ADVM 0066 - CNC MACHINING LEVEL 1

Catalog Description

Formerly known as WELD 66
Advisory: Completion of ADVM 62 with grade of "C" or better
Hours: 90 (36 lecture, 54 laboratory)
Description: Intermediate course making billet aluminum parts from start to finish using HAAS CNC milling machines. Fusion 360 will be used to model and program class assignments which are then posted to HAAS machines where students will learn how to set up and operate HAAS CNC vertical machining centers. After the parts have been machined, students will use common industry measuring and inspection techniques to insure their parts are in tolerance. (not transferable)

Course Student Learning Outcomes

- CSLO #1: Demonstrate safety standards for both a learning lab environment and worksite environment of a CNC Machine Shop lab.
- CSLO #2: Apply the terms used in this industry: X-Y-Z Axis, tool offsets, work offsets, linear interpolation motion, circular interpolation motion, cutter compensation, toolpath, and dryrun operation.
- CSLO #3: Use CNC machine for the the assigned project(s).

Effective Term

Fall 2022

Course Type

Credit - Degree-applicable

Contact Hours

90

Outside of Class Hours

72

Total Student Learning Hours

162

Course Objectives

Lecture:
1. Define safety and machine operation procedure expectations in manufacturing environment.
2. Identify machine control functions.
3. Outline Vertical Mill operation and X-Y-Z directions.
4. Appraise cutting tools.
5. Compare Types of cuts, rough, finish, pocket, chamfer.
6. Explain drilling cycles and tapping cycles.
7. Identify basic tools of precision measurement.
8. Outline tool set up, tool length, call out and loading sequence.
9. Explain squaring, edge finding, work holding.
10. Determine feed rate, spindle speed, lead in/out.
11. Modeling a part and creating a tool path.
12. Outline Haas Intuitive Programming process.
Laboratory:
1. Apply safety processes used in Computer controlled or CNC machining.
2. Practice Machine control functions.
3. Apply Vertical Mill operation.
4. Set up and load cutting Tools.
5. Practice locating work by the following methods; edge-finder, WIPS, DTI.
6. Demonstrate machine assignments that were created in CAD
7. Perform different types of cuts.
8. Perform the science and skills of precision measurement.
9. Perform writing Code by Hand.
10. Practice single block sequencing and % of rapid operation.
11. Observe proofing a program.
12. Practice Haas Intuitive Programming.
13. Perform Machine Maintenance.

General Education Information

- Approved College Associate Degree GE Applicability
- CSU GE Applicability (Recommended-requires CSU approval)
- Cal-GETC Applicability (Recommended - Requires External Approval)
- IGETC Applicability (Recommended-requires CSU/UC approval)

Articulation Information

Methods of Evaluation

- Objective Examinations
  - Example: Students will take a multiple-choice test on each major topic area in CNC Mill application. Standard Grading. Example Question: The Z-direction is: a. left to right, right to left, b. forward backward, backward forward, c. up down or down up, d. none of the above.
- Projects
  - Example: The instructor-assigned student projects are evaluated to industry standards through the use of performance rubrics. Example: Comparison of blueprint to finished project part.
- Skill Demonstrations
  - Example: The instructor will use student skill demonstrations to evaluate student performance to industry standards as an entry level CNC operator. Example: Student will demonstrate work off-set on vertical mill.

Repeatable

No

Methods of Instruction

- Laboratory
- Lecture/Discussion
- Distance Learning

Lab:

1. Instructor demonstrates how to set up the Haas milling machine, followed by the students safety demonstrating how to perform the set-up.

Lecture:

1. Instructor lecture on fundamental technical sciences integrated with applied technical areas (such as engineering materials and mechanics), to successfully apply the analytical techniques (and

problem-solving skills) needed. Student will distinguish production steps needed to program code to perform machine operations.

Distance Learning

1. Following a brief intro video and reading assignment describing the difference between “climb milling” and “conventional milling”; the students shall discuss this subject in a discussion board both with the instructor and other students within the class.

Typical Out of Class Assignments
Reading Assignments

1. Students read the safety section from the text book and be prepared to discuss in class. 2. Students are required to read chapter on measurements and complete the review questions at the end of the chapter.

Writing, Problem Solving or Performance

1. Students will complete an assigned project that meets the criteria and specifications outlined. Example: Tighten 1M and 2M parts. 2. The student will track their project's time expenditures and materials in order to complete the job costing component requirement of this course.

Other (Term projects, research papers, portfolios, etc.)
Required Materials

- Precision Machining Technology
  - Author: Peter J. Hoffman
  - Publisher: Cengage Learning
  - Publication Date: 2015
  - Text Edition: 2nd
  - Classic Textbook?:
  - OER Link:
  - OER:
- Workbook and Projects Manual for Precision Machining Technology
  - Author: James Hellwig
  - Publisher: Cengage Learning
  - Publication Date: 2014
  - Text Edition: 2nd
  - Classic Textbook?:
  - OER Link:
  - OER:
- NIMS Level 1
  - Author: Andrew Klein
  - Publisher: Cengage Learning
  - Publication Date: 2016
  - Text Edition: 1st
  - Classic Textbook?:
  - OER Link:
  - OER:
- Machining and CNC Technology
  - Author: Fitzpatrick and Smith
  - Publisher: McGraw Hill
  - Publication Date: 2019
  - Text Edition: 4th
  - Classic Textbook?:
  - OER Link:
  - OER:

Other materials and-or supplies required of students that contribute to the cost of the course.