



Western Technical College

10444214 Machine Setup 2 for CNC Milling (CBE)

Course Outcome Summary

Course Information

Description	Requires the learner to set up CNC milling machines for multiple tools with electronic probing through tool selection, work holding devices, and program call up and proofing. Student should complete Machine Setup 1 for CNC Milling prior to starting this course.
Career Cluster	Manufacturing
Instructional Level	One-Year Technical Diploma
Total Credits	1
Total Hours	36

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.

Three-ring binder. **Vendor:** Campus Shop. Required.

Clipboard. **Vendor:** Campus Shop. Required.

Pens/Pencils/Black Sharpie Marker. **Vendor:** Campus Shop. Required.

Minimum 4GB USB Flash Drive. **Vendor:** Campus Shop. Required.

Success Abilities

1. Cultivate Passion: Increase Self-Awareness
2. Refine Professionalism: Improve Critical Thinking
3. Refine Professionalism: Practice Effective Communication

Program Outcomes

1. Apply basic safety practices in the machine shop.
2. Interpret industrial/engineering drawings.
3. Apply precision measuring methods to part inspection.
4. 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. Written Product
- 1.2. Skill demonstration in the shop on 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

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. Select cutting tools for CNC milling processes.

Assessment Strategies

- 2.1. Written product
- 2.2. Skill Demonstration

Criteria

You will know you are successful when

- 2.1. you use references to select correct carbide insert grade for specific CNC applications.
- 2.2. you use references to select correct carbide insert shape for specific CNC operations.
- 2.3. you uses print specifications to select correct carbide end mill for specific CNC applications.
- 2.4. you use references to select correct carbide cutting tool size for specific CNC applications.
- 2.5. you change carbide inserts and tooling.
- 2.6. you demonstrate the proper care and storage of carbide cutting tools.

Learning Objectives

- 2.a. Describe the characteristics of carbide inserts
- 2.b. Explain the factors to consider when selecting carbide grades
- 2.c. Explain the factors to consider when selecting carbide insert radii
- 2.d. Describe the effect of carbide insert shape selection on machining considerations
- 2.e. Select carbide cutting tools for CNC milling applications
- 2.f. Describe how to use and care for carbide tooling

3. Determine workholding needs for CNC machining.

Assessment Strategies

- 3.1. Written product
- 3.2. Skill Demonstration

Criteria

You will know you are successful when

- 3.1. you create workholding layouts for CNC machining center jobs.
- 3.2. you specify the workholding devices to be used on the workholding layouts.
- 3.3. you specify the workpiece location and locating devices to be used on the workholding layouts.
- 3.4. you specify workpiece and workholding orientation relative to machine coordinates and axes on the workholding layouts.
- 3.5. you specify clamping mechanisms to be used for securing work on the workholding layouts.
- 3.6. you indicate part or work set up details that must be avoided to prevent collisions on the workholding layouts.

Learning Objectives

- 3.a. Describe types of workholding for CNC machines.
- 3.b. Determine workholding support and location methods.
- 3.c. Determine workholding and clamping methods.
- 3.d. Discuss the location of the workholding device relative to the machine size
- 3.e. Describe precision grid plates as an alternative to dedicated fixtures
- 3.f. Explain considerations related to preventing collisions during tool changes
- 3.g. Explain the use of stops and locating blanks with regard to precision
- 3.h. Explain problems that can occur from excessive clamping forces

4. Set up CNC milling machines with multiple tools for electronic probing setup.

Assessment Strategies

- 4.1. Written product
- 4.2. Skill Demonstration

Criteria

You will know you are successful when

- 4.1. you verify the machine has air, proper fluid levels, control is displaying information, and no alarms are on.
- 4.2. you verify the machine axis displays that the machine is homed.
- 4.3. you load the machine with the correct tools.
- 4.4. you set up the machine so it will change tools without dropping a tool or hanging up in the middle of the cycle.
- 4.5. you verify the machine has correct tool offset values for each tool.
- 4.6. you verify the machine will move to the part origin.

Learning Objectives

- 4.a. Demonstrate program management.
- 4.b. Identify tools used for location.
- 4.c. Perform tool setting procedures.
- 4.d. Set part origin.
- 4.e. Practice multiple tool applications with electronic probing.
- 4.f. Verify program using graphics.