

Overview

This standard identifies the competences you need to carry out machining operations on a honing or lapping 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 hone/lap a range of components, which will include through holes, blind holes and flat surfaces.

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 honing and lapping procedures. You will have an understanding of the honing and lapping 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 equipment/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
- K4 how to stop the machine in both normal and emergency situations, and the procedure for restarting after an emergency
- K5 the importance of wearing the appropriate personal protective equipment (PPE), and of keeping the work area clean and tidy
- K6 where to obtain the component drawings, specifications and/or job instructions required for the components to be machined
- K7 how to extract and use information from engineering drawings and related specifications in relation to work undertaken
- K8 how to use imperial and metric systems of measurement
- K9 the main features of the honing and lapping machine used, and the accessories that can be used
- K10 the various honing or lapping operations that can be performed, and the methods and equipment used
- K11 the effects of backlash in machine slides and screws, and how this can be overcome
- K12 how to handle and store honing and lapping stones and equipment safely and correctly
- K13 the application of roughing and finishing cuts, and the effect on stone life, surface finish and dimensional accuracy
- K14 how to adjust the equipment, to correct taper in bores and achieve workpiece tolerances
- K15 the application of cutting fluids with regard to a range of different materials
- K16 the effects of clamping the workpiece, and how this can cause distortion in the finished components
- K17 how to recognise honing and lapping faults, and how to identify when the stones need replacing
- K18 the quality control procedures used, inspection checks to be carried out, and the equipment that will need to be used

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K19 the issues that can occur with the honing and lapping activities, and how these can be overcome

K20 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 of the following types of honing or lapping machine:
 - 2.1 horizontal honing
 - 2.2 rotary disc lapping
 - 2.3 vertical honing
 - 2.4 reciprocating machines

3. Either - Rough, finish and polish components which includes two of the following for honing machines:
 - 3.1 through holes
 - 3.2 blind holes
 - 3.3 tapered holesor - Rough, finish and polish components which includes two of the following for lapping machines
 - 3.4 flat faces
 - 3.5 parallel faces

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3.6 angular faces

4. Hone and lap components made from one of the following types of material:

4.1 ferrous

4.2 non-ferrous

5. Either - Carry out all of the following checks, during production, for accuracy when using honing machines:

5.1 dimensions

5.2 surface texture

5.3 parallelism

5.4 ovality/lobbing

or - Carry out all of the following checks, during production, for accuracy when using lapping machines

5.5 dimensions

5.6 surface texture

5.7 parallelism

5.8 flatness

6. Produce components with dimensional accuracy, form and surface texture within all of the following standards:

6.1 tolerance to relevant standard

6.2 surface texture $8\mu\text{in}$ or $0.2\mu\text{m}$

6.3 components to be free from stone/disc marks, burrs and sharp edges

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