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## Overview

This standard identifies the competencies you need to carry out cutting and shaping operations using computer numerical controlled CNC water jet cutting machines, in accordance with approved procedures. You will take charge of the prepared machine and 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 machine-operating program, dealing with any error messages, and executing the program activities safely and correctly.

The components produced will have a number of different features, including square and rectangular profiles, angular profiles, curved profiles, circles, slots, holes linearly positioned and holes radially positioned. You will be required to continuously monitor the cutting operations, 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 activities undertaken, and to report any problems with the equipment, program or materials that you cannot personally resolve, or are outside your permitted authority, to the relevant people. You will be expected to work to instructions, 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 provide an informed approach to applying CNC water jet cutting procedures. You will have an understanding of the CNC cutting process, and its application, and will know about the equipment, materials and consumables, 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 the water jet cutting/profiling machine and its associated 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:

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. produce the required cut and shaped materials
6. monitor the computer process and ensure that the production output is to the required specification
7. 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:

1. the safe working practices and procedures to be observed when operating CNC water jet cutting machines (care when working with high power water jets; machine guards; ventilation and waste water extraction; machine safety devices)
2. how to start and stop the machine in normal and emergency situations, and how to close the machine down on completion of activities
3. the importance of ensuring the machine is isolated from the power supply before working with machinery; and the care needed, particularly when working with high pressure water
4. the importance of wearing the appropriate protective clothing and equipment (PPE), and of keeping the work area clean and tidy
5. the hazards associated with using water jet cutting machines (dangers from the water jets; live electrical components; moving parts of machinery; noise), and how they can be minimised
6. the principles and operation of water jet cutting machines (such as pure water, abrasive, 5 axis and 3D cutting machines) and the terminology used
7. the types of abrasives that can be used in the cutting process and the variations that they produce in the cut finish and the effect of other variable parameters (such as cutting speed, cutting head to workpiece distance, water pressure)
8. the types of cutting heads and jet nozzles that can be used and how to recognise the correct one to use
9. 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)
10. how to interpret the visual display and understand 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 speed override controls
15. how to make adjustments to machine-operating programs to take

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- account of out-of-specification components
  - 16. care of equipment and operating programs, including safe storage of material away from possible contamination and corruption
  - 17. monitoring the machine during the cutting process; recognition of problems and action to be taken
  - 18. problems that can occur during the water jet cutting activities, and how to prevent them
  - 19. organisational quality systems (standards to be achieved; production records to be kept)
  - 20. environmental practice or legislative requirements relating to the use of the machine and disposal of waste products
  - 21. the extent of your own authority and whom you should report to if you have problems you cannot resolve

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## Scope/range related to performance criteria

1. Confirm that the water jet cutting equipment is ready for operation, to include checking all of the following:
  1. the machine has been approved for production
  2. all safety equipment and guards are in place and functioning correctly
  3. materials are correctly positioned and held securely without damage and distortion
  4. the correct nozzle has been selected and fitted
  5. the operating program is at the correct start point
  6. safe working practices and start-up procedures are observed
  7. machine settings are adjusted as required to maintain accuracy
2. Produce cut and shaped components which cover five of the following features:
  1. square/rectangular profiles
  2. holes linearly positioned
  3. angular profiles
  4. holes radially positioned
  5. curved profiles
  6. slots and apertures
  7. circles
  8. ellipses
  9. other specific features
3. Machine one of the following types of material:
  1. ferrous
  2. non-ferrous
  3. stainless steel
  4. alloy steel
  5. other appropriate material
4. Produce components within all of the following quality and accuracy standards:
  1. dimensional accuracy is within the tolerance specified on the drawing/specification or within +/- 1.5mm
  2. angled cuts are within specification requirements (perpendicular/angularity)
  3. cuts are clean and smooth to the specified finish
  4. cut components are free from damage and distortion

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## 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

SEMME2098

Cutting and shaping materials using CNC water jet cutting machines



Developed by	Enginuity
Version Number	1
Date Approved	28 Feb 2018
Indicative Review Date	01 Feb 2021
Validity	Current
Status	Original
Originating Organisation	Semta
Original URN	SEMME2098
Relevant Occupations	Engineering, Engineering and Manufacturing Technologies, Metal Forming, Welding and Related Trades
Suite	Marine Engineering Suite 2
Keywords	engineering; marine; welding; fabrication; machine cutting; water jet cutting machine; CNC; profiles; angular profiles