Introduction to Parametric CAD/CATIA

Outline of Instruction

Course Information

Organizations: Monroe County Community College, Applied Science and Engineering Technology
Development Date: 8/26/2009
Course Number: METC 170
Instructional Area: Mechanical Engineering Technology
Potential Hours of Instruction: 90
Total Credits: 3

Description

Course Description

In this course, students learn concepts in the use of profiles and parametric features as building blocks for 3D solid models, using the CATIA/DELMIA part and assembly modeling software. Advanced topics of NURBS surfacing and assemblies, as well as the creation of 2D drawings will be discussed. Software specific topics of Boolean Operations and best practices will also be explored.

MAJOR UNITS

1. A comparison of 2D techniques to the varied 3D techniques of wireframe, surface, solid and parametric solids
2. Creating work planes to most efficiently construct part geometry
3. How constraints define a parametric model
4. Using Non-Uniform Rational B-Splines (NURBS) to represent a 3D contour
5. Building an assembly from component models, and using constraints to hold them together
6. Best Practices to create stable, modifiable models
7. Creating an exploded assembly with a bill of materials
8. Dropping off 2D details of a model to produce proper paper prints
9. There will be a short time spent looking at the advanced features of the software, such as Finite Element Analysis (FEA) and kinematic simulations, and showing how they can improve the mechanical part design process

Types of Instruction

<table>
<thead>
<tr>
<th>Instruction Type</th>
<th>Contact Hours</th>
<th>Credits</th>
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<tr>
<td>The methods of instruction for this course will include but will not be limited to, discussion, lecture, demonstration, in-class activity, lab experiments, and examination.</td>
<td>90</td>
<td>3</td>
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Textbooks

CADCIM. CATIA V5R17 for Designers.

Prerequisites

MDTC 121 or MDTC 160
Exit Learning Outcomes

Program Outcomes
A. Produce graphic representations of designs using CAD software, Solid Modeling software, and pencil and paper methods.
B. Select materials and determine component sizes and shapes to meet design criteria.
C. Apply instruments to make measurements and analyze data from such measurements.
D. Identify typical mechanical components and explain their function.
E. Apply fundamental manufacturing processes using manual and automated machine tools.
F. Recognize assumptions and limits of analysis to the application of technology, including social and ethical implications.
G. Select and apply power generation and power transmission components including mechanical, pneumatic, hydraulic, thermal, and electrical types.
H. Identify and define problems in mathematic and scientific terms
I. Recognize the need to engage in lifelong learning, and to perform research or conduct investigations to continuously upgrade knowledge and skills.
J. Communicate effectively, and work as part of a team.

General Education Outcomes
A. Apply mathematical approaches to the interpretation of numerical information
B. Apply mathematical approaches to the analysis of numerical information
C. Communicate ideas in writing using the rules of standard American English
D. Demonstrate an understanding of the process of scientific inquiry
E. Use computer technology to retrieve information
F. Use computer technology to communicate information

Course Outcomes
1. Describe the advantages of 3D modeling over 2D
2. Create and modify properly constrained mechanical parts
3. Create and constrain complex assemblies
4. Produce printable exploded assemblies and orthographic detail drawings
5. Apply proper methods to constrain features
6. Use family tables to form similar parts
7. Break a mechanical part into a collection of work plane sketches and features
8. Create accurate 3D contours using NURBS