MACH A147: INTRODUCTION TO 5 AXIS MACHINING

Item	Value
Curriculum Committee Approval Date	10/06/2021
Top Code	095630 - Machining and Machine Tools
Units	2 Total Units
Hours	72 Total Hours (Lecture Hours 18; Lab Hours 54)
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

Students will learn basic features of state-of-the-art CNC 5 axis mills. Write necessary manual programs, and produce the parts on The CNC 5 axis machine, with the aid of 5 axis CNC simulation software. ADVISORY: MACH A125, MACH A126, and MACH A130. Transfer Credit: CSU.

Course Level Student Learning Outcome(s)

1. Demonstrate the process of loading programs from a computer to the memory of the machines.
2. Use the machine to prove out a program without first making the part.
3. Produce basic and complex parts on the CNC 5 axis Mills.

Course Objectives

- 1. Describe the process to produce basic parts on CNC 5 Axis Mills
- 2. Make complete part and tool setups without assistance.
- 3. Write programs that use the common autocycles for state of the art CNC 5 Axis Mills.
- 4. Correctly edit programs in memory.
- 5. Accurately locate multiple zero positions.
- 6. Demonstrate the ability to adjust speeds and feeds during a program run to optimal cutting conditions.
- 7. Explain the process of loading programs from a computer to the memory of the machines.
- 8. Describe the process of using the machine to prove out a program without first making the part.

Lecture Content

Review of CNC machine fundamentals Overview of state of the art machine features Machining center zero techniques Machine zero Part zero procedures Program zero option Tool length offset procedures on a machining center Standard method using Tool Offset Measure Methods of using fixture offsets Using advanced autocycles for: Bolt circles Pockets Lettering Tapping Drilling Profiling

Lab Content

CNC machine fundamentals perfomed on the Machine CPU Overview of state of the art machine features in the lab using the UMC-750 HAAS 5 Axis Mill Machining center zero techniques perfomed and practiced using the UMC-750 HAAS 5 Axis Mill Machine zero Part zero procedures Program zero option Tool length offset procedures on a perfomed and practiced using the UMC-750 HAAS 5 Axis Mil Standard method using Tool Offset Measure

Method(s) of Instruction

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

Instructional Techniques

Lecture, demonstration, and laboratory activity on the 5 axis CNC mill.

Reading Assignments

Students will be given handouts as study guides. Approximately 1 hour per week.

Writing Assignments

Writing assignments include: 1. Writing and editing CNC programs for the 5 Axis Machine 2. Providing written answers to assigned questions 3. Performing arithmetic calculations as assigned, including geometric layouts of machined parts 4. Maintaining a notebook of class assignments and activities Approximately a half-hour per week.

Out-of-class Assignments

Students will write manual CNC programs in preparation for running the programs on the machine. Approximately 1 hour per week.

Demonstration of Critical Thinking

Mid term, lab assignments, final project

Required Writing, Problem Solving, Skills Demonstration

Students will write short answer to quizzes and define certain types of machine language codes

Eligible Disciplines

Machine tool technology (tool and die making): Any bachelors degree and two years of professional experience, or any associate degree and six years of professional experience.

Manuals Resources

1. Haas Automation Inc.. Mill Operators Manual, Haas Automation Inc. , 12-02-2017 2. Haas Automation Inc. UMC-750 supplement manual, Haas Automation Inc , 12-01-2018