



Western Technical College

10444212 CNC Production Operator (CBE)

Course Outcome Summary

Course Information

Description	Requires the learner to operate a CNC (Computer Numerical Control) turning and machining center including the calling up of programs, loading and unloading parts, inspecting, and recognizing tool wear.
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. Live Responsibly: Embrace Sustainability
3. Refine Professionalism: Improve Critical Thinking
4. Refine Professionalism: Participate Collaboratively

5. 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. Operate a CNC turning center.

Assessment Strategies

- 1.1. Written Product
- 1.2. Demonstration

Criteria

You will know you are successful when

- 1.1. you list the common brands of CNC turning machines.
- 1.2. you describe the differences in programming requirements for specific CNC turning machines in the machine tool lab or shop.
- 1.3. you demonstrate tool movement relative to coordinate system using models.
- 1.4. you locate and identify the main controls on CNC turning machines in the lab.
- 1.5. you turn on each type of CNC turning machine in the machine tool lab or shop.
- 1.6. you navigate between menus, chapters, and pages on each type of CNC turning center control in the machine tool lab or shop.
- 1.7. you call up and verify programs in conversational control and EIA/SIO Controlled CNC turning machines.
- 1.8. you follow standard procedures for setting up work and tools in the CNC turning machines.
- 1.9. you start and run programs.

Learning Objectives

- 1.a. Identify common CNC turning center programming methods.
- 1.b. Operate controls on CNC turning machines.
- 1.c. Call up programs on CNC turning machines.
- 1.d. Set up tools in CNC turning machines.
- 1.e. Set up work in CNC turning machines.
- 1.f. Run programs in CNC turning machines.
- 1.g. Change CNC turning machine tools and inserts.

2. Operate a CNC machining center.

Assessment Strategies

- 2.1. Demonstration
- 2.2. Written Product

Criteria

You will know you are successful when

- 2.1. you list the common brands of CNC machining centers.
- 2.2. you demonstrate relevant axes movements on machine axes model.
- 2.3. you demonstrate tool movement relative to coordinate system using models.
- 2.4. you identify basic EIA/ISO codes on CNC machining center display screen.
- 2.5. you select tools for CNC milling machines for given applications.
- 2.6. you locate and identify CNC control components on CNC milling machines in the machine tool lab or shop.
- 2.7. you navigate between menus, chapters, and pages on each type of CNC machining center control in the machine tool lab or shop.

- 2.8. you call up and verify programs in conversational control and EIA/SIO controlled CNC machining centers.
- 2.9. you follow standard procedures for setting up work and tools in the CNC milling machines.
- 2.10. you start and run programs.

Learning Objectives

- 2.a. Identify various types of CNC machining centers.
- 2.b. Describe the coordinate movements of CNC machining centers.
- 2.c. Identify common CNC machining center programming methods.
- 2.d. Operate controls on CNC machining centers.
- 2.e. Call up programs on CNC machining centers.
- 2.f. Set up tools in CNC machining centers.
- 2.g. Set up work in CNC machining centers.
- 2.h. Run programs in CNC machining centers.
- 2.i. Change CNC machining center tools and inserts.

3. Perform scheduled machine maintenance.

Assessment Strategies

- 3.1. Written Objective Test
- 3.2. Demonstration

Criteria

You will know you are successful when

- 3.1. you locate coolant tanks on all CNC turning and milling machines in the machine tool lab or shop.
- 3.2. you state the correct mixture and concentration for coolant tank fluid.
- 3.3. you identify situations when the coolant tank needs to be filled.
- 3.4. you fill the coolant tank.
- 3.5. you locate and identify the way oil system components on all CNC turning and milling machines in the machine tool lab or shop.
- 3.6. you demonstrate the process for fluid level maintenance after machine warm up.
- 3.7. you maintain and complete a maintenance log.

Learning Objectives

- 3.a. Identify the components of CNC machining and turning center coolant systems.
- 3.b. Identify procedures for coolant tank inspections.
- 3.c. Examine the process for filling coolant tanks.
- 3.d. Inspect hydraulic systems.
- 3.e. Maintain fluid levels after machine warmup.
- 3.f. Describe how coolant and chips are removed from the machining area of a CNC machining center.
- 3.g. Describe the lubrication system components and maintenance procedures.
- 3.h. Identify the of lock-out procedures during maintenance.
- 3.i. Follow the procedures for checking and correcting system deficiencies.

4. Perform quality inspections on CNC parts.

Assessment Strategies

- 4.1. Demonstration

Criteria

You will know you are successful when

- 4.1. you apply safety procedures 100% of the time while inspecting parts in CNC machines.
- 4.2. you identify part dimensions to measure and inspect based on specifications on documents.
- 4.3. you identify part finishes to inspect based on specifications on documents.
- 4.4. you identify the frequency with which to inspect parts.
- 4.5. you perform inspections on parts.
- 4.6. you follow directions for inspection frequency.
- 4.7. you record inspection results on documentation sheets.
- 4.8. you identify problems with part quality.
- 4.9. you follow the correct procedures for reporting part quality problems.

Learning Objectives

- 4.a. Analyze part prints or specification to determine part dimensions to inspect.
- 4.b. Demonstrate safe procedures for inspecting parts while still in the CNC centers.
- 4.c. Perform inspections on parts after machining per specified frequency.
- 4.d. Explain the concepts of locational, roughness, and size tolerances.
- 4.e. Identify quality defects in machined parts.
- 4.f. Record inspection results.

5. Troubleshoot problems related to CNC machine operation.

Assessment Strategies

- 5.1. Written Product
- 5.2. Demonstration

Criteria

You will know you are successful when

- 5.1. you apply safety procedures 100% of the time while running CNC milling machines.
- 5.2. you identify problems with part quality.
- 5.3. you identify problems with part quality as a result of chatter.
- 5.4. you identify machine vibration sounds.
- 5.5. you use of override controls to reduce or correct vibration problems.
- 5.6. you identify finish problems associated with tool wear, tool failure, or workholding problems.
- 5.7. you list potential causes of broken cutter inserts and suggests preventative actions.
- 5.8. you follow specified procedures for reporting problems during machining.

Learning Objectives

- 5.a. Define the machine operator's role in identifying quality defects.
- 5.b. Identify chatter sounds between the workpiece and tool.
- 5.c. Identify the condition that chatter creates on the workpiece surface.
- 5.d. Follow a logical path through likely problem sources to isolate areas to investigate.
- 5.e. Describe potential problem sources related to quality problems.
- 5.f. Describe the steps required to correct problems by making an adjustment and resuming production.
- 5.g. Explain common causes of chatter.
- 5.h. Explain ways to correct vibration using overrides.
- 5.i. Associate chatter sources with part or tool conditions.
- 5.j. Identify causes of finish problems other than from vibration.
- 5.k. Explain the relationship between tool wear and rough or finish operations.
- 5.l. Describe the operator's responsibility after discovering machining problems.