Western Technical College

31420313 CNC Production Lathe - Operation

Course Outcome Summary

Course Information

Description	Operation of CNC (Computer Numerical Control) turning centers includes calling up programs, loading and unloading parts, inspection, and the recognition of tool wear. Procedural proceses, inspection of parts, and the use of inspection sheets and guides will be covered.
Career Cluster	Manufacturing
Instructional Level	Technical Diploma Courses
Total Credits	1

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.

Success Abilities

1. **Apply mathematical concepts.**

2. **Demonstrate ability to think critically.**

3. **Demonstrate ability to value self and work ethically with others in a diverse population.**

4. **Make decisions that incorporate the importance of sustainability.**

5. **Transfer social and natural science theories into practical applications.**

6. **Use effective communication skills.**

7.   Use technology effectively.

Course Competencies

1.   Identify various types of CNC turning machines

Assessment Strategies
1.1.   In the classroom, lab, or shop setting
1.2.   Using interactive computer software and/or actual CNC machine tools
1.3.   In written and applied assignments
1.4.   Individually
1.5.   On tests and quizzes
1.6.   Given diagrams, materials, and all available shop equipment and supplies

Learning Objectives
1.a.   Describe safety procedures for CNC turning centers
1.b.   Identify CNC turning machine brands
1.c.   Describe control models within machine brands
1.d.   Explain differences in CNC turning machine features
1.e.   Explain the use of chucks and collets, spindles, and bar feeding cycles
1.f.   Explain the operation of turrets and automatic tool handling mechanisms
1.g.   Identify multi-turret CNC lathes

2.   Describe the coordinate movements of CNC turning centers

Assessment Strategies
2.1.   In the classroom, lab, or shop setting
2.2.   Using interactive computer software and/or actual CNC machine tools
2.3.   In written and applied assignments
2.4.   Individually
2.5.   On tests and quizzes
2.6.   Given diagrams, materials, and all available shop equipment and supplies

Learning Objectives
2.a.   Describe safety procedures for CNC turning centers
2.b.   Identify basic operating principles of CNC turning machines
2.c.   Explain the use of chucks and collets, spindles, and bar feeding cycles
2.d.   Explain the operation of turrets and automatic tool handling mechanisms
2.e.   Describe driven or power tooling
2.f.   Identify multi-turret CNC turning machines
2.g.   Describe CNC turning machine axis movements relative to the Cartesian coordinate system
2.h.   Explain tool movement control relative to the coordinate system
2.i.   Describe the part reference zero locations on a CNC turning center
2.j.   Describe the location of the machine home or machine zero

3.   Identify common CNC turning center programming methods

Assessment Strategies
3.1.   In the classroom, lab, or shop setting
3.2.   Using interactive computer software and/or actual CNC machine tools
3.3.   In written and applied assignments
3.4.   Individually
3.5.   On tests and quizzes
3.6.   Given prints, diagrams, materials, and all available shop equipment and supplies

Learning Objectives
3.a.   Identify CNC turning machine models of controls
3.b.   Identify common languages used in CNC turning machine programming
3.c.   Differentiate conversational controls and EIA controls on CNC turning machines

3.d.   Describe various machining operations performed on CNC turning machines
3.e.   Select tools for various machining operations
3.f.   Identify basic function universal EIA programming codes
3.g.   Identify the universally common elements of a conversational program
3.h.   Describe the difference between online and offline programming

4.   Operate controls on CNC turning machines

Assessment Strategies
4.1.   In the classroom, lab, or shop setting
4.2.   Using interactive computer software and/or actual CNC machine tools
4.3.   In written and applied assignments
4.4.   Individually
4.5.   On tests and quizzes
4.6.   Given prints, diagrams, materials, and all available shop equipment and supplies

Learning Objectives
4.a.   Identify main controls on various CNC turning machines
4.b.   Identify the CNC control components on various machines
4.c.   List the steps required to turn on CNC turning machines
4.d.   Demonstrate the procedure to turn on CNC machines
4.e.   Differentiate CNC operating modes of manual and automatic
4.f.   Identify control variations
4.g.   Demonstrate the navigation of menus, chapters, and pages on CNc control monitors
4.h.   Demonstrate the navigation between position, program, and offset pages on CNc control monitors
4.i.   Describe the information found on each page of the CNC control monitor
4.j.   Demonstrate the use of cursors and control buttons on CNC control monitors
4.k.   Explain the use of Emergency Stop button on CNC turning machines
4.l.   Describe the variations between Handle Jog controls on various machines
4.m.   Demonstrate the use of Handle Jog controls on various machines

5.   Call up programs on CNC turning machines

Assessment Strategies
5.1.   In the classroom, lab, or shop setting
5.2.   Using interactive computer software and/or actual CNC machine tools
5.3.   In written and applied assignments
5.4.   Individually
5.5.   On tests and quizzes
5.6.   Given prints, diagrams, materials, and all available shop equipment and supplies

Learning Objectives
5.a.   List the steps for calling up programs on various CNC turning machines
5.b.   Identify the buttons on the CNC machine control for calling up programs
5.c.   Demonstrate the procedure for calling up programs on CNC turning machines
5.d.   Call up programs on conversational and EIA controlled CNC turning machines
5.e.   Verify programs in graphical interface

6.   Perform scheduled machine maintenance

Assessment Strategies
6.1.   In the classroom, lab, or shop setting
6.2.   Using interactive computer software and/or actual CNC machine tools
6.3.   In written and applied assignments
6.4.   Individually
6.5.   On tests and quizzes
6.6.   Given diagrams, logs, materials, and all available shop equipment and supplies

Learning Objectives
6.a.   Identify coolant tank locations
6.b.   Describe procedures for coolant tank inspections
6.c.   Describe the process for filling coolant tanks
6.d.   Describe the components of the hydraulic system
6.e.   Describe the procedures for inspecting hydraulic systems

     6.f.   Describe the way oil system components
     6.g.   Describe the process for maintaining fluid levels after machine warmup
     6.h.   Demonstrate the procedures for maintaining CNC turning machines

7. Set up tools in CNC turning machines

Assessment Strategies

7.1. In the classroom, lab, or shop setting
7.2. Using interactive computer software and/or actual CNC machine tools
7.3. In written and applied assignments
7.4. Individually
7.5. On tests and quizzes
7.6. Given prints, specification sheets, and all available shop equipment and supplies

Learning Objectives

7.a. Describe tool holding systems in various types of CNC turning machines
7.b. Identify tools for CNC turning machines
7.c. Select tools for CNC turning machines
7.d. Demonstrate the procedure for changing tools in CNC turning machines without turrets
7.e. Identify control button to move the turret
7.f. Describe the safe location of the turret for rotation
7.g. Demonstrate rotating the turret to tool positions
7.h. Demonstrate the procedure for changing tools in CNC turning machine turrets
7.i. Interpret a tool drawing to determine axis direction relative to spindle centerline
7.j. Identify tool angle and dimensions

8. Set up work in CNC turning machines

Assessment Strategies

8.1. In the classroom, lab, or shop setting
8.2. Using interactive computer software and/or actual CNC machine tools
8.3. In written and applied assignments
8.4. Individually
8.5. On tests and quizzes
8.6. Given prints, stock, and all available shop equipment and supplies

Learning Objectives

8.a. Describe the procedures for homing various CNC turning machines
8.b. Demonstrate the procedures for homing various CNC turning machines
8.c. Describe the conditions that cause and overtravel alarm
8.d. Demonstrate the process of securing work in CNC turning machines
8.e. Demonstrate the procedures for using stock stops for production machining

9. Run programs in CNC turning machines

Assessment Strategies

9.1. In the classroom, lab, or shop setting
9.2. Using interactive computer software and/or actual CNC machine tools
9.3. In written and applied assignments
9.4. Individually
9.5. On tests and quizzes
9.6. Given prints, diagrams, stock, and all available shop equipment and supplies

Learning Objectives

9.a. Practice safe operating procedures for running CNC turning machines
9.b. List the procedures for setting up and performing a production run on CNC turning machines
9.c. Call up programs that will be ran in CNC turning machines
9.d. Follow procedures for securing work in CNC turning machines
9.e. Demonstrate how to locate offset screens using various machine controls
9.f. Set tool length and diameter offsets
9.g. Run programs in various CNC turning machines
9.h. Perform production steps required after first part is ran

10. Perform quality inspections on CNC turned parts

Assessment Strategies

10.1.   In the classroom, lab, or shop setting
10.2.   Using interactive computer software and/or actual CNC machine tools
10.3.   In written and applied assignments
10.4.   Individually
10.5.   On tests and quizzes
10.6.   Given prints, diagrams, pictures, inspection sheets, materials, and all available shop equipment and supplies

Learning Objectives

10.a.   Analyze part prints or specifications to determine part dimensions to inspect
10.b.   Demonstrate safe procedures for inspecting parts
10.c.   Perform inspections on parts per specified frequency
10.d.   Record inspection results
10.e.   Explain the procedure for reporting problems with part quality

11.   Recognize problems related to CNC machine operation

Assessment Strategies

11.1.   In the classroom, lab, or shop setting
11.2.   Using interactive computer software and/or actual CNC machine tools
11.3.   In written and applied assignments
11.4.   Individually or in groups
11.5.   On tests and quizzes
11.6.   Given diagrams, materials, and all available shop equipment and supplies

Learning Objectives

11.a.   Identify visual and sound indicators of chatter
11.b.   Describe causes of vibration
11.c.   Explain ways to correct vibration using overrides
11.d.   Describe potential sources of chatter problems
11.e.   Associate chatter sources with part or tool conditions
11.f.   Identify causes of finish problems other than from vibration
11.g.   Explain the relationship between tool war and rough or finish operations
11.h.   Describe the causes of broken cutting inserts
11.i.   Describe how to isolate the cause of broken cutting inserts
11.j.   Explain how to maintain proper surface finish and correct dimensions

12.   Change CNC turning machine tools and inserts

Assessment Strategies

12.1.   In the classroom, lab, or shop setting
12.2.   Using interactive computer software and/or actual CNC machine tools
12.3.   In written and applied assignments
12.4.   Individually
12.5.   On tests and quizzes
12.6.   Given diagrams, materials, and all available shop equipment and supplies

Learning Objectives

12.a.   Explain the procedure for changing tools and inserts in the CNC turning center
12.b.   Perform inspections of tooling and inserts
12.c.   Identify the effect of damaged or worn inserts on workpiece finish
12.d.   Identify damaged or worn inserts
12.e.   Explain the most likely causes of insert failure
12.f.   Demonstrate the process of changing inserts
12.g.   Adjust offsets as needed
12.h.   Explain operator responsibility after changing inserts