MACH A130: INTRODUCTION TO CNC AND MANUAL PROGRAMMING

Item	Value
Curriculum Committee Approval Date	10/06/2021
Top Code	095630 - Machining and Machine Tools
Units	3 Total Units
Hours	54 Total Hours (Lecture 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
Open Entry/Open Exit	No
Grading Policy	Standard Letter (S)

Course Description

A basic course in computerized numerical control of machine tools. Types of control systems, capabilities and the different machine languages are examined. Elementary parts programming in two-axis systems, including all steps necessary to complete a part on both CNC lathes and mills. ADVISORY: MACH A105 and MACH A110 or instructor permission. Transfer Credit: CSU.

Course Level Student Learning Outcome(s)

1. Demonstrate the appropriate use of various N/C machines.
2. Solve problems of machine axis designations.
3. Write and implement programs for lathes and mills.

Course Objectives

- 1. Recognize and describe various N/C machines.
- 2. Recognize problems of machine axis designations.
- 3. Understand and use the basic word address codes for CNC lathes and mills.
- 4. Compose both CNC lathe and mill programs.
- 5. Complete a name plate program.
- 6. Describe the basic zero positions used on CNC machines.
- 7. Explain part programs using subroutines.
- 8. Write both absolute and incremental part programs.
- 9. Apply the rules of visualization for angular compensation.
- 10. Write programs containing circular interpolation moves for both lathes and mills.

Lecture Content

Orientation to Computerized Numerical Control Definition of computerized numerical control History of CNC development from l955 to present Kinds of N/C machine tools and their capabilities Extent of N/C machine tool work in Orange County Kinds of personnel involved and the required training Job opportunity to N/C work Advantages and disadvantages Machine Axis Designations The Cartesian coordinate system Rectangular coordinates Part drawings translated into coordinates Control Systems Open loop Closed loop feedback Absolute incremental Machine Systems Point to Point Continuous path Manual Programming Fundamental elements of a complete program Programming steps Program verification Miscellaneous functions available Use of the CNC Machine Job setup and clamping Setup point Tooling and machine operation Sample Project Prepare drawing Write program (Manuscript) Run the job on the CNC machine

Method(s) of Instruction

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

Instructional Techniques

Lecture, demonstration, and program writing assignments

Reading Assignments

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

Writing Assignments

Students will answer short quizzes and exams. They will also describe the meaning of machine language CNC programs. Performing arithmetic calculations as assigned, including geometric layouts of machined parts. 2.875 hours per week

Out-of-class Assignments

Students will write manual CNC programs in preparation for running the programs on the machine. Approximately 2.875 hour per week.

Demonstration of Critical Thinking

Quizzes, programming exercises, final exam, and final project

Required Writing, Problem Solving, Skills Demonstration

Short answer quizzes, exams, and machine language programs

Eligible Disciplines

Manufacturing technology (quality control, process control): Any bachelor's degree and two years of professional experience, or any associate degree and six years of professional experience.

Textbooks Resources

1. Required Haas Automation Inc.. CNC Lathe and Mill Operator?s Manual,, latest ed. Oxnard: Haas Automation Inc., 2020 Rationale: -