



Western Technical College

## 10444213 Machine Setup 1 for CNC Milling (CBE)

### Course Outcome Summary

#### Course Information

<b>Description</b>	Requires the learner to set up CNC milling machines for single tool with manual touch off through tool selection, work holding devices, and program call up and proofing.
<b>Career Cluster</b>	Manufacturing
<b>Instructional Level</b>	One-Year Technical Diploma
<b>Total Credits</b>	1
<b>Total Hours</b>	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. Perform set up of CNC milling machines for single tool with manual touch off.**

#### **Assessment Strategies**

- 4.1. Written product
- 4.2. Skill Demonstration - Cairo Map

#### **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 tool.
- 4.4. you verify the machine has correct tool offset values for each tool.
- 4.5. 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. Practice single tool applications: end milling, hole producing, engraving.
- 4.e. Verify program using graphics.