

### Overview

This unit identifies the competences you need to carry out milling operations on a milling machine, 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 combine a number of different features, such as flat faces, parallel faces, faces that are flat and square to each other, angular faces, steps, slots and special forms.

You will be required to operate the 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 milling machining. You will have an understanding of the milling machine 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 tooling and associated workholding devices, is the subject of another unit 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 and guidelines
- P2 confirm that the machine is set up and ready for the machining activities to be carried out
- P3 manipulate the machine tool controls safely and correctly in line with operational procedures
- P4 produce components to the required quality and within the specified dimensional accuracy
- P5 carry out quality sampling checks at suitable intervals
- P6 deal promptly and effectively with problems within your control and report those that cannot be solved
- P7 shut down the equipment to a safe condition on conclusion of the machining activities

### Knowledge and understanding

*You need to know and understand:*

- K1 the safe working practices and procedures to be followed whilst operating milling machines
- K2 the safety mechanisms on the machine, and the procedure for checking that they function correctly
- K3 operation of the machine controls in both hand and power modes, and how to stop the machine in an emergency
- K4 the personal protective equipment to be worn, and where this can be obtained
- K5 the hazards associated with operating milling machines and carrying out the milling operations, and how to minimise them and reduce any risks
- K6 the importance of keeping the work area clean and tidy
- K7 where to obtain the component drawings, specifications and/or job instructions required for the components to be machined
- K8 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)
- K9 how to use imperial and metric systems of measurement
- K10 the main features of the milling machine, and the accessories that can be used
- K11 the various milling operations that can be performed, and the methods and equipment used
- K12 the effects of backlash in machine slides and screws, and how this can be overcome
- K13 how to handle and store cutting tools safely and correctly
- K14 the application of roughing and finishing cuts, and the effect on tool life, surface finish and dimensional accuracy
- K15 the application of cutting fluids with regard to a range of different materials
- K16 the effects of clamping the workpiece, and how this can cause distortion in the finished components
- K17 how to recognise machining faults, and how to identify when cutters need re-sharpening
- K18 the quality control procedures that are used, inspection checks to be carried out, and the equipment that will need to be used
- K19 the problems that can occur with the milling activities, and how these can be overcome
- K20 the extent of your own authority and to whom you should report if you have problems that you cannot resolve

### Additional Information

#### Scope/range related to performance criteria

*You must be able to:*

1. apply **all** of the following during the machining activities:
  - 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, COSHH, 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 follow the defined operating procedures and apply safe working practices and procedures at all times
  - 1.8 ensure that machine settings are adjusted as and when required (either by yourself or the setter) to maintain the required accuracy
  - 1.9 ensure that the components produced meet the required specification for quality and accuracy
  - 1.10 leave the work area and machine in a safe and appropriate condition on completion of the activities
2. operate **one** type of milling machine from the following:
  - 2.1 horizontal milling machine
  - 2.2 vertical milling machine
  - 2.3 universal milling machine
3. produce machined components which combine different operations and cover **six** of the following:
  - 3.1 flat faces
  - 3.2 open ended slots
  - 3.3 bored holes
  - 3.4 square faces
  - 3.5 enclosed slots
  - 3.6 profile forms (such as vee, concave, convex, gear forms)
  - 3.7 parallel faces
  - 3.8 recesses
  - 3.9 serrations
  - 3.10 angular faces
  - 3.11 tee slots
  - 3.12 indexed or rotated forms
  - 3.13 steps/shoulders
  - 3.14 drilled holes

- 3.15 special forms
- 4. machine components made from **one** of the following types of material:
  - 4.1 ferrous
  - 4.2 non-ferrous
  - 4.3 non-metallic
- 5. produce components with dimensional accuracy, form and surface texture within **all** the following quality and accuracy standards, as is applicable to the operations performed:
  - 5.1 components to be free from false tool cuts, burrs and sharp edges
  - 5.2 dimensional tolerance equivalent to BS 4500 or BS 1916 grade 9
  - 5.3 flatness and squareness within 0.005" per inch or 0.125mm per 25mm
  - 5.4 surface finish 63µin or 1.6µm
  - 5.5 angles within +/- 1 degree
- 6. use appropriate gauges or instruments to carry out the necessary checks, during production, for accuracy of **four** of the following
  - 6.1 dimensions
  - 6.2 angles
  - 6.3 slots
  - 6.4 squareness
  - 6.5 flatness
  - 6.6 recesses
  - 6.7 hole size/fit
  - 6.8 surface finish

**SEMMME2-08** - SQA Unit Code H2A9 04  
Operating Milling Machines

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<b>Developed by</b>	SEMTA
<b>Version number</b>	1
<b>Date approved</b>	December 2008
<b>Indicative review date</b>	December 2013
<b>Validity</b>	Current
<b>Status</b>	Original
<b>Originating organisation</b>	SEMTA
<b>Original URN</b>	O45NMME2-08
<b>Relevant occupations</b>	Engineering and manufacturing technologies; Engineering; and Engineering Technicians
<b>Suite</b>	Mechanical Manufacturing Engineering Suite 2 2008
<b>Key words</b>	engineering, manufacturing, mechanical, machining, operating, milling machines, horizontal mills, vertical mills, flat surface, slotting