

SEMME269 - SQA Unit Code H2BK 04

Cutting and shaping using NC/CNC plasma or gas cutting machines



Overview

This unit identifies the competences you need to carry out cutting and shaping operations using numerical control (NC) or computer numerical control (CNC) plasma or gas cutting and profiling machines, in accordance with approved procedures.

Setting up the machine, its tooling, workholding devices and associated equipment, are the subjects of other units.

You will take charge of the prepared machine and check that it is ready for the cutting 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 and shaping operations, making any necessary adjustments to machine parameters, in line with your permitted authority.

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 sound basis for your work, and will provide an informed approach to applying NC/CNC plasma or gas cutting/profiling procedures. You will have an understanding of the NC/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 plasma/gas cutting machine, and with 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.

SEMME269 - SQA Unit Code H2BK 04

Cutting and shaping using NC/CNC plasma or gas cutting machines

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

Knowledge and understanding

You need to know and understand:

- K1 the safe working practices and procedures to be observed when operating NC/CNC plasma and gas cutting/profiling machines (to include general workshop and site safety, appropriate personal protective equipment, fire and explosion prevention, protecting other workers; fume control, machine safety devices)
- K2 statutory requirements, risk assessment procedures, accident procedure and relevant requirements of HASAWA, COSHH and Work Equipment Regulations
- K3 the hazards associated with using NC/CNC plasma or gas cutting equipment (such as naked flames, fumes and gases, explosive gas mixtures, oxygen enrichment, spatter, hot metal, moving parts of machinery), and how they can be minimised
- K4 how to start and stop the machine in normal and emergency situations, and how to close the machine down on completion of activities
- K5 the importance of ensuring that the machine is isolated from the power supply before working with machinery; and the care needed when working with compressed gases
- K6 the protective clothing or equipment to be worn when working with fabrications and thermal cutting equipment (such as leather aprons and gloves, eye protection, safety helmets, etc)
- K7 the correct methods of moving or lifting plate materials and components
- K8 principles and operation of the plasma or gas cutting equipment, and the terminology used in thermal cutting, in relation to the operations being performed
- K9 how to interpret information from engineering drawings and related specifications, in relation to work undertaken
- K10 how to use imperial and metric systems of measurement, workpiece reference points and system of tolerancing
- K11 how to interpret the machine's visual display, and how to understand the various messages displayed
- K12 the function of error messages, and what to do when an error message is displayed
- K13 how to find the correct restart point in the program when the machine has been stopped before completion of the program
- K14 the operation of the various hand and automatic modes of machine control (such as hand wheels, joysticks, program operating and control buttons)
- K15 how to operate the machine (using single block run, full program run and speed override controls)
- K16 how to make adjustments to machine-operating programs to take account of out-of-specification components

SEMME269 - SQA Unit Code H2BK 04

Cutting and shaping using NC/CNC plasma or gas cutting machines

- K17 setting of operating conditions; flame control and the effects of mixtures and pressures associated with thermal cutting
- K18 the effects of oil, grease, scale or dirt on the cutting process
- K19 care of equipment and operating programs (including safe storage of material away from electromagnetic forces)
- K20 monitoring the machine during the cutting process; recognition of problems and action to be taken
- K21 the actions to be taken prior to cutting (such as setting up the material/workpiece, checking cleanliness of materials used)
- K22 the holding methods that are used to aid thermal cutting, and equipment that can be used for this
- K23 the problems that can occur with thermal cutting, and how they can be avoided; causes of distortion during thermal cutting and methods of controlling distortion
- K24 organisational quality systems (such as standards to be achieved; production records to be kept)
- K25 the extent of your authority, and whom you should report to if you have problems that you cannot resolve

Additional Information

Scope/range related to performance criteria

You must be able to:

1. Confirm that the plasma/gas cutting installation is ready for operation, to include checking **all** of the following:
 - 1.1 the machine has been approved for production
 - 1.2 all safety equipment and guards are in place and are functioning correctly
 - 1.3 materials are correctly positioned and held securely without distortion
 - 1.4 the cutting nozzles are clean and in a suitable condition
 - 1.5 the operating program is at the correct start point
 - 1.6 the workpiece is clear of the machine spindle
 - 1.7 safe working practices and start-up procedures are observed
 - 1.8 machine settings are adjusted, as required, to maintain accuracy

2. Use **one** of the following thermal cutting methods:
 - 2.1 oxy-fuel gas cutting
 - 2.2 plasma gas cutting

3. Produce components which are cut and shaped, and which cover **six** of the following features:
 - 3.1 square/rectangular profiles
 - 3.2 round holes
 - 3.3 angular profiles
 - 3.4 slots and apertures
 - 3.5 curved profiles
 - 3.6 angled cuts
 - 3.7 circles
 - 3.8 bevelled edge – weld preparations
 - 3.9 ellipses
 - 3.10 other features

4. Carry out plasma or gas cutting on **one** of the following types of material:
 - 4.1 mild steel
 - 4.2 other alloy steels
 - 4.3 carbon steel
 - 4.4 other appropriate material
 - 4.5 stainless steel

5. Produce components within **all** of the following quality and accuracy standards:
 - 5.1 dimensional accuracy is within the tolerance specified on the

SEMME269 - SQA Unit Code H2BK 04

Cutting and shaping using NC/CNC plasma or gas cutting machines

- 5.2 drawing/specification or within +/- 1.5mm
angled cuts are within specification requirements
(perpendicularity/angularity)
- 5.3 cuts are clean and smooth with minimal drag lines
- 5.4 components are free from distortion

SEMME269 - SQA Unit Code H2BK 04

Cutting and shaping using NC/CNC plasma or gas cutting machines

Developed by	SEMTA
Version number	1
Date approved	June 2004
Indicative review date	December 2012
Validity	Current
Status	Original
Originating organisation	SEMTA
Original URN	ME2.69
Relevant occupations	Managers and Senior Officials; Engineering and manufacturing technologies; Engineering; Functional Managers
Suite	Marine Engineering Suite 2
Key words	Engineering, marine, machining, NC, CNC, plasma, gas, cutting, shaping, holes, materials