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## Overview

This standard identifies the competencies you need to produce pattern, corebox or model components using machine tools, in accordance with approved procedures. You will be required to select the appropriate equipment to use, based on the type of operations to be performed, the size of the components and the materials to be used. The production of the components will involve the use of both fixed and portable conventional machines, which are designed specifically for metallic materials.

The size and complexity of the components produced will vary, and this will require you to set up the necessary machines and their associated tooling, and to make any necessary adjustments during machining in order that the parts produced meet the required specification. The components produced will be used to produce loose or plated patterns (with and without cores), coreboxes, and various types of full and scale models.

Your responsibilities will require you to comply with organisational policy and procedures for the machining activities undertaken, and to report any problems with the activities, materials or equipment that you cannot personally resolve, or are outside your permitted authority, to the relevant people. You will be expected to work with minimum supervision, taking personal responsibility for your own actions and for the quality and accuracy of the work that you carry out.

Your underpinning knowledge will provide a good understanding of your work, and will provide an informed approach to applying metalwork machining procedures. You will understand the equipment being used, and its application, and will know about the tooling, machine setting arrangements and safety devices, in adequate depth to provide a sound basis for carrying out the activities, correcting faults and ensuring the work output is to the required specification.

You will understand the safety precautions required when carrying out the machining activities. You will be required to demonstrate safe working practices throughout, and will understand the responsibility you owe to yourself and others in the workplace.

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## Performance criteria

### You must be able to:

1. work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines
2. confirm that the machine is set up and ready for the machining activities to be carried out
3. operate the machine tool controls safely and correctly in line with operational procedures
4. produce components to the required quality and within the specified dimensional accuracy
5. carry out component quality sampling checks at suitable intervals
6. complete relevant data and documentation
7. deal promptly and effectively with problems within your control and report those that cannot be solved
8. shut down the equipment to a safe condition on conclusion of the machining activities

## Knowledge and understanding

### You need to know and understand:

1. the specific safety precautions to be taken while carrying out the metal machining activities (such as any specific legislation, regulations or codes of practice relating to the activities, equipment or materials)
2. the health and safety requirements of the work area in which you are carrying out the machining activities, and the responsibility these requirements place on you
3. the use of machine guards and emergency stop mechanisms
4. the personal protective equipment and clothing (PPE) to be worn during the machining activities
5. the hazards associated with machining metal pattern or model materials, and how they can be minimised
6. the importance of ensuring that all machine and portable tools are used correctly and within their permitted operating range
7. the need to ensure that all plugs, sockets and cables on portable machines are in a safe, tested and usable condition
8. how to obtain the necessary job instructions, drawings and specifications to be used during the machining activities, and how to interpret the information contained in them
9. the various machines that are used in metal pattern and model machining, and the range of operations they are capable of performing (such as sawing, milling, turning, spark and wire erosion, grinding)
10. how to check the cutting tools are in a usable and safe condition, and the procedure for changing these when required
11. how different types of machine use different methods to feed the material to the cutting/dressing tool or surface
12. the various methods used to hold the components that are being machined (such as machine vices, chucks, jigs and fixtures, clamping direct to the machine table)
13. how different materials require changes to the machining methods (such as roughing and finishing cuts, changes in feed or speeds used to cut them)
14. how to conduct any necessary checks to ensure the accuracy and quality of the pattern components or models produced, and the type of equipment that is used
15. recognising defects in the components (such as material defects, those produced through machining)
16. why it is important to keep the tools and equipment clean and free from damage, to practice good housekeeping of tools and equipment, and to maintain a clean and unobstructed working area
17. the extent of your own responsibility and whom you should report to

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if you have problems that you cannot resolve

## Scope/range related to performance criteria

1. Carry out all of the following during the machining activities:
  - 1.1. obtain all the necessary information to carry out the machining activities (such as drawings, specifications)
  - 1.2. check that the machine and its tools are fit for purpose and are in a safe and useable condition
  - 1.3. ensure the work area is free from hazards
  - 1.4. ensure all machine guards and safety devices are correctly positioned
  - 1.5. set and adjust the machine to produce the components to the required specification
  - 1.6. use safe and approved machining techniques at all times
2. Use fixed machines to include three of the following:
  - 2.1. milling
  - 2.2. electro-discharge
  - 2.3. drilling
  - 2.4. finishing
  - 2.5. turning
  - 2.6. grinding
  - 2.7. band sawing
  - 2.8. jig boring
  - 2.9. circular saw
3. Use portable machines to carry out all of the following activities:
  - 3.1. form holes
  - 3.2. polish surfaces
  - 3.3. blend joints
4. Produce components which combine different features and cover ten of the following:
  - 4.1. flat faces
  - 4.2. parallel diameters
  - 4.3. convex profiles
  - 4.4. parallel faces
  - 4.5. tapered diameters
  - 4.6. eroded forms
  - 4.7. square faces
  - 4.8. bores
  - 4.9. drilled holes
  - 4.10. angular/tapered faces
  - 4.11. curved profiles
  - 4.12. threaded holes
  - 4.13. stepped features
  - 4.14. concave profiles
  - 4.15. counter bored or countersunk holes
  - 4.16. slots and recesses
  - 4.17. other specific feature

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5. Produce components made from two of the following materials:

- 5.1 low carbon steel
- 5.2 stainless steel
- 5.3 brass/bronze
- 5.4 high carbon steel
- 5.5 aluminium
- 5.6 non-metallic
- 5.7 cast iron

6. Use appropriate measuring equipment and tools to check four of the following:

- 6.1. dimensions
- 6.2. profile
- 6.3. concentricity
- 6.4. flatness
- 6.5. hole position
- 6.6. distortion/straightness
- 6.7. squareness

7. Produce components to one of the following quality standards:

- 7.1 company
- 7.2 customer (contractual)
- 7.3 international

8. Complete the relevant data/documentation from one of the following, and pass it to the appropriate person:

- 8.1 job cards
- 8.2 production records
- 8.3 company specific documentation/computerised system

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## Behaviours

You will be able to apply the appropriate behaviours required in the workplace to meet the job profile and overall company objectives, such as:

- strong work ethic
- positive attitude
- team player
- dependability
- responsibility
- honesty
- integrity
- motivation
- commitment

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