Western Technical College

31420318 Machining: Milling Processes

Course Outcome Summary

Course Information

Description	This course will provide instruction and practice in the use of manual vertical and horizontal milling machines and various processes performed on them.
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*

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 milling machine controls in a safe, efficient manner.

Domain *Cognitive* ***Level*** *Applying* ***Status*** *Active*

Assessment Strategies

1.1. by locating and operating machine controls in demonstration 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 locate/demonstrate 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 a score of 75% or better.

Learning Objectives

1.a. learner will describe the function and location of machine controls.
1.b. learner will demonstrate the ability to operate the machine controls.

2. Identify proper tools and toolholding for various operations.

Domain *Cognitive* ***Level*** *Knowledge* ***Status*** *Active*

Assessment Strategies

2.1. by identifying various tools from a selection in the shop.
2.2. by completing all related projects with the tooling/equipment in the shop.

Criteria

Your performance will be successful when:

2.1. you complete and submit all related assignments.
2.2. you complete the unit test with a score of 75% or better.
2.3. you complete all related projects with a score of 75% or better.

Learning Objectives

2.a. learner will identify various cutting tools used in milling operations.
2.b. learner will describe how various tools are held in the machine.
2.c. learner will demonstrate how to mount various cutting tools in the machine.

3. Squaring the machine head. (Tramming)

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

Assessment Strategies

3.1. by squaring(tramming) the head on a vertical milling machine in the shop.
3.2. by showing the instructor that the vertical milling machine that you are assigned is trammed.

Criteria

Your performance will be successful when:

3.1. you complete and submit all related assignments.
3.2. you complete the unit test with a score of 75% or better.
3.3. you complete all related projects with a score of 75% or better.

Learning Objectives

3.a. learner will square(tram) the machine head.

4. Indicating the vise.

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

Assessment Strategies

4.1. by indicating a vise on a vertical machine in the shop.
4.2. by indicating the vise on a horizontal machine in the shop.
4.3. by showing an instructor that the vise is indicated on the respective machines.

Criteria

Your performance will be successful when:

4.1. you complete and submit all related assignments.
4.2. you complete the unit test with a score of 75% or better.
4.3. you complete all related projects with a score of 75% or better.

Learning Objectives

4.a. learner will indicate the vise and secure to machine table on a vertical milling machine.
4.b. learner will indicate the vise and secure to machine table on a horizontal milling machine.

5. Properly perform and execute setups for milling surfaces flat and parallel.

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

Assessment Strategies

5.1. by completing the related projects using the machines 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 related projects with a score of 75% or better.

Learning Objectives

5.a. learner will machine surfaces parallel to the machine table.
5.b. learner will machine surfaces parallel to each other.
5.c. learner will machine surfaces flat.

6. Properly perform and execute setups for milling surfaces square.

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

Assessment Strategies

6.1. by completing all related projects using the equipment 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 you complete all related projects with a score of 75% or better.

Learning Objectives

6.a. learner will machine surfaces perpendicular to the machine table on vertical machines.
6.b. learner will machine surfaces perpendicular to the machine table on horizontal machines.
6.c. learner will machine surfaces perpendicular to each other on vertical machines.

6.d. learner will machine surfaces perpendicular to each other on horizontal machines.

7. Proper setup and use of endmills.

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

Assessment Strategies

7.1. by completing all related projects on the equipment 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 related projects with a score of 75% or better.

Learning Objectives

7.a. learner will mount endmilling cutters in the vertical machine.
7.b. learner will mount endmilling cutters in the horizontal machine.
7.c. learner will use endmilling cutters for various machining operations in the vertical machine.
7.d. learner will use endmilling cutters for various machining operations in the horizontal machine.

8. Proper setup and use of facemills.

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

Assessment Strategies

8.1. by completing all related projects using the equipment in the shop.

Criteria

Your performance will be successful when:

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

Learning Objectives

8.a. learner will mount facemills in the vertical machine.
8.b. learner will mount facemills in the horizontal machine.
8.c. learner will use facemills in various machining operations on the vertical machine.
8.d. learner will use facemills in various machining operations on the horizontal machine.

9. Properly perform and execute setups for slot milling.

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

Assessment Strategies

9.1. by completing all related projects using the equipment in the shop.

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 related projects with a score of 75% or better.

Learning Objectives

9.a. learner will mill slots using the vertical machine.
9.b. learner will pick up part edges using paper.
9.c. learner will locate slots using the machine dials.
9.d. learner will locate slots using the digital readout.

10. Properly perform and execute setups for pocket milling.

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

Assessment Strategies

10.1. by completing all related projects using the equipment in the shop.

Criteria

Your performance will be successful when:

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

Learning Objectives

10.a. learner will machine pockets using the vertical machine.

11. Properly perform and execute setups for angle milling.

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

Assessment Strategies

11.1. by completing all related projects using the equipment in the shop.

Criteria

Your performance will be successful when:

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

Learning Objectives

11.a. learner will use angle blocks to set up and machine angles using the vertical machine.
11.b. learner will use angle blocks to setup and machine angles using the horizontal machine.

12. Properly perform and execute setups for radii milling.

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

Assessment Strategies

12.1. by completing all related projects using the equipment in the shop.

Criteria

Your performance will be successful when:

12.1. you complete and submit all related assignments.
12.2. you complete the unit test with a minimum score of 75%.
12.3. you complete all related projects with a minimum score of 75%.

Learning Objectives

12.a. learner will use corner rounding cutters to machine radii using the vertical machine.

13. Perform precision location techniques using an edge finder.

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

Assessment Strategies

13.1. by demonstrating the use of an edge finder to an instructor in the shop.
13.2. completing all related projects using equipment in the shop.

Criteria

Your performance will be successful when:

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

Learning Objectives

13.a. learner will use an edge finder to locate of part features.

14. Perform precision location techniques using a dial test indicator.

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

Assessment Strategies

14.1. by demonstrating the process of using a dial test indicator for location purposes to an instructor in the shop.
14.2. by completing all related projects.

Criteria

Your performance will be successful when:

14.1. you complete all related assignments.
14.2. you complete the unit test with a minimum score of 75%.
14.3. you complete all related projects with a minimum score of 75%.

Learning Objectives

14.a. learner will use a dial test indicator to locate part features.

15. Properly perform and execute setups using the offset boring head.

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

Assessment Strategies

15.1. by completing all related projects using the equipment in the shop.

Criteria

Your performance will be successful when:

15.1. you complete and submit all related assignments.
15.2. you complete the unit test with a minimum score if 75%.
15.3. you complete all related projects with a minimum score of 75%.

Learning Objectives

15.a. learner will use an offset boring head to bore holes.