

SEMFEW226 - SQA Unit Code H2BJ 04

Cutting and shaping materials using NC/CNC laser profiling machines



Overview

This unit identifies the competencies you need to carry out cutting and profiling operations using NC/CNC laser profiling 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 laser cutting and profiling procedures. You will have an understanding of the CNC cutting/profiling 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 laser 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.

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

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 laser cutting and profiling machines (care when working with high power laser beams; machine guards; ventilation and fume extraction; machine safety devices)
- K2 how to start and stop the machine in normal and emergency situations, and how to close the machine down on completion of activities
- K3 the importance of ensuring the machine is isolated from the power supply before working with machinery; and the care needed, particularly when working with laser beams
- K4 the importance of wearing the appropriate protective clothing and equipment, and of keeping the work area clean and tidy
- K5 the hazards associated with using laser cutting and profiling machines (dangers from the laser beam; live electrical components; moving parts of machinery), and how they can be minimised
- K6 principles and operation of lasers; laser machines; terminology used
- K7 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)
- K8 how to interpret the visual display and understand the various messages displayed
- K9 the function of error messages, and what to do when an error message is displayed
- K10 how to find the correct restart point in the program when the machine has been stopped before completion of the program
- K11 the operation of the various hand and automatic modes of machine control (such as hand wheels, joysticks, program operating and control buttons)
- K12 how to operate the machine using single block run, full program run and speed override controls
- K13 how to make adjustments to machine-operating programs to take account of out-of-specification components
- K14 care of equipment and operating programs, including safe storage of material away from electromagnetic forces
- K15 monitoring the machine during the cutting process; recognition of problems and action to be taken
- K16 problems that can occur during the laser cutting activities, and how to prevent them
- K17 organisational quality systems (standards to be achieved; production records to be kept)
- K18 the extent of your own authority and whom you should report to if you have problems you cannot resolve

Additional Information

Scope/range related to performance criteria

You must be able to:

1. confirm that the laser cutting equipment 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 functioning correctly
 - 1.3 materials are correctly positioned and held securely without distortion
 - 1.4 the laser lens is clean and in a suitable condition
 - 1.5 the operating program is at the correct start point
 - 1.6 safe working practices and startup procedures are observed
 - 1.7 machine settings are adjusted as required to maintain accuracy
2. produce cut and shaped components which cover **five** of the following features:
 - 2.1 square/rectangular profiles
 - 2.2 holes linearly positioned
 - 2.3 angular profiles
 - 2.4 holes radially positioned
 - 2.5 curved profiles
 - 2.6 slots and apertures
 - 2.7 circles
 - 2.8 other features
 - 2.9 ellipses
3. machine **one** of the following types of material:
 - 3.1 ferrous
 - 3.2 non-ferrous
 - 3.3 stainless steel
 - 3.4 alloy steel
 - 3.5 other appropriate material
4. produce components within **all** of the following quality and accuracy standards:
 - 4.1 dimensional accuracy is within the tolerance specified on the drawing/specification or within +/- 1.5mm
 - 4.2 angled cuts are within specification requirements (perpendicular/angularity)
 - 4.3 cuts are clean and smooth
 - 4.4 components are free from distortion

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