SEMMME3057

Setting tool and cutter grinding machines for production

Overview

This standard identifies the competences you need to prepare and set up tool and cutter grinding machines, and associated tool and cutter grinding equipment, 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 grinding wheels and tools, check them for defects, and mount and secure them to the relevant holding device. You will set up and align the workpiece in the correct relationship to the grinding wheel, and set the machine operating parameters to grind the workpiece to the required specification.

The tools to be ground will include such items as drills, milling cutters, turning tools, saws, shaping and slotting tools, hobs, gear cutting and shaving tools, and broaches. You must produce trial cuts and prove the machine is working satisfactorily before declaring the machine ready for operation. Making adjustments to settings to achieve specification, and solving machine-related problems during operation, 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, grinding wheels, 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 tool and cutter grinding machine used, and its application, and will know about the workholding devices, cutters, tools, relevant materials, consumables and setting up procedures, in adequate depth to provide a sound basis for setting up the equipment, correcting faults and ensuring the tools are ground 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.

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

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 legislation that governs the mounting, dressing and balancing of grinding wheels and how this applies to you
3. the hazards associated with setting tool and cutter grinding machines and how to minimise them and reduce any risks
4. how to start and stop the machine in normal and emergency situations
5. the importance of ensuring that the machine is isolated from the power supply before mounting grinding wheels, workpieces and work holding devices
6. the importance of wearing the appropriate protective clothing (PPE) and equipment, and of keeping the work area clean and tidy
7. the basic principles of operation of the tool and cutter grinding machine, and typical operations that they can perform
8. how to handle and store tools and cutters safely and correctly
9. how to handle and store grinding wheels safely and correctly
10. 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
11. how to interpret first and third angle drawings, imperial and metric systems of measurement, workpiece reference points and system of tolerancing
12. terminology used in tool and cutter grinding in relation to the activities undertaken
13. the range of workholding methods and devices that are used on tool and cutter grinding machines
14. the methods of mounting and setting the workpiece on the workholding device, and the tools and equipment that can be used
15. the different types of tool and cutter grinding wheels and grits that are used, and how they are selected, prepared and mounted to the machine tool holding devices
16. how to check that the grinding wheels are in a safe and serviceable condition (such as free from damage, cracks, correctly balanced)
17. methods of forming the wheels to the required profile (such as use of diamond

dressing units, wheel forming equipment)
18. the need for `trueing up' and dressing of wheels to prevent glazing and burning of the workpiece
19. factors which determine speeds to be used
20. how the various types of material will affect the speeds that can be used
21. how to set up the machine for the particular operations being performed
22. the need to conduct trial runs, and to check that the machine is set up and running safely and correctly
23. problems that can occur with setting up the tool and cutter grinding machine, workholding devices and machine operating parameters, and what to do if they occur
24. 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. Prepare one of the following the tool and cutter grinding machines in readiness for production:
   2.1 universal tool and cutter grinder
   2.2 purpose-built tool and cutter grinder
3. Select, prepare and mount workholding devices to include five of the following:
   3.1 arbors
   3.2 centres
   3.3 chucks
   3.4 vices
   3.5 collets
   3.6 work heads
   3.7 work rests
   3.8 ancillary equipment
   3.9 indexing mechanisms
4. Select and mount diamond wheels and grit wheels, to include all of the following:
   4.1 selecting grinding wheels for specific materials (such as diamond grade, grit grade, grain size, structure, bond)
   4.2 mounting wheels (such as paper washers, flanges, locking pressure)
   4.3 testing wheels for cracks/damage
   4.4 balancing wheels (where appropriate)
5. Prepare and dress grinding wheels using all of the following, as applicable to the machine used:
   5.1 dressing and `trueing up' grinding wheels
   5.2 relieving the wheel sides
   5.3 wheel forming (chamfers, radii, angular forms, profiles)
   5.4 diamond dressing sticks
6. Set up the machine in accordance with instructions and specifications, to include setting all of the following:
   6.1 centres for tapers
   6.2 centres for parallelism

6.3 setting indexing devices
6.4 positioning wheels
6.5 workpiece position and alignment
6.6 setting grinding depth/cut required
6.7 setting dust extraction systems
6.8 machine guards/safety mechanisms

7. Set up the machine to grind new and refurbished tools and cutters, to include ten the following:

7.1 twist drills
7.2 reamers
7.3 face mills
7.4 lathe tools
7.5 slot drills
7.6 broaches
7.7 core drills
7.8 end mills
7.9 hobs
7.10 form tools
7.11 slotting tools
7.12 slab mills
7.13 counterbore tools
7.14 gear shaving
7.15 machine saws
7.16 side/face cutters

8. Grind tools and cutters made from both of the following types of material:

8.1 high-speed steel
8.2 tungsten carbide

9. Set the machine to grind components within all of the following quality and accuracy standards:

9.1 all operations are carried out to the required specification
9.2 ground cutting angles and clearance meet operational requirements
9.3 where applicable, dimensional accuracy and surface texture are within the tooling requirements

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