MACH A110: MILLING MACHINE

Item	Value
Curriculum Committee Approval Date	12/06/2023
Top Code	095630 - Machining and Machine Tools
Units	5 Total Units
Hours	162 Total Hours (Lecture Hours 54; Lab Hours 108)
Total Outside of Class Hours	0
Course Credit Status	Credit: Degree Applicable (D)
Material Fee	Yes
Basic Skills	Not Basic Skills (N)
Repeatable	No
Grading Policy	Standard Letter (S)

Course Description

A basic course in milling machine operations to include both vertical and horizontal milling usage, theory, and usage of tools and accessories. Safety is also emphasized. ADVISORY: MACH A100 and MACH A120. Transfer Credit: CSU.

Course Level Student Learning Outcome(s)

1. Properly and safely set up and operate vertical and horizontal milling machines.
2. Calculate the proper cutting speeds and feed rate for a variety of cutters and materials.
3. Safely set up and use common work holding devises such as: vises, indexing tools, and fixtures.

Course Objectives

- 1. Setup and operate both vertical and horizontal milling machines.
- 2. Accurately align vises on both vertical and horizontal machines.
- 3. Demonstrate the proper procedure for tramming in the head of a vertical mill.
- 4. Demonstrate the process of calculating the correct cutter R.P.M.
- 5. Demonstrate the process of calculating the correct feed rate for a variety of cutters.
- 6. Accurately machine surfaces, slots, angles, and pockets.
- 7. Identify the main components and state the function of each on a milling machine.
- 8. Use the common milling machine cutting tools.
- 9. Demonstrate the proper technique for drilling close tolerance hole locations.
- 10. Use and setup common indexing devices.

Lecture Content

Course Orientation Course Requirements Grading practices Shop practices Shop tour Safety General safety Milling machine safety Milling Machine Classification and Construction Size classification Type classification (vertical vs. horizontal) Capabilities of basic milling machines Parts and functions Speeds and Feeds Calculating RPM Calculating feed rate Types of cuts Work Holding Methods Vises Clamping to the table Fixtures Milling Cutters and Holders End mills Face mills Horizontal cutters Special cutters and insert cutters Solid holder Collets Quick change holders Arbors Alignment and Set up Procedures Tramming in the head Locating vises Alignment of fixtures Alignment of various shapes of parts Making Precision Holes Drilling Reaming Use of power quill feed Developing hole patterns on the mill Keyway Cutting Using an end mill Using a horizontal cutter Woodruff keyways Angular Milling Use of compound angle vise Using standard vise Offsetting the head or table Offset Boring Head Capabilities Usage Rotary Tables Capabilities Usage Indexing Indexing devices Direct indexing Indirect indexing Maintenance Lubrication Adjustment Special Mills Duplex mills CNC mills

Lab Content

See Course Content.

Method(s) of Instruction

- Lecture (02)
- DE Live Online Lecture (02S)
- Lab (04)
- DE Live Online Lab (04S)

Instructional Techniques

Lecture, demonstration, and laboratory activity on a variety of milling machines

Reading Assignments

.

Writing Assignments

Students will write short answer quizzes and exams; some exams may be practical exercises

Out-of-class Assignments

.

Demonstration of Critical Thinking

Quizzes, final exams are 40%, laboratory work evaluation; laboratory work shall count as 60% of final grade

Required Writing, Problem Solving, Skills Demonstration

Students will write short answer quizzes and exams; some exams may be practical exercises

Textbooks Resources

1. Required Hoffman, Edward G.G.. Shop Reference Handbook, latest ed. Chicago: Industrial Press Inc, 2000 Rationale: - 2. Required Kibbe, Richard. Machine Tool Practices, ed. Atlanta: Prentice Hall, 2006 Rationale: -

Other Resources

1. Students required to supply basic measuring tools and safety goggles.