

Operating single and multi-spindle drilling machines

Overview

This standard identifies the competences you need to carry out drilling operations on single or multi-spindle drilling machines, such as bench drilling machines, pedestal machines, radial arm machines or special-purpose drilling machines, 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 drilled and reamed holes, counterbores, countersinks and internal threads.

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 drilling procedures. You will have an understanding of the single and multi-spindle drilling processes, and their 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 standard and is the responsibility of the machine-tool setter.

Operating single and multi-spindle drilling machines

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 quality sampling checks at suitable intervals
6. deal promptly and effectively with problems within your control and report those that cannot be solved
7. complete the required production documentation
8. shut down the equipment to a safe condition on conclusion of the machining activities

Operating single and multi-spindle drilling machines

Knowledge and understanding

You need to know and understand:

1. the safe working practices and procedures to be followed whilst operating single or multi-spindle drilling machines
2. the safety mechanisms on the machine, and the procedure for checking that they function correctly
3. operation of the machine controls in both hand and power modes
4. how to stop the machine in both normal and emergency situations, and the procedure for restarting after an emergency
5. the personal protective equipment (PPE) to be worn, and where this can be obtained
6. the hazards associated with operating multi-spindle drilling machines and carrying out the drilling operations, and how to minimise them and reduce any risks
7. the importance of keeping the work area clean and tidy
8. where to obtain the component drawings, specifications and/or job instructions required for the components to be machined
9. 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)
10. how to use imperial and metric systems of measurement
11. the main features of the single or multi-spindle drilling machine, and the accessories that can be used
12. the various drilling operations that can be performed, and the methods and equipment used
13. how to handle and store drills and tools safely and correctly
14. the application of cutting fluids with regard to a range of different materials
15. the effects of clamping the work piece in a jig/work holding device, and how this can cause distortion in the finished components
16. how to recognise machining faults, and how to identify when drills and tools need re-sharpening
17. the quality control procedures that are used, inspection checks to be carried out, and the equipment that will need to be used
18. the problems that can occur with the drilling activities, and how these can be overcome
19. the extent of your own authority and to whom you should report if you have problems that you cannot resolve

Operating single and multi-spindle drilling machines

Scope/range related to performance criteria

1. Apply **all** of the following during the machining activities:
 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, COSHH, personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work
 3. confirm with the machine setter that the machine is ready for production
 4. where appropriate, seek any necessary instruction/training on the operation of the machine
 5. ensure that machine guards are in place and are correctly adjusted
 6. hold components securely, without distortion
 7. follow the defined operating procedures and apply safe working practices and procedures at all times
 8. ensure that machine settings are adjusted as and when required (either by yourself or the setter) to maintain the required accuracy
 9. ensure that the components produced meet the required specification for quality and accuracy
 10. leave the work area and machine in a safe and appropriate condition on completion of the activities
2. Operate **two** of the following types of drilling machine:
 1. single spindle pedestal drill
 2. radial arm drill
 3. multi-spindle pedestal drill
 4. bench drill
 5. special-purpose drilling machines
3. Produce drilled components which combine different operations and cover **five** of the following:
 1. drilling to depth
 2. countersinking
 3. drilling through the work piece
 4. spot facing
 5. drilling flat bottomed
 6. reaming
 7. counter boring
 8. tapping

Operating single and multi-spindle drilling machines

4. Drill components made from **one** of the following types of material:
 1. ferrous
 2. non-ferrous
 3. non-metallic
5. Use appropriate gauges or instruments to carry out the necessary checks, during production, for accuracy of **all** of the following:
 1. hole size/fit
 2. hole depths
 3. thread fits
6. Produce components with dimensional accuracy, form and surface texture within **all** of the following quality and accuracy standards, as is applicable to the operations performed:
 1. components to be free from false tools cuts, burrs and sharp edges
 2. dimensional tolerance equivalent to BS EN 20286 or BS 1916 Grade 9
 3. surface finish 63µin or 1.6µm
 4. reamed holes within H8
 5. screw threads BS medium fit

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