defined procedures for starting and running the operating system
4. deal promptly and effectively with error messages or equipment faults that are within your control and report those that cannot be solved
5. monitor the computer process and ensure that the production output is to the required specification
6. shut down the equipment to a safe condition on conclusion of the activities
7. complete relevant documentation in line with company procedure

Knowledge and understanding

You need to know and understand:

1. the specific safety precautions to be taken when working with CNC fabrication machines and equipment
2. the safety mechanisms on the machine and the procedures for checking that they are operating correctly
3. the hazards associated with working on CNC cutting and forming machines (such as moving machinery, automatic machine operation, handling of cutting tools, lifting and handling workholding devices, handling sheet materials)
4. how to start and stop the machine, in both normal and emergency situations
5. the importance of wearing the appropriate protective clothing and equipment (PPE) and of keeping the work area clean and tidy
6. the application of the CNC machine and the range of operations it can perform
7. where to obtain component drawings, specifications and/or job instructions required for the components being machined
8. how to use and extract information from engineering drawings and related specifications (to include symbols and conventions to appropriate BS or ISO standards) in relation to work undertaken
9. how to interpret first and third angle drawings, imperial and metric systems of measurement, workpiece reference points and system of tolerancing
10. how to interpret the visual display and the various messages displayed
11. the function of error messages and what to do when an error message is displayed
12. how to find the correct restart point in the program, when the machine has been stopped before completion of the program
13. the operation of the various hand and automatic modes of machine control (such as program operating and control buttons)
14. how to operate the machine using single-block run, full program run and feed/speed override controls
15. how to make adjustments to the program operating parameters
16. how to set and secure the workpiece to the machine; the effects of clamping the workpiece; and how material removal can cause warping/distortion of the finished workpiece

17. the problems that can occur with the cutting and forming activities and how these can be overcome
18. the quality control procedures used, inspection checks that need to be carried out and the equipment to be used
19. the extent of your own responsibility and whom you should report to if you have problems that you cannot resolve

Scope/range related to performance criteria

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 distortion
1.4 checking that cutting tools/tooling/consumables are in a suitable condition
1.5 setting plate/section datums and positioning the machine
1.6 updating the program tool data, as applicable
1.7 ensuring that startup 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/devices:

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 and 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 holes linearly pitched
4.6 holes radially pitched
4.7 louvres
4.8 swages
4.9 bends at 90°

4.10 bends of various angles
4.11 multi-bend platework
4.12 curved plates
4.13 other specific operations

5.

Produce components for **four** of the following:

5.1 deck plates
5.2 shell plates
5.3 transverses/longitudinal girders
5.4 frames/longitudinals/stiffeners
5.5 bulkheads
5.6 intercostals/wash plates
5.7 beam knees/brackets
5.8 web/cantilevers

6.

Produce components using **one** of the following types of material:

6.1 ferrous
6.2 non-ferrous
6.3 stainless
6.4 special alloys

7.

Carry out the necessary checks during production, for accuracy of **four** of the following:

7.1 linear dimensions
7.2 position of features
7.3 accuracy of profiles
7.4 flatness/freedom from excessive distortion
7.5 accuracy of louvres and swages

8.

Produce components which meet **all** of the following standards:

8.1 dimensional accuracy is within the specification tolerances
8.2 the plate conforms to best practice and or specification, without deformation or cracking
8.3 the component conforms to the required shape/geometry (to the template profile)
8.4 components are free from deformity, burrs and sharp edges

Behaviours

Behaviours:

You will be able to apply the appropriate behaviours required in the workplace to meet the job profile and overall company objectives, such as:

- strong work ethic
- positive attitude
- team player
- dependability
- responsibility
- honesty
- integrity
- motivation
- commitment

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