SEMMME215

Operating broaching machines

Overview

This standard identifies the competences you need to carry out machining operations on a broaching machine, 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 cover a number of different features, such as keyways, square holes, hexagonal and octagonal holes, holes with a single flat side, splines, serrations and special forms.

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 broaching procedures. You will have an understanding of the broaching process and its 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.

Performance criteria

You must be able to:

P1 work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines

P2 confirm that the machine is set up and ready for the machining activities to be carried out

P3 operate the machine controls in accordance with safe working practices and operational procedures

P4 produce machined components to the required specification and within the specified dimensional accuracy

P5 carry out quality sampling checks with the appropriate gauges/instruments for accuracy at suitable intervals

P6 deal with problems within your control and report those that cannot be solved

P7 complete and store all relevant documentation in accordance with organisational requirements

P8 shut down the equipment to a safe condition on conclusion of the machining activities

Knowledge and understanding

You need to know and understand:

K1 how to work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines
K2 the safety mechanisms on the machine, and the procedure for checking that they function correctly
K3 operation of the machine controls in both hand and power modes, and how to stop the machine in an emergency
K4 the importance of wearing the appropriate personal protective equipment (PPE), and of keeping the work area clean and tidy
K5 where to obtain the component drawings, specifications and/or job instructions required for the components to be machined
K6 how to extract and use information from engineering drawings and related specifications in relation to work undertaken
K7 how to use imperial and metric systems of measurement
K8 the various broaching techniques that can be used to produce the required shapes, and the types of broaches used
K9 how to handle and store broaches safely and correctly
K10 the application of cutting fluids with regard to a range of different materials
K11 the effects of clamping the work piece, and how this can cause distortion in the finished components
K12 how to recognise broaching faults, and how to identify when tools need re-sharpening
K13 the quality control procedures used, inspection checks to be carried out, and the equipment that will need to be used
K14 the issues that can occur with the broaching activities, and how these can be overcome
K15 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. Apply 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, personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work

1.3 confirm with the machine setter that the machine is ready for production

1.4 where appropriate, seek any necessary instruction/training on the operation of the machine

1.5 ensure that machine guards are in place and are correctly adjusted

1.6 hold components securely, without distortion

1.7 follow the defined operating procedures and apply safe working practices and procedures at all times

1.8 ensure that machine settings are adjusted as and when required (either by yourself or the setter) to maintain the required accuracy

1.9 ensure that the components produced meet the required specification for quality and accuracy

1.10 leave the work area and machine in a safe and appropriate condition on completion of the activities

2. Operate one type of broaching machine from the following:

2.1 horizontal broaching machine

2.2 vertical broaching machine

3. Produce machined components which cover three of the following:

3.1 keyways

3.2 octagonal holes

3.3 flat sided holes

3.4 splines

3.5 square holes

3.6 serrations

3.7 hexagonal holes

3.8 other/special forms

4. Machine components made from one type of material from the following:

4.1 ferrous
4.2 non-ferrous
4.3 non-metallic

5. Use appropriate gauges or instruments to carry out the necessary checks, during production, for accuracy of three of the following:
5.1 dimensions
5.2 surface finish
5.3 squareness
5.4 keyway width
5.5 spline/serration fit
5.6 keyway position

6. Produce components with dimensional accuracy, form and surface texture within all of the following quality and accuracy standards:
6.1 dimensional tolerance equivalent to relevant standards
6.2 surface finish 63µin or 1.6µm
6.3 components to be free from false tool cuts, burrs and sharp edges

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