

Unit 321

Machining components using electro-discharge machines

UAN:	L/600/5439
Level:	3
Credit value:	77
GLH:	161
Relationship to NOS:	This unit has been derived from Semta National Occupational Standard Mechanical Manufacturing Engineering Unit 21: Machining Components using Electro-Discharge Machines (Level 3).
Assessment requirements specified by a sector or regulatory body:	This unit is endorsed by Semta, the Sector Skills Council for Science, Engineering and Manufacturing Technologies.
Aim:	<p>This unit covers the skills and knowledge needed to prove the competences required to carry out electro-discharge machining operations, using spark erosion or wire erosion machines, in accordance with approved procedures. The learner will be required to check that the machine is ready for the operations to be performed, and that all the required components, consumables and measuring equipment is available. The learner will be expected to produce a range of component shapes, such as internal and external profiles, that have flat, square, parallel, and tapered faces, square/rectangular forms, concave and convex forms, holes, slots, radii/arcs, cavities and special forms.</p> <p>The learner must operate the machine in line with safe working practices and approved procedures, and continuously monitor the erosion operations, making any necessary adjustments to settings in order to ensure that the work output is to the required quality and accuracy. Meeting production targets will be an important issue, and their production records must show consistent and satisfactory performance.</p> <p>The learner's responsibilities will require them to comply with organisational policy and procedures for the electro discharge</p>

machining activities undertaken, and to report any problems with the equipment or activities that they cannot personally resolve, or are outside their permitted authority, to the relevant people. The learner will be expected to work with a minimum of supervision, taking personal responsibility for their actions and for the quality and accuracy of the work that they produce.

The learner's knowledge will provide a good understanding of their work, and will provide an informed approach to applying electro-discharge machining procedures. The learner will understand the electro discharge process undertaken, 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.

The learner will understand the safety precautions required when working with the machine and its associated tools and equipment. The learner will be required to demonstrate safe working practices throughout, and will understand the responsibility they owe to themselves and others in the workplace.

Learning outcome
The learner will: 1. machine components using electro-discharge machines
Assessment criteria
The learner can: 1.1 work safely at all times, complying with health and safety and other relevant regulations and guidelines 1.2 ensure that they apply all of the following during the machining activities: <ul style="list-style-type: none">• obtain and use the appropriate documentation (such as job instructions, drawings, quality control documentation)• adhere to procedures or systems in place for risk assessment, COSHH, Personal Protective Equipment and other relevant safety regulations and procedures to realise a safe system of work• ensure that machine guards are in place and correctly adjusted• hold components securely without distortion• maintain cutting tools in a suitable condition• apply safe working practices at all times• adjust machine settings, as required, to maintain the required accuracy• ensure that components produced meet specification

- leave the work area and machine in a safe and appropriate condition on completion of the activities
- 1.3 confirm that the machine is set up and ready for the machining activities to be carried out
- 1.4 operate one of the following types of electro-discharge machine:
 - spark erosion
 - wire erosion
- 1.5 manipulate the machine tool controls safely and correctly in line with operational procedures
- 1.6 produce components to the required quality and within the specified dimensional accuracy
- 1.7 rough and finish components which include six of the following features:
 - flat faces
 - square faces
 - concave forms
 - convex forms
 - profile forms
 - cavities
 - square/rectangular forms
 - angular faces
 - parallel faces
 - threads
 - holes
 - engraving
 - radii/arcs
 - slots
 - other special activities
- 1.8 produce components within all the relevant quality and accuracy standards, as applicable to the operations performed:
 - components to be free from false starts and sharp edges
 - tolerance to BS 4500 or BS 1916 Grade 7
 - surface texture 32 μin or 0.8 μm or 18VDI
- 1.9 machine components made from one of the following types of material:
 - ferrous
 - non-ferrous
- 1.10 carry out quality sampling checks at suitable intervals
- 1.11 carry out the necessary checks during production for accuracy of four of the following:
 - dimensions
 - parallelism
 - angle/taper
 - squareness
 - surface texture
 - profile
- 1.12 deal promptly and effectively with problems within their control and report those that cannot be solved

1.13 shut down the equipment to a safe condition on conclusion of the machining activities.

Learning outcome

The learner will:

2. know how to machine components using electro-discharge machines

Assessment criteria

The learner can:

- 2.1 describe the safe working practices and procedures to be followed while operating electro-discharge machines
- 2.2 describe the hazards associated with carrying out the electro-discharge machining operations (such as moving machine parts, electrical components, handling dielectrics, fumes), and how to minimise them and reduce any risks
- 2.3 describe the safety mechanisms on the machine, and the procedure for checking that they function correctly
- 2.4 describe the operation of the machine controls in both hand and power modes, and how to stop the machine in an emergency
- 2.5 describe the Personal Protective Equipment to be worn, and where this can be obtained
- 2.6 explain the importance of keeping the work area clean and tidy
- 2.7 explain where to obtain the component drawings, specifications and/or job instructions required for the components to be machined
- 2.8 explain how to extract and use information from engineering drawings and related specifications (to include symbols and conventions to appropriate BS, ISO or BSEN standards) in relation to work undertaken
- 2.9 explain how to interpret first and third angle drawings, imperial and metric systems of measurement, workpiece reference points and system of tolerancing
- 2.10 explain the terminology used in electro-discharge machining in relation to the activities undertaken
- 2.11 describe the various erosion operations that are used to produce the required forms, and the types of electrodes or wires used
- 2.12 explain how to dress and reshape electrodes, and the equipment to be used
- 2.13 describe the methods that can be used to position the workpiece in relation to the electrodes/wire, and the equipment that is used
- 2.14 explain the importance of checking the position and alignment of the workpiece before commencing the erosion operations, and the tools and equipment that are used
- 2.15 describe the effects of backlash in machine slides and screws, and how this can be overcome
- 2.16 explain how to handle and store electrodes and wires safely and correctly
- 2.17 describe the factors which affect the selection of electrode or wire feeds and speeds (such as material type, finish and tolerance required)
- 2.18 describe the application of roughing and finishing cuts, and the effect on electrode life, surface finish and dimensional accuracy
- 2.19 explain the reason for using dielectrics, and the type of fluid used
- 2.20 describe the effects of clamping the workpiece, and how this can

cause distortion in the finished components

- 2.21 explain how to recognise erosion faults and identify when electrodes need changing
- 2.22 describe the quality control procedures used, inspection checks to be carried out, and the equipment to be used
- 2.23 describe the problems that can occur with the electro-discharge machining activities, and how these can be overcome
- 2.24 describe the extent of their own authority and to whom they should report if they have problems that they cannot resolve.