MACH A146: MACHINING WITH MASTERCAM

Item	Value
Curriculum Committee Approval Date	12/02/2020
Top Code	095630 - Machining and Machine Tools
Units	1.5 Total Units
Hours	45 Total Hours (Lecture Hours 18; Lab Hours 27)
Total Outside of Class Hours	0
Course Credit Status	Credit: Degree Applicable (D)
Material Fee	No
Basic Skills	Not Basic Skills (N)
Repeatable	No
Grading Policy	Standard Letter (S), • Pass/No Pass (B)

Course Description

An intermediate course in manufacturing with vertical machining centers using MasterCAM to develop programs for the purpose of creating metal parts. Basic 2-D toolpaths as well as advanced 3-D toolpath techniques will be discussed and created. Transfer Credit: CSU.

Course Level Student Learning Outcome(s)

1. Draw accurate 2-D and 3-D parts from a blueprint.
2. Demonstrate the effective use of MasterCAM's advanced surface toolpaths.
3. Produce an accurate part within given time constraints for profitability.

Course Objectives

- 1. Draw an accurate part model given a simple Blueprint.
- 2. Apply correct toolpaths to drive milling cutters.
- 3. Select appropriate tools to machine simple 2D parts.
- 4. Select appropriate tools to machine advanced 3D parts.
- 5. Verify cutter paths from MasterCAMs advanced machine verification.
- 6. Understand the effect of correct feeds and speeds relating to the machining of aluminum.

Lecture Content

1. Course Overview and Beginning Tool-Paths A. Course Structure B. Introduction to MasterCAM C. Set-up and Planning D. Tooling E. Facing F. Contouring 2. Cutting Holes A. Spot Drilling B. Drilling C. Tapping D. Boring E. Thread Milling 3. Advanced Pocketing A. Morph Pocketing B. Advanced Pocket Entries a. Entry Points b. Ramping c. Helixing 4. Basic Surfacing – Revolved Surfaces A. Flat Boundaries B. Fillets C. Surface Rough Pocketing D. Semi-Finish Scallop E. Containment Boundaries F. Finish Blending G. Revolved Surfaces H. Rough Surface Machining Techniques 5. Basic Surfacing – Swept Surfaces A. Tool Selection B. Semi - Finish Flow line C. Finish Surface Projection D. Flow line Parameters 6. Advanced Surface Projection A. Machining Splines B. 3D Curve Cutting C. Gap Settings D. Depth L imits E. Spline Linearization 7. Solid Modeling A. Basics of Solid Modeling B. Boolean operations C. Creating 2D Toolpaths from Solid Models D. Creating 3D Toolpaths from Solid Models E. Full Machine Verification 8. Full Overview A. Surface Finish Evaluations B. Machine Cycle Time Evaluations

Lab Content

A) Students will develop programs using MasterCAM software. B) Students will select appropriate tools and set up machines for 2D and 3D advanced machining.C)In the lab students will verify cutter paths from MasterCAM program.D) Students will receive hands-on training on the effects of using the correct tool paths for advanced machining.

Method(s) of Instruction

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

Instructional Techniques

Projects and class participation

Reading Assignments

Reading from instructor handouts

Writing Assignments

Writing and editing CNC programs

Out-of-class Assignments

Student projects

Demonstration of Critical Thinking

Apply blueprints and select appropriate toolpaths to drive machine. Demonstrate understanding of the effect of correct feeds and speeds relating to machining aluminum.

Required Writing, Problem Solving, Skills Demonstration

Demonstrate and apply blueprint information to write and edit CNC programs. Produce an accurate part from specifications.

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.

Other Resources

1. Instructor handouts