SEMMME3030

Loading and proving CNC machine tool programs

Overview

This standard identifies the competences you need to load and prove machine tool programs on Computer Numerical Control (CNC) machine tools, in accordance with approved procedures. You will be required to obtain the correct component program, which may be on a range of media devices or downloaded from a networked computer. You will need to check the program for currency and load it correctly into the machine controller, checking for fault/error messages and dealing with these as appropriate to your level of responsibility. You will also be required to adjust the machine tool equipment and program, following proving/editing procedures, to achieve component specification. You must ensure that any edited programs are saved safely and correctly.

Your responsibilities will require you to comply with organisational policy and procedures for obtaining, loading and proving the programs, and to report any problems with these 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 and accuracy 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 applying the machine tool programming procedures used. You will understand the CNC machine tools used in the process, and their application, and will know about the programming, editing and proving process, in adequate depth to provide a sound basis for carrying out the activities, correcting faults and ensuring the machine controller is set up to produce the components to the required specification.

You will understand the safety precautions required when working on 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.

Setting workholding devices and tooling is the subject of other standards.

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. use the correct control program and ensure it is correctly loaded into the machine controller
3. follow the correct procedures for calling up the program and dealing with any error messages or faults
4. confirm program integrity
5. adjust the equipment and program operating parameters to optimise the outcomes to be achieved
6. load and correctly set up all associated equipment
7. check that all safety mechanisms are in place and that the equipment is set correctly for the required operations
8. operate the machine to prove the program
9. complete the required production documentation
10. 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. how to start and stop the machine in normal and emergency situations
3. the importance of wearing the appropriate protective clothing (PPE) and equipment, and of keeping the work area clean and tidy
4. how to save the programs in the appropriate format, and the importance of storing programs and storage devices safely and correctly, away from contaminants and possible corruption
5. the methods and procedures used to minimise the chances of infecting a computer with a virus
6. the implications if the computer you are using does become infected with a virus and who to contact if it does occur
7. the computing coding language used in CNC programs
8. the function keys and operating system of the machine computer control system being operated
9. how to load, execute, edit and exit programs correctly
10. how to set machine datums for each of the machine axis being used
11. how to deal with error messages and faults on the program or computer controlled equipment
12. how to place the machine into the correct operating mode and access the program edit facility, in order to enter tooling data such as tool datums, positions, lengths, offsets and radius compensation
13. the use of tool posts, magazines and carousels, and how to identify the tools in relationship to the operating program
14. how to conduct trial runs, using single block run, dry run and feed and speed override controls
15. why you would conduct a full dry run and single block run
16. the items that you need to check before allowing the machine to operate in full program run mode
17. how to extract and use information from engineering drawings or data and related specifications (to include symbols and conventions to appropriate standards) in relation to work undertaken

18. how to interpret first and third angle drawings, imperial and metric systems of measurement, workpiece reference points and system of tolerancing
19. factors which will affect the feeds and speeds that can be used, and why they may need to be adjusted from the program setting (condition of material, workholding method, tooling used, tolerance and finish to be achieved)
20. the application of cutting fluids with regard to a range of different materials, and why some materials do not require the use of cutting fluids
21. typical problems that can occur with the loading and editing of the operating program, and what to do if they occur
22. 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. Ensure that you apply all of the following during the programming 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 programming procedures at all times
   1.4 obtain the required operating program and check it for currency and validity
   1.5 prepare the machine controller to accept the operating program
   1.6 load the program into the controller safely and correctly
   1.7 ensure that program media is stored safely and correctly, away from contaminants or possible corruption sources
   1.8 leave the work area and machine in a safe and appropriate condition on completion of the activities
2. Load and prove programs for one of the following types of CNC machine tool:
   2.1 two axis machine
   2.2 three axis machine
   2.3 multiple axis machines (5 or more)
   2.4 machining centres
3. Obtain and load programs stored on one of the following mediums:
   3.1 media storage device
   3.2 disk/tape
   3.3 networked computer system
4. Operate a CNC machine controller using six of the following, as applicable to the machine type:
   4.1 single block run
   4.2 graphic displays
   4.3 full dry run
   4.4 search facilities
   4.5 program save/store facilities
   4.6 edit facilities
   4.7 program override controls (speed, feed, tool data)
   4.8 data input facilities
5. Confirm the machine and program operates safely and correctly by checking all of the following, as applicable to the machine type:
   5.1 datums for each machine axis are set in relation to all equipment and tooling used
   5.2 tool offsets are correctly entered into the machine controller
   5.3 tool change positions are safe and clear of the workpiece and machine equipment
   5.4 the correct tools are selected at the appropriate points in the program
   5.5 tool cutter paths are executed safely and correctly

5.6 all operations are carried out to the program co-ordinates
5.7 any alterations to programs are communicated fully to the appropriate personnel

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