ADVM 0005F - CNC MILLING WITH 4TH AND 5TH AXIS

Catalog Description

Formerly known as ADVM 0068
Prerequisite: Completion of ADVM 0005E with grade of "C" or better
Hours: 72 (18 lecture, 54 laboratory)
Description: Advanced CNC machining 4th and 5th axis Mill work. Developing complicated part geometry with Computer Aided Design (CAD), Post process CAM tool path development, planning machine operations, and developing machine codes and techniques for cost effectiveness. CNC multi axis vertical and universal mill operations. (CSU)

Course Student Learning Outcomes

- CSLO #1: Model CAM in 5 axis CNC Mill applications to industry standards.
- CSLO #2: Apply CAM in 5 axis CNC Mill applications to industry standards.

Effective Term

Fall 2026

Course Type

Credit - Degree-applicable

Contact Hours

72

Outside of Class Hours

36

Total Student Learning Hours

108

Course Objectives

Lecture:

1. Identify safe work expectations when using multi-axis CNC equipment
2. Outline CAM process to create finished parts using multi-axis machining strategies
3. Describe Industry conventions for axis rotation in relationship to coordinate systems
4. Compare processes when different materials are specified

Laboratory:

1. Apply shop safe practices. Build team safety and quality control system used in the learning environment
2. Prepare CAD process for creating CAM tool path application
3. Develop multi-axis program operations
4. Demonstrate multi-axis CNC machining center set-up and operation
5. Measure and compare CAD specifications with completed part geometry and provide logical recommendations for corrections

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

- CSU Transferable

Methods of Evaluation

- Problem Solving Examinations
  - Example: Students are provided a blueprint and a sample part, in which the student will develop a job sheet identifying operational steps to manufacture the sample using CNC Mill.
- Projects
  - Example: Students will be evaluated on their ability to make a part from a computer model, followed by machining it and final inspection.
- Skill Demonstrations
  - Example: Using the above planning process, the student will develop a job sheet identifying operational steps to manufacture the sample using the CNC Mill.

Repeatable

No

Methods of Instruction

- Laboratory
- Lecture/Discussion
- Distance Learning

Lab:

1. Laboratory demonstration of sacrifice plate or sub plate vs soft jaw work holding along with the other various types of work holding systems. Students will practice using multiple work holding methods.

Lecture:

1. Instructor presents lecture tool pathing of a five axis part. Students will utilize CAM modeling to plan tool path sequencing.

Distance Learning

1. The instructor will create a how-to tutorial showing students how to create a CAM toolpath application to a CAD model. Students will then be expected to follow the directions and create CAM toolpath application their own CAD model.

Typical Out of Class Assignments

Reading Assignments

1. Read section in textbook on program planning and complete the end of chapter review questions. 2. Read chapter in textbook on screw thread technology and complete the review questions at the end of the chapter. Be prepared to discuss in class.

Writing, Problem Solving or Performance

1. Perform computation of tool path centerline and apply cutter compensation. 2. Planning a job project from start to finish on multi-axis CNC machines.

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

Required Materials

- Machining and CNC Technology
  - Author: Michael Fitzpatrick
  - Publisher: McGraw-Hill
  - Publication Date: 2024
  - Text Edition:
  - Classic Textbook?:
  - OER Link:
  - OER:

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