Introduction to CAD

What Do Those Letters Mean to You?
Painting “The Big Picture”

• What is Computer-Aided Design (CAD)?
The Design Process

• What is Computer-Aided Design (CAD)?
More Specific Definitions

- **Computer-Aided Design (CAD)** is the technology concerned with the use of computer systems to assist in the creation, modification, analysis, and optimization of a design. [Groover and Zimmers, 1984]

- **Computer-Aided Manufacturing (CAM)** is the technology concerned with the use of computer systems to plan, manage, and control manufacturing operations.

- **Computer-Aided Engineering (CAE)** is the technology concerned with the use of computer systems to analyze CAD geometry, allowing the designer to simulate and study how the product will behave.
Modern CAD/CAM/CAE practice

Information from all product lifecycle activities is available from a single database.
PDM and PLM

• PDM – is the activity of storing, retrieving, and controlling the use of digital product data shared by multiple users.

• PLM – is the strategic, integrated use of diverse software to support all product lifecycle activities of a manufacturing enterprise, from the conception of a product, through design, manufacturing, customer support, and product retirement.
Components of CAD Systems

CAD/CAM/CAE System

Hardware
- Computing machine
- Data storage devices
- Communication devices
- User input devices
- User output devices

Software
- Solid Modeling
- Assembly Modeling
- Motion Simulation
- Finite Element Analysis

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Components of CAD Systems

• Input Devices
Components of CAD Systems

- Output Devices

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Components of CAD Systems

- Integrated Input/Output Devices – Virtual Reality
Components of CAD Systems

• Integrated Input/Output Devices – Virtual Reality

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### SolidWorks versus other CAD software

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SolidWorks vs. Autodesk
Inventor vs. Solid Edge

- Programs are similar but not equivalent:
  - Same class of software
  - Same types of tools available
  - Same general techniques used in each
  - Specific buttons, menus and input sequences different
  - Customer lists different

- Today vs. tomorrow
  - User interfaces will change
  - Fundamentals will stay the same
Course Goals

- Basic and Advanced Shape Modeling
- Parametric Modeling
- Working in Teams
- Advanced Top-Down Design Methodology
- Use of Solid Models for Downstream Applications
  - Design Documentation
  - Mechanism Analysis
  - Finite Element Analysis/Shape Optimization
  - Computer-Aided Manufacturing
Course Expectations

• Learning through doing (hands-on learning)
• Learning by studying theory
• Benefits from course
  – How to model products well, using state of the art CAD software
  – Understanding how computer is leveraged in design process