SEMMME224

Operating CNC electro-discharge machines

Overview

This standard identifies the competences you need to operate Computer Numerical Control (CNC) electro-discharge machines, such as spark erosion and wire erosion machines, in accordance with approved procedures. You will confirm with the machine setter that the machine is ready for the operations to be performed and that all the required components/materials and consumables are available. You will be expected to produce a range of components that cover a number of different features, such as flat, tapered and angled faces, internal and external profiles, parallel and tapered slots and steps, parallel and tapered holes which are linearly or radially pitched.

You will be required to operate the CNC machine in line with safe working practices and approved procedures, to continuously monitor the machining operations and, where necessary, make minor adjustments or seek the help of the setter to make the required adjustments, in order to ensure that the work output is to the required quality and accuracy. 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 machining activities undertaken, and to report any problems with the machining activities 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 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 enable you to adopt an informed approach to applying procedures for electro-discharge machining. You will have an understanding of the CNC electro-discharge process and its application, and will know about the equipment, materials and consumables in adequate depth to provide a sound background for carrying out the activities to the required specification.

You will understand the safety precautions required when working with the machine, 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.

Setting up of the machine, its programming, tooling and associated workholding

devices, is the subject of another standard and is the responsibility of the machine-tool setter.

Performance criteria

You must be able to:

P1 work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines

P2 confirm that the CNC electro-discharge machine is set up and ready for operation

P3 operate the machine controls in accordance with safe working practices and operational procedures

P4 deal with problems within your control and report those that cannot be solved

P5 operate the CNC electro-discharge machine to produce machined components

P6 monitor the computer process and ensure that the production output is to the required specification

P7 complete and store all relevant documentation in accordance with organisational requirements

P8 shut down the equipment to a safe condition on conclusion of the activities

Knowledge and understanding

You need to know and understand:

K1 how to work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines
K2 the safety mechanisms on the CNC electro-discharge machine, and the procedure for checking that they function correctly
K3 how to stop the CNC electro-discharge machine in both normal and emergency situations, and the procedure for restarting after an emergency
K4 the importance of wearing the appropriate personal protective equipment (PPE), and of keeping the work area clean and tidy
K5 the main features of the CNC electro-discharge machines, and the accessories that can be used
K6 the various CNC electro-discharge operations that can be performed, and the methods and equipment used
K7 the operation of the various hand and automatic modes of machine control
K8 how to use 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 where to obtain the component drawings, specifications and/or job instructions required for the components to be machined
K12 how to extract and use information from engineering drawings or data and related specifications in relation to work undertaken
K13 how to use imperial and metric systems of measurement
K14 the application of dielectric and ionised fluids with regard to a range of different materials
K15 the effects of clamping the work piece in a chuck/work holding device, and how this can cause distortion in the finished components
K16 how to recognise CNC electro-discharge machining faults, and when actions need to be taken
K17 the quality control procedures used, inspection checks to be carried out, and the equipment that will need to be used
K18 the issues that can occur with the CNC electro-discharge machining activities, and how these can be overcome

K19 the extent of your own responsibility and to whom you should report if you have problems that you cannot resolve

Scope/range related to performance criteria

1. Confirm that the machine is ready for operation by checking all of the following:

1.1 obtain and use the appropriate documentation (such as job instructions, drawings, quality control documentation)

1.2 adhere to procedures or systems in place for risk assessment, personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work

1.3 confirm with the machine setter that the machine is ready for production

1.4 where appropriate, seek any necessary instruction/training on the operation of the machine

1.5 ensure that machine guards are in place and are correctly adjusted

1.6 hold components securely, without distortion

1.7 ensure that the dielectric fluid is at an appropriate level

1.8 check that the operating program is at the correct start point

1.9 follow the defined operating procedures and apply safe working practices and procedures at all times

1.10 ensure that machine settings are adjusted as and when required (either by yourself or the setter) to maintain the required accuracy

1.11 ensure that the components produced meet the required specification for quality and accuracy

1.12 leave the work area and machine in a safe and appropriate condition on completion of the activities

2. Operate one of the following CNC electro-discharge machines:

2.1 CNC spark erosion machine

2.2 CNC wire erosion machine

2.3 CNC electro-discharge machining centre

3. Produce machined components which cover six of the following:

3.1 flat faces

3.2 parallel faces

3.3 tapered faces

3.4 angular faces

3.5 open-ended slots/recesses

3.6 faces square to each other

3.7 holes on pitched circles

3.8 internal profiles
3.9 enclosed slots/recesses
3.10 linear holes (rows, angles)
3.11 external profiles
3.12 tapered holes
3.13 special profiles (such as concave, convex)
3.14 parallel and tapered steps/slots/shoulders
3.15 circular/curved profiles (internal and external)
3.16 other special forms or features

4. Machine components made from one of the following types of material:
4.1 ferrous
4.2 non-ferrous

5. Use appropriate gauges or instruments to carry out the necessary checks, during production, for accuracy of three of the following:
5.1 dimensions
5.2 parallelism
5.3 squareness
5.4 profile
5.5 position
5.6 angle/taper
5.7 surface texture

6. Produce components with dimensional accuracy, form and surface texture within all of the following quality and accuracy standards as is applicable to the operations performed:
6.1 dimensional tolerance equivalent to relevant standard
6.2 flatness and squareness within 0.001” per inch or 0.025mm per 25mm
6.3 components to be free from false starts, and sharp edges
6.4 angles within +/- 0.5 degree
6.5 machined holes within H8
6.6 surface finish 32 µin; 0.8 µm; 18VDI

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