ATMT-2620: CAM PRINCIPLES

Cuyahoga Community College

Viewing: ATMT-2620 : CAM Principles

Board of Trustees:
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Academic Term:
Spring 2019

Subject Code
ATMT - Appd Ind Tech-ManufacturingTec

Course Number:
2620

Title:
CAM Principles

Catalog Description:
Study of geometric modeling, using selected CAD/CAM packages to graphically model parts in 2D, 3D wire-frame and solid, generating G-codes, post-processing G-codes into formats interpretable by given CNC controllers. Topics include editing G-codes with verification of toolpaths in 3D and solid model simulation; downloading path programs into CNC turning and milling centers; and machining parts. Use of metrology methods to check dimensional and geometrical accuracy of produced parts.

Credit Hour(s):
2

Lecture Hour(s):
1

Lab Hour(s):
2

Requisites

Prerequisite and Corequisite
ATMT-2600 CNC Programming/Operations, and departmental approval.

Outcomes

Course Outcome(s):
N/A

Objective(s):

1. Differentiate between direct and graphic based CNC programming.
2. Interpret 2D/3D and solid models.
3. Select appropriated tooling and determine the desired spindle speed, feed-rate, and other machining parameters required to deliver CNC code generation.
4. Generate G-codes and post-process them for a given CNC controller type (FANUC).
5. Verify path programs through 3D or solid machining simulation.
6. Download path program to the machine control unit (MCU).
7. Set up parts for machining, including the determination of tools offsets, and establishing work "zero" and tools change positions.
8. Run CNC milling machine or lathe to produce part.
9. Check machined parts with metrology tools and instruments.
10. Recognize how reverse engineering methods work with computer systems.
11. Differentiate between the operations of a machined part through job-routing diagrams.

Methods of Evaluation:

1. Quizzes
2. Exams
3. Classroom participation
4. Demonstration project evaluated on site.

Course Content Outline:

1. Introduction to CAD/CAM
   a. Types of design models
   b. Concurrent engineering
2. Design process and role of CAD
   a. Modeling using CAD
   b. Defining the model
3. Techniques for geometric modeling
4. Entity manipulation and data storage
   a. Object transformations
   b. Associative geometry and attributes
5. Applying the CAD model in design
6. Tools and fixtures selection - part simulation
7. Machining parameters selections
   a. Link to machine control
   b. Numerical control
   c. Part programming
8. Program generations
   a. Tool paths from solid models
   b. Program postprocessing
9. Machining simulation -- multiple axis preview
10. Program editing and storage -- file management
11. CNC machine setup -- actual part production
12. Metrology inspection
    a. Geometric feature checks
    b. Surface measurements
    c. Coordinate measuring machine
13. Reverse engineering
    a. Rapid prototyping
    b. CMM digitizing
    c. Stereolithography
14. Job routing
    a. Flow of machine operations
    b. "Input - process - output"

Resources

Busch, T., R. Harlow, and R. Thompson. *Fundamentals of Dimensional Metrology.* 3rd ed. Delmar Publishing, 1998.

McMahon, Chris, and Jimmie Browne. *CAD/CAM: From Principles to Practice.* Addison-Wesley, 1993.

Wood, Lamont. *Rapid Automated Prototyping: An Introduction.* Industrial Press, Inc., 1993.

Resources Other

1. Software: SURFCAM. Version 7. MasterCAM, SolidWorks 98, etc.

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