

Des Moines Area Community College

Course Information – EFFECTIVE Aug. 2006

Acronym/Number CAD 242 Historical Ref CADT 431

Title Manufacturing Interfaces

Credit breakout 3 2 2 0 0
(credit lecture lab practicum work experience)

PREREQUISITE(S): MAT 772

COURSE DESCRIPTION:

Computer interfaces between manufacturing and engineering will be the primary focus of the class. File exchange formats, data compilation and machining interpretation of the model file will be addressed. Tool path generation will be discussed. Manufacturing system integration will be covered.

COURSE COMPETENCIES:

During this course, the student will be expected to:

1. Discuss phases of manufacturing development.
 - 1.1 Discuss the product design phase (R & D).
 - 1.1.1 Discuss manufacturing considerations.
 - 1.1.2 Discuss possible CAD platforms and files that can be used.
 - 1.2 Discuss model prototyping.
 - 1.2.1 Describe conventional machining techniques that could be used.
 - 1.2.2 Differentiate between cutting and shaping tools.
 - 1.2.2.1 Discuss shaping (bending) operations.
 - 1.2.2.2 Discuss cutting operations.
 - 1.2.3 Discuss non-traditional machining processes.
 - 1.3 Examine the manufacturing phase.
 - 1.3.1 Discuss industrial engineering.
 - 1.3.1.1 Discuss tool engineering.
 - 1.3.2 Discuss manufacturing flow.
 - 1.3.2.1 Describe process control.
 - 1.3.2.2 Discuss environmental concerns.
 - 1.3.3 Discuss quality control.
 - 1.3.3.1 Discuss inspection and calibration.
2. Describe Computer-Aided Manufacturing (CAM).
 - 2.1 Examine numerical control.
 - 2.1.1 Discuss numerical control (NC).
 - 2.1.2 Discuss computer numerical control (CNC).
 - 2.1.3 Discuss direct numerical control (DNC).

CAD 242

- 2.2 Discuss advantages of CNC.
- 2.3 Discuss dis-advantages of CNC.
- 2.4 Identify CNC applications.
- 2.5 Examine CAM software.
 - 2.5.1 Identify a CAM file.
 - 2.5.2 Observe downloading a CNC program to a milling machine.
 - 2.5.3 Observe program running on milling machine.
- 2.6 Discuss CAD file translation.
 - 2.6.1 Describe how a CAD file is implemented into CNC.
 - 2.6.2 Discuss file translation difficulties.
- 3. Describe Computer-Integrated Manufacturing (CIM).
 - 3.1 Define computer-integrated manufacturing (CIM).
 - 4.1.1 Discuss what constitutes CIM.
 - 3.2 Explain five problems that may occur in a CIM environment.
 - 4.2.1 Discuss why users cannot control or understand the information they receive.
 - 4.2.2 Describe why the change may be too costly.
 - 4.2.3 Explain how systems may not be integrated.
 - 4.2.4 Identify why data quality may be poor.
 - 4.2.5 Describe why the system may take too long to change.
 - 3.3 Describe what occurs with the following:
 - disengagement
 - disidentification
 - disorientation
 - disenchantment
 - 3.4 Discuss CIM advantages/disadvantages.
- 4. Describe Just-In-Time Manufacturing.
 - 4.1 Define just-in-time manufacturing (JIT).
 - 4.2 Identify six factors essential to JIT implementation.
 - 4.3 Describe how JIT is used in conjunction with engineering/manufacturing, design production schedules.
- 5. Describe Manufacturing Resource Planning (MRP).
 - 5.1 Define what manufacturing resource planning (MRP) is.
 - 7.1.1 Discuss MRPII.
 - 5.2 List the four components of a MRP system.
 - Control database
 - Planning database
 - Functional models
 - Integrated models
 - 5.3 Identify the seven basic factors essential to MRP implementation.
 - 5.4 Demonstrate how an MRP system performs its calculations.
 - 5.4.1 Discuss how MRP is used in conjunction with engineering/manufacturing design production schedules.

CAD 242

6. Describe Statistical Process Control (SPC).
 - 6.1 Define statistical process control.
 - 6.2 Utilize the basic tools of SPC in case studies and actual experiments.
 - 8.2.1 Construct a cause and effect diagram.
 - 8.2.2 Demonstrate the concepts of brainstorming.
 - 8.2.3 Construct the five basic types of flow charts.
 - 8.2.4 Formulate a histogram from a set of data points.
 - 6.3 Discuss data analysis.
 - 6.3.1 Discuss data compilation.
 - 6.3.2 Describe how the data is used for quality control and engineering design improvement.
 - 6.3.3 Discuss how data is used for tolerance analysis in a design.
7. Discuss file data exchange formats.
 - 7.1 Describe how the CAD drawing data is used in manufacturing.
 - 7.2 Discuss IGES (*.JGS) files.
 - 7.3 Discuss DXF (*.DXF) files.
 - 7.4 Discuss import/export problems.
 - 7.5 Explain what happens when the program does not receive the proper data file.
8. Analyze tool path generation.
 - 8.1 Define tool path.
 - 8.2 Examine three dimensional applications.
 - 10.2.1 Discuss surface modeling.
 - 8.3 Create CNC tool paths using CAM.
 - 10.3.1 Apply tool paths and post-process for CAM.
 - 8.4 Discuss using three dimensional CAD solid models for tool path generation.
 - 8.4.1 Discuss why surface models are preferred for CNC.
9. Discuss database data extraction.
 - 9.1 Discuss what data is contained in a CAD file.
 - 9.2 Discuss what data is contained in a CAM file.
 - 9.3 Discuss printing or "extracting" the data from the file.
 - 9.3.1 Discuss printing the file for coordinate data.
 - 9.4 Examine data that can be added to a CAD file.
 - 9.4.1 Discuss tool size data.
 - 9.4.2 Discuss tool path data.
 - 9.4.3 Discuss misc. data.
 - 9.5 Discuss "read only" terminals for inspection.
 - 9.6 Examine using precision measuring machines for data.
 - 9.6.1 Describe how data from a part can be used to construct a part in CAD/CAM.
(Reverse engineering).
 - 9.6.2 Observe a precision measuring machine gathering data.
10. Describe manufacturing database inventory files.
 - 10.1 Describe how parts are "tracked".

CAD 242

- 10.2 Discuss bar coding.
 - 10.3 Examine how CAD/CAM/CIM/JIT and MRP are inter-connected.
 - 10.4 Discuss how the data used for one project can be applied to improve quality.
11. Explore linear, angular, and radial measurements with hand tools.
- 11.1 Properly identify proper measurement hand tools used to measure linear, angular and radial measurements.
 - 11.2 Describe the proper care and usage of various measurement hand tools.
 - 11.3 Interpret measurement readings on digital, Vernier, and scale-type devices.
 - 11.4 Define the limits of interpolation of each measurement device.

CAD 242

COMPETENCIES REVIEWED AND APPROVED BY:

DATE: _____

FACULTY:

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.

Effective date: 12/2000

by: J. Leetch

Campus: A B C U N W OC

extension: 6377

Revision(s): 12/2000;