

Overview

This standard identifies the competences you need to prepare and set up capstan and turret lathes, in accordance with approved procedures. This will involve selecting the appropriate workholding devices, securing them to the machine spindle, selecting and setting suitable chuck jaws and collet chucks, boring out soft jaws, and mounting workpieces in jigs or fixtures. You will be expected to select the appropriate turning tools, check that they are in a usable condition, and mount and secure them to the relevant tool holding devices, in front and rear tool posts and on the capstan/turret head.

You will need to set the machine operating parameters to produce the workpiece to the required specification. This will involve setting up capstan/turret and saddle feed stops, setting appropriate depths of cut for roughing and finishing operations, selecting and setting feeds and speeds, and setting up multiple cutting arrangements between capstan/turret and saddle. You must produce trial cuts and prove the machine is working satisfactorily before declaring the machine ready for production. Making adjustments to settings to achieve specification, and solving machine-related problems during production, will also form part of your role.

Your responsibilities will require you to comply with organisational policy and procedures for the machine setting activities undertaken, and to report any problems with the machine, tooling, equipment or setting-up activities that you cannot resolve, or 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 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 the setting-up procedures used. You will understand the machine used, and its application, and will know about the workholding devices, turning tools, relevant materials, consumables and setting-up procedures, 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 working with the machine and its associated tools and equipment. You will be required to demonstrate safe

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working practices throughout, and will understand the responsibility you owe to yourself and others in the workplace.

This standard does not cover CNC turning activities, for which other standards apply.

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. follow the correct specifications for the component to be produced
3. determine what has to be done and how the machine will be set to achieve this
4. mount, set and secure the required work-holding devices, workpiece and cutting tools
5. set the machine tool operating parameters to achieve the component specification
6. check that all safety mechanisms are in place and that the equipment is set correctly for the required operations
7. complete the required production documentation
8. deal promptly and effectively with problems within your control and report those that cannot be solved

Knowledge and understanding

You need to know and understand:

1. how to work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines
2. the hazards associated with setting capstan and turret lathes and how they can be minimised and reduce any risks
3. how to start and stop the machine in normal and emergency situations
4. the importance of ensuring that the machine is isolated from the power supply before mounting turning tools and workholding devices
5. the importance of wearing the appropriate protective clothing (PPE) and equipment, and of keeping the work area clean and tidy
6. the basic principles of operation of the capstan or turret lathe and its accessories, and typical operations that they can perform
7. how to handle and store turning tools safely and correctly
8. how to extract and use information from engineering drawings and related specifications (to include symbols and conventions to appropriate standards) in relation to work undertaken
9. how to interpret first and third angle drawings, imperial and metric systems of measurement, workpiece reference points and system of tolerancing
10. terminology used in capstan and turret lathe turning in relation to the activities undertaken
11. the range of workholding methods and devices that are used on capstan and turret lathes
12. the use of hard and soft jaws in chucks, and the methods of boring out soft jaws to suit the workpiece
13. the different types of turning tools that are used, and how they are selected, prepared and mounted to the machine tool holding devices
14. the use of pilot bars and shoes for the capstan/turret, and why they need to be accurately aligned
15. the need to produce a balanced capstan/turret arrangement, with tools appropriately positioned around the turret stations
16. factors which determine speeds and feeds to be used
17. how the various types of material will affect the feeds and speeds that can be used

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18. the types of cutting fluid that are used, and precautions to be taken when handling and using them
19. how to set up the turret lathe and its accessories for the particular operations being performed
20. the need to conduct trial runs, and to check that the machine is set up and producing the components correctly
21. problems that can occur with setting up the workholding devices, tooling and machine operating parameters, and what to do if they occur
22. 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. Carry out all of the following during the setting up activities:
 - 1.1 obtain and use the appropriate 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 follow safe practice/approved setting up procedures at all times
 - 1.4 ensure that correctly adjusted machine guards are in place
 - 1.5 check that cutting tools are in a suitable condition
 - 1.6 hold components securely without distortion
 - 1.7 leave the work area and machine in a safe and appropriate condition on completion of the activities
2. Select, mount and secure the workpiece using four of the following workholding devices:
 - 2.1 hand chucks with hard jaws
 - 2.2 power chucks with hard jaws
 - 2.3 jigs/fixtures
 - 2.4 hand chucks with soft jaws
 - 2.5 power chucks with soft jaws
 - 2.6 collet chucks
3. Use two of the following groups of turning tools:
 - 3.1 solid high-speed steel
 - 3.2 brazed tungsten carbide
 - 3.3 indexable tips (such as carbide, ceramic, diamond)
4. Select and mount roughing and finishing tools, to include eight of the following types of tools:
 - 4.1 turning tools
 - 4.2 parting off tools
 - 4.3 recessing tools
 - 4.4 expanding reamers
 - 4.5 facing tools
 - 4.6 thread chaser
 - 4.7 centre drills
 - 4.8 taps
 - 4.9 form tools
 - 4.10 single point threading
 - 4.11 twist/core drills
 - 4.12 dies
 - 4.13 chamfer/radii
 - 4.14 boring bars
 - 4.15 solid reamers
 - 4.16 knurling tools

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5. Mount, secure and position tools in all of the following:
 - 5.1 front tool box
 - 5.2 rear tool post
 - 5.3 ending boxes
 - 5.4 die boxes
 - 5.5 roller box
 - 5.6 polygon/special profile boxes
 - 5.7 boring bars (single / multiple)
 - 5.8 multiple cutting arrangements
 - 5.9 turret/capstan knee box
 - 5.10 chucks/floating arrangement
6. Set up machine in accordance with instructions and specifications, to include setting all of the following:
 - 6.1 position of workpiece in work holding device
 - 6.2 depth of cut for roughing and finishing
 - 6.3 position of turning tools in relationship to workpiece
 - 6.4 turret and saddle feed stops and indicators
 - 6.5 screw threading devices
 - 6.6 cutting fluid flow rate
 - 6.7 workpiece speed and feed
 - 6.8 machine guards/safety mechanisms
7. Set up the machine to produce internal and external profiles that include ten of the following:
 - 7.1 flat faces
 - 7.2 drilled holes
 - 7.3 internal threads
 - 7.4 chamfers and radii
 - 7.5 parallel diameters
 - 7.6 bored holes
 - 7.7 external threads
 - 7.8 knurls/special finishes
 - 7.9 stepped diameters
 - 7.10 reamed holes
 - 7.11 eccentric features
 - 7.12 grooves/undercuts
 - 7.13 tapered diameters
 - 7.14 profile forms
 - 7.15 parting off
 - 7.16 counterbores
8. Machine components from one of the following types of material:
 - 8.1 ferrous
 - 8.2 non-ferrous
 - 8.3 non-metallic
9. Set the machine to produce components within all of the following quality and accuracy standards, as applicable to the operations performed:

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- 9.1 components to be free from false tool cuts, burrs and sharp edges
- 9.2 dimensional tolerance as specified in relevant standard
- 9.3 reamed and bored holes within H8
- 9.4 screw threads BS medium fit
- 9.5 angles within +/- 0.5 degree
- 9.6 surface finish 63 μ m or 1.6 μ m

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