

Setting horizontal boring machines for production

Overview

This standard identifies the competences you need to prepare and set up horizontal boring machines, and horizontal boring attachments, in accordance with approved procedures. This involves selecting the appropriate workholding devices, and mounting and positioning them to the machine in the correct location for the type of operation being carried out. You will also be expected to select the appropriate horizontal boring tools and cutters, check them for defects, and mount and secure them to the relevant tool holding devices and machine spindle.

You will be expected to set up and align the workpiece in the correct relationship to the machine spindle, and to set the machine operating parameters to produce the workpiece to the required specification. You must produce trial cuts, and prove the machine is working satisfactorily before declaring the installation 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, cutters, tools, equipment or setting up activities that you cannot personally 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 horizontal boring machine used, and its application, and will know about the workholding devices, cutters, tools, relevant materials and consumables, and setting up procedures, in adequate depth to provide a sound basis for carrying out the activities 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 working practices throughout, and will understand the responsibility you owe to yourself and others in the workplace.

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

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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. 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 workholding 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

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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 horizontal boring machines, and how to minimise them 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 tools, cutters, workpieces and work holding 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 horizontal boring machine, and typical operations that it can perform
7. how to handle and store tools and cutters 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 horizontal boring in relation to the activities undertaken
11. the range of workholding methods and devices that are used on machines
12. the methods of mounting and setting the workpiece in/on the workholding devices, and the tools and equipment that can be used
13. the different types of horizontal boring tools and cutters that are used, and how they are selected, prepared and mounted to the machine tool holding devices
14. factors which determine speeds and feeds to be used
15. how the various types of material will affect the feeds and speeds that can be used
16. the types of cutting fluid that are used, and precautions to be taken when handling and using them
17. how to set up the machine for the particular operations being performed
18. the need to conduct trial runs, and check that the machine is set up and running safely and correctly
19. problems that can occur with setting up the horizontal boring machine, tools and cutters, work holding devices and machine operating parameters, and what to do if problems occur
20. the extent of your own responsibility and to whom you should report

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if you have problems that you cannot resolve

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Scope/range related to performance criteria

1. Carry out all of the following activities during setting up:
 1. obtain and use the appropriate documentation (such as job instructions, drawings, quality control documentation)
 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
 3. follow safe practice/approved setting up procedures at all times
 4. ensure that correctly adjusted machine guards are in place
 5. check that cutting tools are in a suitable condition
 6. hold components securely without distortion
 7. leave the work area and machine in a safe and appropriate condition on completion of the activities
2. Prepare the machine and its equipment in readiness for production, to include all of the following:
 1. lifting equipment
 2. boring heads
 3. workholding devices
 4. slings
 5. tool/cutter holding devices
3. Position, align and secure the workpiece using three of the following work holding arrangements:
 1. clamping direct to machine table
 2. indexing/rotating device
 3. four jaw chucks
 4. machine vice (such as plain, swivel, universal)
 5. vee block and clamps
 6. fixtures
 7. three jaw chucks, hard jaws
 8. three jaw chucks, soft jaws
 9. angle plate
 10. pneumatic or magnetic table
 11. other workholding devices
4. Select and mount horizontal boring tools/cutters to include seven of the following:
 1. boring
 2. facing
 3. twist drills
 4. reamers
 5. forming
 6. turning
 7. recessing
 8. chamfering or radii

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9. taps
 10. milling cutters
 5. Set up the machine in accordance with instructions and specifications to include all of the following:
 1. alignment of workholding device/workpiece
 2. cutter/tool revolutions per minute
 3. position of cutters/tools in relationship to workpiece
 4. depth of cut for roughing and finishing
 5. position of cutters/tools in relationship to datums
 6. cutting fluid flow rate
 7. feed rate
 8. machine guards/safety mechanisms
 6. Set up the machine to produce internal and external profiles that include ten of the following:
 1. bored holes through workpiece
 2. threaded holes
 3. parallel faces
 4. bored holes to a depth
 5. external diameters
 6. angular faces
 7. tapered bores
 8. grooves/recesses
 9. slots
 10. drilled holes to depth
 11. chamfers/radii
 12. indexed or rotated forms
 13. drilled holes through workpiece
 14. flat faces
 15. reamed holes
 16. square faces
 7. Machine components made from one of the following types of material:
 1. ferrous
 2. non-ferrous
 3. non-metallic
 8. Set the machine to produce components within all of the following quality and accuracy standards, as applicable to the operations performed:
 1. components to be free from false tool cuts, burrs and sharp edges
 2. flatness and squareness within 0.001" per inch or 0.025mm per 25mm
 3. dimensional tolerance equivalent to relevant standard
 4. surface finish 63 μ m or 1.6 μ m
 5. angles within +/- 0.5 degree
 6. bored holes within H8

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