MET-2220: ADVANCED CAD/CAM PROCESSES

Cuyahoga Community College

Viewing: MET-2220 : Advanced CAD/CAM Processes
Board of Trustees:
2008-05-22

Academic Term:
Fall 2018

Subject Code
MET - Mech Eng/Manuf Ind Eng Tech

Course Number:
2220

Title:
Advanced CAD/CAM Processes

Catalog Description:
Applying Mastercam for advanced CAD/CAM operations; creating wireframe, surface and solid models; generating, editing, verifying, and post-processing codes interpretable by given CNC controllers, with emphasis on FANUC controller; downloading path programs to CNC machines; tooling and setting up parts; operating CNC machines to produce parts.

Credit Hour(s):
3

Lecture Hour(s):
2
Lab Hour(s):
3

Requisites

Prerequisite and Corequisite
MET-1240 Machine Tools and Manufacturing Processes, and MET-1400 CNC Programming Operations, and MET-2000 CAD/CAM Processes.

Outcomes
Course Outcome(s):
A. Perform advanced CAD/CAM Operations

Course Outcome(s):
9. Plan for 3D milling and C-axis turning.

Course Outcome(s):
10. Create 3D wireframe of parts.

Course Outcome(s):
11. Create solid models of parts.

Course Outcome(s):
12. Create 3D surfaces of models.

Course Outcome(s):
13. Create, postprocess, edit and verify Toolpaths.

Course Outcome(s):
14. Setup CNC machines for 3D or C-axis Machining.

Course Outcome(s):
15. Run CNC machines to produce parts.

Course Outcome(s):
1. Construct wire frame models using geometry commands.

Course Outcome(s):
2. Create parts using the surfaces module

Course Outcome(s):
3. Generate 3D cutting tool paths using roughing and finishing functions.

Course Outcome(s):
4. Edit 3D tool paths.

Course Outcome(s):
5. Select cutting tools and plan for proper programming sequences.

Course Outcome(s):
6. Create objects using the solids module.

Course Outcome(s):
7. Verify the accuracy of the programmed cutter path on a CNC machine.

Course Outcome(s):
8. Transport computer-aided drafting models (CAD) for programming.

Methods of Evaluation:
1. Lab reports, models inspection, simulation analysis
2. Quizzes and assignments
3. Projects
4. Final examination

Course Content Outline:
1. Wire frame models
   a. Features of wireframe models and surface models.
   b. Basic elements of surface and edge profiles.
   c. Construct wireframe models using geometry commands.
2. Surfaces modeling for creating parts.
   a. Surfaces and their applications.
   b. Surface types and uses.
   c. Using surface modules.
3. Procedures and shortcuts in creating parts using surfaces.
   a. Loft, coons, ruled, sweep.
4. Use to create derived surfaces from existing surfaces.
   a. composite surface models
5. 3D Cutting Tool paths

    a. Methods of generating tool paths to cut surfaces.
    b. Using modules to generate tool paths from wireframe models.
    c. Applying 3D tool path modules
6. Features of seven surface roughing functions.
7. Features of eight surface finishing functions.
8. Common parameters used in surfacing tool path functions.
9. Surface tool path functions to generate NC programs for machining surfaces.
10. Post processing
    a. Post files and interpretation
    b. Universal post editing
11. 3D Tool path Editing
    a. Tool path editing functions (project and trim) to modify tool paths
    b. Tool path editing features and applications
12. Cutting tool selection and programmed path sequence planning.
    a. Tool path generation procedures for 3D surfaces.
    b. Plan for most productive sequence for machining features and surfaces.
    c. Select proper tooling and machining parameters.
13. Constructing parts using the solids module.
14. Wire frame transfer or development.
15. Modeling commands.
    a. Extruding
    b. Fillets & rounds
    c. Shell
    d. Holes, bosses, & pockets.
    e. Chain commands
16. Verifying program on a CNC machine.
    a. Down load program from PC or Microfloppy
    b. Review basic controller functions.
    c. Locate part zero with spindle using jog functions.
    d. Run tool tryout.

Resources

Lin,S.C. Jonathon ;F.C. Tony Shiue. *Mastercam Version 9 Mastercam Version X Millenium and Solids.* 6th Ed. Ann Arbor: Scholars International Publishing, 2006.

Stenerson. *Industrial Automation and Process Control.* Upper Saddle River, NJ, 2003.

Amirouche, Farid. *Principles of Computer Aided Design and Manufacturing.* 2nd Ed. Upper Saddle River, NJ, 2004.

Wright, Paul Kenneth. *21st Century Manufacturing.* Prentice HallUpper Saddle River, NJ, 2001.

Precision Metalforming Association. "Product Design and Development Magazine" Monthly. 2007-10-01 00:00:00.0.

Resources Other
1. Mastercam, Solidworks, Inventor.
2. Machine and software manuals.
3. Handouts.
4. Mastercam Solids v.7 by S.C. Jonathon Lin and F.C. Tony Shiue
5. Richard Cozzens, Mastercam Workbook, Version 9

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