Western Technical College

31444302 Machine Setup for CNC Milling

Course Outcome Summary

Course Information

Description	This course will provide instruction and practice in tool selection and setup, work-holding devices and work setup, program call up and proofing, and minor program editing and machine adjustments on CNC Tool Room mills and CNC Machining Centers.
Career Cluster	Manufacturing
Instructional Level	One-Year Technical Diploma
Total Credits	2
Total Hours	72

Textbooks

No textbook required.

Learner Supplies

Safety glasses with side eye protection that meet Z87 OSHA guidelines. **Vendor:** Campus Shop. Required.

Proper footwear - $35.00-75.00. **Vendor:** To be discussed in class. Required.

Scientific calculator (recommend T1-36x Solar). **Vendor:** Campus Shop. Required.

Program Outcomes

1. MACH 1. Apply basic safety practices in the machine shop
2. MACH 2. Interpret industrial/engineering drawings
3. MACH 3. Apply precision measuring methods to part inspection
4. MACH 5. Perform programming, set-up and operation of CNC Machine Tools

Course Competencies

1. Perform machine start up with CNC Milling controls.

Assessment Strategies

1.1. In a shop setting
1.2. In a applied activities using actual CNC machine tools

Criteria

You will know you are successful when

1.1. you follow safety procedures when starting up machines.
1.2. you sequentially and accurately lists the steps required to start and home CNC machining centers.
1.3. you correctly demonstrate the ability to start and home all CNC milling machines in the machine tool lab.
1.4. you follow documented procedures to spindle warm up the CNC machining center
1.5. you score of 70% or higher on all related assessments.

Learning Objectives

1.a. Observe safe operating procedures for machine start up
1.b. Locate and identify the main machine controls on CNC milling machines
1.c. Describe the process for starting and homing CNC milling machines
1.d. Demonstrate the process and procedures for starting and homing CNC milling machines
1.e. Perform CNC machining center warm up

2. Call up programs to run in CNC milling machines

Assessment Strategies

2.1. In the shop setting
2.2. Using actual CNC machine tools
2.3. In applied assignments
2.4. Individually
2.5. Given prints, process sheets, directions, and all available shop equipment and supplies

Criteria

Performance will be satisfactory when:

2.1. learner demonstrates the methods used for storing CNC programs on external devices and equipment
2.2. learner demonstrates the methods used for storing CNC programs in the machine control unit
2.3. learner demonstrates the process for loading programs in each CNC milling machine from various program storage locations in the machine tool lab.
2.4. learner demonstrates the process to activate or call up programs from each CNC milling machine in the machine tool lab.
2.5. learner demonstrates the process to delete programs from each CNC milling machine in the machine tool lab.
2.6. learner completes all related course activities and assessments with a combined minimum score of 70%

Learning Objectives

2.a. Describe program storage methods for CNC milling machines
2.b. Operate controls for selecting, activating, and loading programs
2.c. Load programs from a USB drive
2.d. Describe program loading options
2.e. Locate stored programs
2.f. Activate programs from control memory
2.g. Delete programs

3. Analyze programs to determine set up requirements for CNC milling machines.

Assessment Strategies

3.1. In the classroom or shop setting
3.2. In written and applied assignments
3.3. Individually
3.4. On tests and quizzes
3.5. Given program examples, templates, materials, and all available shop equipment and supplies

Criteria

Performance will be satisfactory when:

3.1. learner identifies the three main sections of a milling program.
3.2. learner identifies material, tooling, and work piece locations required for setting up machines that are programmed using G&M codes
3.3. learner completes all related course assessments with a combined minimum score of 70%

Learning Objectives

3.a. Interpret programs to determine setup requirements.
3.b. Create a written process for setting up a CNC milling machine.

4. Perform set up of CNC milling machines following program requirements.

Assessment Strategies

4.1. Using CNC milling machines in the lab.
4.2. Individually
4.3. Given program examples

Criteria

4.1. learner successfully completes set up of required projects with minimum average score of 70%.
4.2. learner submits all related setup verification with projects.

5. Verify programs graphically in CNC milling machines.

6. Verify program set up in CNC milling machines.

Assessment Strategies

6.1. In the shop setting
6.2. Using actual CNC machine tools
6.3. In written and applied assignments
6.4. Individually
6.5. On tests and quizzes
6.6. Given prints, stock, and all available shop equipment and supplies

Criteria

Performance will be satisfactory when:

6.1. learner follows safety procedures when running CNC milling machines.
6.2. learner demonstrates the correct sequence to run programs in each type of CNC milling machine in the machine tool lab.
6.3. learner demonstrates the procedures for changing speed and feed settings
6.4. learner demonstrates the correct use of overrides to run programs for the first time
6.5. learner references process sheets to verify the correct speed and feed settings
6.6. learner demonstrates the process for turning the coolant on and off
6.7. learner determines the correct direction and volume of the coolant flow
6.8. learner demonstrates the correct procedures for changing tooling and resuming operation on CNC machines (Tool Room models.)
6.9. learner performs inspections before removing part from the machine
6.10. learner completes all related course assessments with a combined minimum score of 70%

Learning Objectives

6.a. Observe safe operating procedures for running CNC milling machines.
6.b. Follow procedures to determine that all steps have been performed prior to running programs
6.c. Locate and operate controls to run programs in CNC turning machines
6.d. Use overrides to safely run programs for the first time
6.e. Verify speed and feed settings
6.f. Change speed and feed settings
6.g. Turn coolant on and off
6.h. Change tools in CNC milling machine(Tool Room models).
6.i. Resume program run after optional stops
6.j. Run multiple new part programs in CNC milling center