Western Technical College

31420317 Machining: Turning Processes

Course Outcome Summary

Course Information

Description	This course will provide instruction and practice in the use of the manual engine lathe and various turning processes.
Career Cluster	Manufacturing
Instructional Level	Technical Diploma Courses
Total Credits	3.00
Total Hours	108.00

Types of Instruction

Instruction Type	Credits/Hours
Lecture	1 CR / 36 HR
Lab	2 CR / 72 HR

Course History

Purpose/Goals

To demonstrate knowledge and skill in the safe, efficient and accurate operation of the machines and accessories covered in this course.

Pre/Corequisites

Pre/Corequisite: 31420314 Machining: Intro to Machining

Textbooks

No textbook required.

Learner Supplies

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

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

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

Core Abilities

1. Apply mathematical concepts.
Status *Active*

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

3. Use effective communication skills.
Status *Active*

4. Use technology effectively.
Status *Active*

Program Outcomes

1. MACH 1. Apply basic safety practices in the machine shop
Type *TSA* ***Status*** *Active*

Summative Assessment Strategies
1.1. in a performance demonstration in the machine shop or lab
1.2. in a written examination

Criteria
1.1. Demonstrate safety procedures
1.2. Operate machine with all required guards in place
1.3. Maintain clean and organized work environment
1.4. Wear appropriate clothing and Personal Protective Equipment (PPE)
1.5. Explain proper lock-out tag-out procedures

2. MACH 2. Interpret industrial/engineering drawings
Type *TSA* ***Status*** *Active*

Summative Assessment Strategies
2.1. in a performance demonstration

Criteria
2.1. Interpret orthographic projections
2.2. Interpret lines, symbols, standards, and notations
2.3. Interpret a Bill of Materials
2.4. Interpret a title block
2.5. Determine location of part features according to established specifications
2.6. Calculate tolerances according to established specifications
2.7. Develop drawings that follow view projection standards
2.8. Interpret Geometric Dimensioning and Tolerancing

3. MACH 3. Apply precision measuring methods to part inspection
Type *TSA* ***Status*** *Active*

Summative Assessment Strategies
3.1. in a performance demonstration

Criteria
3.1. Select correct measuring tool for job requirements
3.2. Demonstrate care of precision measuring equipment according to established procedures
3.3. Convert English/metric measurements
3.4. Use standard industry measurement terminology
3.5. Perform precision measurement according to established procedures
3.6. Complete an inspection document to verify print specifications

3.7. Use computer aided metrology

4. MACH 4. Perform basic machine tool equipment set-up and operation
Type *TSA* ***Status*** *Active*

Summative Assessment Strategies
4.1. in a performance demonstration
4.2. given an engineering drawing

Criteria
4.1. Select and load tools according to the requirements of the job
4.2. Select and set up work-holding devices for specific operations
4.3. Verify machine set-up
4.4. Verify proper application of speeds and feeds
4.5. Operate machine tools according to established procedures
4.6. Complete project within specified timeframe
4.7. Take action to optimize machine tool operation

Course Competencies

1. Operate turning machines in a safe, efficient manner.
Domain *Psychomotor* ***Level*** *Practicing* ***Status*** *Active*

Assessment Strategies
1.1. by demonstrating operation of machine controls to the instructor in the shop.
1.2. by completing all related projects with a score of 75% or better using the machines in the shop.

Criteria

Your performance will be successful when:
1.1. you complete and submit all related assignments.
1.2. you demonstrate the location/operation of machine controls to the instructor.
1.3. you complete the unit test with a score of 75% or better.
1.4. you complete all related projects with and average score of 75% or better.

Learning Objectives
1.a. Describe the function of all machine controls.
1.b. Locate all machine controls.
1.c. Recognize safety hazards associated with turning machines.
1.d. Identify machine guards and their purpose.
1.e. Employ machine guards and/or other safety devices as needed.

2. Utilitze proper tools and toolholding for various turning operations.
Domain *Psychomotor* ***Level*** *Practicing* ***Status*** *Active*

Assessment Strategies
2.1. by selecting specified tools from the selection in the shop.
2.2. by completing all projects in the shop.

Criteria

Your performance will be successful when:
2.1. you complete and submit all related assignments.
2.2. you select specified tools from the selection in the shop with 90% or better accuracy.
2.3. you complete the unit test with a score of 75% or better.

Learning Objectives
2.a. Identify various cutting tools that are commonly used on turning machines, and their applications.
2.b. Identify various types of toolholders commonly used on turning machines.
2.c. Demonstrate proper mounting techniques for various cutting tools used in turning operations.
2.d. Describe attributes of proper tool alignment for various types of tooling used on turning machines.

3. Utilitze proper workholding devices for turning operations.

Domain *Psychomotor* ***Level*** *Practicing* ***Status*** *Active*

Assessment Strategies

3.1. by grinding a right hand cutting tool on the pedestal grinder in the shop.
3.2. by grinding a left hand tool on the pedestal grinder in the shop.
3.3. by grinding a thread cutting tool on the pedestal grinder in the shop.

Criteria

Your performance will be successful when:

3.1. you complete and submit all related assignments.
3.2. you properly grind tool samples for practice.
3.3. you complete the unit test with a score of 75% or better.

Learning Objectives

3.a. Determine level of accuracy/precision required on workpiece.
3.b. Identify different types of workholding devices/accessories and their applications.
3.c. Recognize which workholding device/accessory will work best for a given turning process/situation.

4. Verify the alignment of lathe components.

Domain *Psychomotor* ***Level*** *Practicing* ***Status*** *Active*

Assessment Strategies

4.1. by align the tailstock on a lathe in the shop using a test bar and indicator.
4.2. by completing all lathe projects in the shop.

Criteria

Your performance will be successful when:

4.1. you complete and submit all related assignments.
4.2. you demonstrate tailstock alignment process to the instructor.
4.3. you complete all shop projects with an average score of 75% or better.
4.4. you complete the unit test with a score of 75% or better.

Learning Objectives

4.a. Recognize the results of tailstock mis-alignment.
4.b. Select tooling needed to check tailstock alignment.
4.c. Demonstrate process of checking tailstock alignment.

5. Demonstrate proper facing techniques.

Domain *Psychomotor* ***Level*** *Practicing* ***Status*** *Active*

Assessment Strategies

5.1. by facing projects in the shop.

Criteria

Your performance will be successful when:

5.1. you complete and submit all related assignments.
5.2. you complete the unit test with a score of 75% or better.
5.3. you complete all shop projects with a score of 75% or better.

Learning Objectives

5.a. Select the proper tool for facing operations.
5.b. Determine the proper speeds and feeds for the facing operation.
5.c. Select proper cutting fluid for a facing operation.
5.d. Apply appropriate measuring/inspection tools and techniques for a facing operation.
5.e. Follow proper procedures to perform facing operations.

6. Demonstrate proper center drilling techniques.

Domain *Psychomotor* ***Level*** *Practicing* ***Status*** *Active*

Assessment Strategies

6.1. by properly centerdrilling your projects in the shop.

Criteria

Your performance will be successful when:

6.1. you complete and submit all related assignments.
6.2. you complete the unit test with a score of 75% or better.
6.3. you complete all shop projects with a score of 75% or better.

Learning Objectives

6.a. Select proper tool and work holding devices.
6.b. Select the proper center drill.
6.c. Determine the proper speed and feed for center drilling operations.
6.d. Follow proper procedures to complete the center drilling operation.
6.e. Select proper cutting fluid for center drilling operations.

7. Demonstrate proper techniques for turning between centers.

Domain *Psychomotor* ***Level*** *Practicing* ***Status*** *Active*

Assessment Strategies

7.1. by completing all projects for this unit in the shop.

Criteria

Your performance will be successful when:

7.1. you complete and submit all related assignments.
7.2. you complete the unit test with a score of 75% or better.
7.3. you complete all shop projects with a score of 75% or better.

Learning Objectives

7.a. Demonstrate procedure for mounting and truing a soft center in the three jaw chuck.
7.b. learner will use a live center in the tailstock quill.
7.c. learner will select and mount the proper cutting tool/toolholder for the machining situation.
7.d. learner will set proper speeds and feeds for machining situation.
7.e. learner will manipulate machine controls and workpiece to complete machining part to blueprint specifications.
7.f. learner will use measuring tools to monitor the machining process and inspect the workpiece when completed.

8. Properly perform and execute setups for knurling.

Domain *Psychomotor* ***Level*** *Practice* ***Status*** *Active*

Assessment Strategies

8.1. by completing the shop projects.

Criteria

Your performance will be successful when:

8.1. you complete and submit all related assignments.
8.2. you complete all shop projects with a score of 75% or better.
8.3. you complete the unit test with a score of 75% or better.

Learning Objectives

8.a. learner will perform knurling between centers.
8.b. learner will select and mount the proper knurling tool.
8.c. learner will set proper speeds and feeds for knurling operations.
8.d. learner will knurl the workpiece to blueprint specifications.
8.e. learner will use measuring tools to inspect the workpiece when completed.

9. Properly perform and execute setups for grooving.

Domain *Psychomotor* ***Level*** *Practice* ***Status*** *Active*

Assessment Strategies

9.1. by completing all shop projects.

Criteria

Your performance will be successful when:

9.1. you complete and submit all related assignments.
9.2. you complete the unit test with a score of 75% or better.
9.3. you complete all shop projects with a score of 75% or better.

Learning Objectives

9.a. learner will select and mount proper grooving tool.
9.b. learner will be grooving with workpiece between centers.
9.c. learner will set up proper speeds for grooving operations.
9.d. learner will manipulate machine controls to complete the grooving operation to blueprint specifications.
9.e. learner will use use measuring tools to monitor the machining process and inspect the workpiece when completed.

10. Properly perform and execute setups for drilling.

Domain *Psychomotor* ***Level*** *Practice* ***Status*** *Active*

Assessment Strategies

10.1. by completing all shop projects.

Criteria

Your performance will be successful when:

10.1. you complete and submit all related assignments.
10.2. you complete all shop projects with a score of 75% or better.
10.3. you complete the unit test with a score of 75% or better.

Learning Objectives

10.a. learner will use a drill chuck in the tailstock quill.
10.b. learner will use direct mounting procedures into the tailstock quill.
10.c. learner will set up proper speeds for drilling operations.
10.d. learner will manipulate machine controls to complete drilling operations to blueprint specifications.
10.e. learner will use measuring tools to inspect workpiece when completed.

11. Properly perform and execute setups for boring.

Domain *Psychomotor* ***Level*** *Practice* ***Status*** *Active*

Assessment Strategies

11.1. by completing all shop projects.

Criteria

Your performance will be successful when:

11.1. you complete and submit all related assignments.
11.2. you complete all shop projects with a score of 75% or better.
11.3. you complete the unit test with a score of 75% or better.

Learning Objectives

11.a. learner will be using drilling procedures to prepare workpiece for boring operations.
11.b. learner will select and mount proper boring tool in machine.
11.c. learner will set proper speeds and feeds for boring operation.
11.d. learner will manipulate machine controls to perform boring operation to blueprint specifications.
11.e. learner will use measuring tools to monitor the boring operation and inspect workpiece when completed.

12. Use reference materials and tables to calculate various thread dimensions and measurement processes.

Domain *Cognitive* ***Level*** *Application* ***Status*** *Active*

Assessment Strategies

12.1. by completing the thread calculation sheet assignment.
12.2. by completing the shop projects.

Criteria

Your performance will be successful when:

12.1. you complete the thread calculation assignment with a score of 75% or better.
12.2. you complete the shop projects with a score of 75% or better.
12.3. you complete and submit all related assignments.
12.4. you complete the unit test with a score of 75% or better.

Learning Objectives

12.a. learner will identify components of a thread callout.
12.b. learner will locate thread dimensioning tables in Machinery's Handbook.
12.c. learner will describe the various components of the thread dimension tables.
12.d. learner will use thread dimension tables to list dimensional sizes for various components of a thread.
12.e. learner will use the three wire thread charts to determine dimensions for machining/inspecting various threads.

13. Properly perform and execute setups for external thread cutting.

Domain *Psychomotor* ***Level*** *Practice* ***Status*** *Active*

Assessment Strategies

13.1. by completing the shop projects.

Criteria

Your performance will be successful when:

13.1. you complete and submit all related assignments.
13.2. you complete all shop projects with a score of 75% or better.
13.3. you complete the unit test with a score of 75% or better.

Learning Objectives

13.a. learner will machine external threads with workpiece between centers.
13.b. learner will use turning procedures to prepare workpiece for external threading operation.
13.c. learner will select and mount proper tool for external threading operations.
13.d. learner will set up machine components/controls for external threading operations.
13.e. learner will set proper speeds and feeds for thread cutting operations.
13.f. learner will manipulate machine controls to cut threads to blueprint specifications.
13.g. learner will use measuring tools to monitor threading process and inspect workpiece when completed.

14. Properly perform and execute setups for internal thread cutting.

Domain *Psychomotor* ***Level*** *Practice* ***Status*** *Active*

Assessment Strategies

14.1. by completing all shop projects.

Criteria

Your performance will be successful when:

14.1. you complete and submit all related assignments.
14.2. you complete all shop projects with a score of 75% or better.
14.3. you complete the unit test with a score of 75% or better.

Learning Objectives

14.a. learner will mount the workpiece in the three jaw chuck for internal threading operations
14.b. learner will use drilling/boring procedures to prepare workpiece for threading operations.
14.c. learner will select and mount proper tooling for internal threading operations.
14.d. learner will set up machine components/controls for internal threading operations.
14.e. learner will set proper speeds and feeds for internal threading operations.
14.f. learner will manipulate machine controls to cut threads to blueprint specifications.
14.g. learner will use measuring tools to monitor internal threading operations and inspect workpiece when completed.

15. Use reference materials and tables to calculate taper information.

Domain *Cognitive* ***Level*** *Application* ***Status*** *Active*

Assessment Strategies

15.1. by completing the taper calculation assignment.
15.2. by completing all shop projects.

Criteria

Your performance will be successful when:

15.1. you complete the taper calculation assignment with a score of 75% or better.
15.2. you complete all related assignments.
15.3. you complete the unit test with a score of 75% or better.

Learning Objectives

15.a. learner will locate the proper tables in the Machinery's handbook for calculating taper information.
15.b. learner will calculate taper per inch.
15.c. learner will calculate taper per foot.
15.d. learner will calculate taper in degrees of angle.

16. Properly perform and execute setups for external taper cutting.

Domain *Psychomotor* ***Level*** *Practice* ***Status*** *Active*

Assessment Strategies

16.1. by completing all shop projects.

Criteria

Your performance will be successful when:

16.1. you complete and submit all related assignments.
16.2. you complete all shop projects with a score of 75% or better.
16.3. you complete the unit test with a score of 75% or better.

Learning Objectives

16.a. learner will use the tailstock offset method of machining external tapers.
16.b. learner will use the taper attachment for machining external tapers.
16.c. learner will use measuring tools to monitor the machining operation and inspect the workpiece when completed.

17. Properly perform and execute setups for internal taper cutting.

Domain *Psychomotor* ***Level*** *Practice* ***Status*** *Active*

Assessment Strategies

17.1. by completing all shop projects.

Criteria

Your performance will be successful when:

17.1. you complete and submit all related assignments.
17.2. you complete the unit test with a score of 75% or better.
17.3. you complete all shop projects with a score of 75% or better.

Learning Objectives

17.a. learner will use the taper attachment for machining internal tapers.
17.b. learner will use the compound rest for machining internal tapers.
17.c. learner will use measuring tools to monitor the machining process and inspect the workpiece when completed.

18. Properly perform and execute setups for turning with a collet chuck.

Domain *Psychomotor* ***Level*** *Practice* ***Status*** *Active*

Assessment Strategies

18.1. by completing all shop projects.

Criteria

Your performance will be successful when:

18.1. you completing and submitting all related assignments.
18.2. you complete all shop projects with a score of 75% or better.
18.3. you complete the unit test with a score of 75% or better.

Learning Objectives

18.a. learner will select and use the proper collet.
18.b. learner will use measuring tools to monitor the machining process and inspect the workpiece when completed.

19. Properly perform and execute setups for turning with a 4 jaw chuck.

Domain *Psychomotor* ***Level*** *Practice* ***Status*** *Active*

Assessment Strategies

19.1. by completing all shop projects.

Criteria

Your performance will be successful when:

19.1. you complete and submit all related assignments.
19.2. you complete all shop projects with a score of 75% or better.
19.3. you complete the unit test with a score of 75% or better.

Learning Objectives

19.a. learner will use a dial indicator to properly set up the workpiece in the 4 jaw chuck.
19.b. learner will use measuring tools to monitor the machining process and inspect the workpiece when completed.