
Overview

This standard identifies the competences you need to produce and/or modify components by machining, for use on commercial or passenger carrying automotive vehicles, in accordance with approved procedures. The machining activities carried out will include milling, turning, grinding, shaping/slotting, drilling, boring and spark or wire erosion, as applicable to the components being produced. You will be expected to produce new components or modify existing components, requiring you to use a wide range of different machines, and this will involve setting up the workholding arrangements, workpiece and machine tooling. The components produced will have a combination of features such as diameters, lengths, threads, flat faces, square faces, slots, and profiles/special forms.

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 used that you cannot personally resolve, or that are outside your permitted authority, to the relevant people. You will be expected to work with a minimum of 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 machining procedures and instructions on vehicle components. You will understand the machining processes used, and their application, and will know about the tooling and ancillary equipment, materials and consumables, in adequate depth to provide a sound basis for carrying out the machining activities, correcting faults and ensuring that the completed components are to the required specification.

You will understand the safety precautions required when working with the machines and their associated tools and equipment, especially those for isolating the machine during tool mounting and setting, and when handling cutting tools and equipment. You will be required to demonstrate safe working practices throughout, and will understand the responsibilities you owe to yourself and others in the workplace.

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 activities to be carried out
3. manipulate the machine tool controls safely and correctly in line with operational procedures
4. produce machined components to the required quality and within the specified dimensional accuracy
5. carry out quality sampling checks at suitable intervals
6. check the completed components comply with specifications
7. deal promptly and effectively with problems within your control and report those that cannot be solved
8. ensure that work records are completed, stored securely and available to others as per organisational requirements
9. leave the work area in a safe condition on completion of the activities, as per organisational and legal requirements

Knowledge and understanding

You need to know and understand:

1. the specific safety precautions to be taken whilst carrying out the activities (including 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 and the activities, and the responsibility these requirements place on you
3. the hazards associated with the activities, and how to minimise them and reduce risks
4. the personal protective equipment and clothing (PPE) to be worn during the activities
5. the procedure for obtaining the required drawings, sketch, development sheets job instructions and other related specifications, and how to interpret them correctly
6. how to operate all the machine controls in both hand and power modes, and how to stop the machine in the case of an emergency
7. the basic concepts of material removal using machines (lathes, milling, grinding, drilling, shaping, slotting and electro-discharge machining)
8. the various machining techniques that can be used to produce the required shapes, and the types of tooling and cutters required (high speed steel tools, solid carbide tools and interchangeable tipped tooling)
9. types and applications of grinding wheels, methods of mounting, and why some wheels require balancing
10. types and application of electrodes, wires and tapes used in spark and wire erosion activities
11. the methods that can be used to position the workpiece in relation to the cutting tools
12. the effects of backlash in the machine slides and how this can be overcome
13. how to handle and store cutters, grinding wheels and tools, safely and correctly
14. the factors which effect the selection of cutting feeds and speeds, the application of roughing and finishing cuts and the depth of cut that can be taken (workpiece rigidity, machine condition, type of tooling being used, material type, finish and tolerance required)
15. how the various types of material will affect the feeds and speeds that can be used

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16. the application of cutting fluids and dielectrics for a range of different materials
 17. the effects of clamping the workpiece and how material removal can cause warping/distortion in the finished workpiece
 18. the quality control procedures used, inspection checks to be carried out, and the equipment to be used
 19. the problems that can occur with the machining activities and how these can be overcome
 20. the extent of your own responsibility and to whom you should report if you have problems that you cannot resolve
 21. how to access, use and maintain information to comply with organisational requirements and legislation

Scope/range related to performance criteria

1.

Carry out 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, hazardous substances, personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work
- 1.3 ensure that machine guards are in place and correctly adjusted
- 1.4 hold components securely without distortion
- 1.5 maintain cutting tools in a suitable condition
- 1.6 apply safe working practices at all times
- 1.7 ensure that components produced meet specification
- 1.8 leave the work area and machine in a safe and appropriate condition on completion of the activities

2.

Produce vehicle components by machining, carrying out both of the following:

- 2.1 modifying existing components
- 2.2 producing new components

3.

Produce machined components using three of the following machining processes:

- 3.1 turning
- 3.2 milling
- 3.3 grinding
- 3.4 drilling
- 3.5 spark/wire erosion
- 3.6 shaping or slotting
- 3.7 laser cutting/profiling
- 3.8 punch
- 3.9 CNC machines
- 3.10 saws (machine)
- 3.11 saws (manual)
- 3.12 water cutting

4.

Use a range of workholding devices, to include five of the following:

- 4.1 3-jaw chucks
- 4.2 vee blocks
- 4.3 magnetic plates
- 4.4 special fixtures
- 4.5 4-jaw chucks
- 4.6 screw clamping
- 4.7 indexing devices

- 4.8 collet chucks
- 4.9 machine vices
- 4.10 face plates
- 4.11 angle plates
- 4.12 vacuum/air clamping
- 4.13 hydraulic clamping
- 4.14 other specific device

5.

Produce machined components which cover seven of the following features:

- 5.1 external diameters
- 5.2 threads
- 5.3 slots/recesses
- 5.4 internal diameters
- 5.5 circular/curved/radial profiles
- 5.6 drilled/bored/reamed holes
- 5.7 lengths/depths
- 5.8 faces that are square to each other
- 5.9 concave or convex forms
- 5.10 flat faces
- 5.11 angular/tapered surfaces
- 5.12 special forms
- 5.13 parallel faces
- 5.14 steps/shoulders

6.

Machine two different types of material from:

- 6.1 low carbon steel
- 6.2 aluminium
- 6.3 plastic/synthetic
- 6.4 high carbon steel
- 6.5 brass
- 6.6 composite
- 6.7 stainless steel
- 6.8 bronze
- 6.9 special steels or alloys
- 6.10 cast iron

7.

Carry out all necessary checks for dimensional accuracy, to include four of the following:

- 7.1 dimensions
- 7.2 thread size and fit
- 7.3 angles
- 7.4 hole size/fit
- 7.5 flatness/squareness
- 7.6 profile
- 7.7 concentricity

7.8 quality of surface finish

8.

Check components comply with all of the following standards, as applicable to the operations performed:

- 8.1 components to be free from false tool cuts, burrs and sharp edges
- 8.2 dimensional tolerance equivalent to current industry standards, codes of practice and procedures
- 8.3 surface finish 63 μ m or 1.6 μ m
- 8.4 reamed and bored holes within H8
- 8.5 screw threads medium fit
- 8.6 angles within ± 0.5 degree

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Machining components for commercial and passenger carrying vehicle applications



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