CAD/CAM (21-342)
Advanced Manufacturing Laboratory
Department of Industrial Engineering
Sharif University of Technology

Session # 14

Course Description

- **Instructor**
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- **Class time**
  - Saturday- Monday 10:30-12:00

- **Course evaluation**
  - Mid-term (25%)
  - Final exam (40%)
  - Quiz (5%)
  - Exercise (30%)
Course Description (Continued ...)

- **Mid-term session:**
  - Monday: 8th Ordibehesht 1393, 10:30 ~ 12:30

- **Final Exam:**
  - Saturday: 24th Khordad 1393, 15:00 ~ 17:30

- **Reference:**
  - Benhabib, Beno; “Manufacturing: Design, Production, CAD/CAM, and Integration”, 2003, Marcel Dekker Inc, New York

Course Description (Continued..)

- **Contents:**
  - Introduction to CAD/CAM/CAE systems (5 sessions)
  - Components of CAD/CAM/CAE systems (2 sessions)
  - Geometric modeling systems (3 sessions)
  - Optimization in CAD (5 sessions)
  - Rapid prototyping and manufacturing (3 sessions)
  - Virtual engineering (2 sessions)
  - Product Life Cycle Cost Model (2 sessions)
  - Computer-Based Design and Features/Methodologies of Feature Representations (5 sessions)
  - Feature-Based Process Planning and Techniques (3 sessions)
  - Collaborative Engineering (2 sessions)
Course Description (Continued..)

* Contents:
  * Virtual engineering
    * Definition
  * Virtual design
  * Virtual prototyping

Introduction to CAD/CAM/CAE systems
Virtual engineering

• Definition
  • Virtual engineering is defined as integrating geometric models and related engineering tools such as analysis, simulation, optimization, and decision making tools, ..., within a computer-generated environment that facilitates multidisciplinary collaborative product development.
  
  • Virtual engineering shares many characteristics with software engineering, such as the ability to obtain many different results through different implementations.
  
  • Virtual engineering brings an entirely new approach to engineering tasks. The use of simulation will eliminate costly physical prototypes and physical experiments.

Virtual engineering

• Components
  • Virtual design
    • Virtual design is performed in a virtual environment, using reality technology.
    
    • Virtual design focuses on an alternative user interface in the design process.
    
    • The main objective of Virtual engineering is to
      • enable the designer to use intuitive and natural actions.
      • Incorporate early in the design process the viewpoint of a potential user of the product
      • Capture the design process experts' skills in assembling or manipulating parts
Virtual engineering

- Components
  - Digital simulation
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- The main objective of Virtual engineering is to
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Virtual engineering

- Components
  - Digital simulation
    - Process verification

  - Examine the machine operation before the actual work begin
Virtual engineering

- **Components**
  - Digital prototyping
    - Building a complete prototype assembly with geometric models of individual parts
  
  - This allows the visualization of the assembly of parts and a check of the feasibility of the proposed assemblies within the production constraints.

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Virtual engineering

- **Components**
  - Digital factory
    - A simulation of a complete production system
  
  - This includes design of the workcells, manufacturing processes, storage systems.
Virtual engineering

- **Applications**
  - Design tool
  - Manufacturing assessment
  - Quality estimation and control
  - Process validation and optimization
  - Production and product planning
  - Collaborative engineering