

CAD/CAM (21-342)

*Advanced Manufacturing Laboratory
Department of Industrial Engineering
Sharif University of Technology*

Session # 14



Course Description

▪ *Instructor*

- *Omid Fatahi Valilai, Ph.D. Industrial Engineering Department, Sharif University of Technology*
- *Email: FValilai@sharif.edu, Tel: 6616-5706*
- *Website: Sharif.edu/~fvalilai*

▪ *Class time*

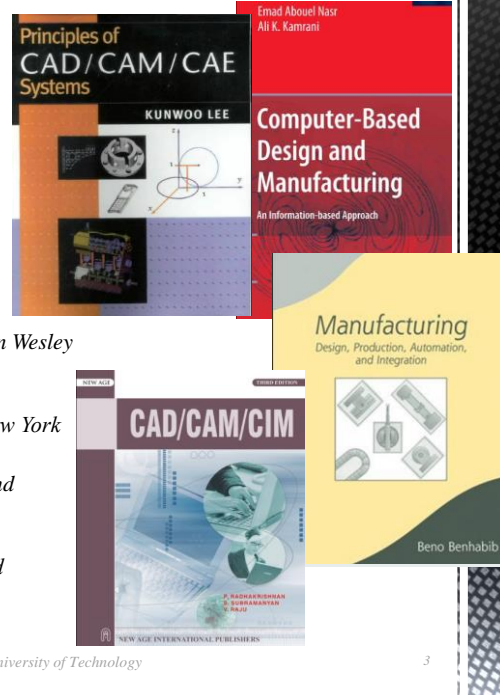
- *Saturday- Monday 10:30-12:00*

▪ *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:**
 - Lee, Kunwoo; "Principles of CAD/CAM/CAE systems", 1999, Addison Wesley
 - Abouel Nasr, Emad; Kamrani, Ali K.; "Computer-Based Design and Manufacturing: An Information-Based Approach", 2007, Springer, New York
 - Benhabib, Beno; "Manufacturing: Design, Production, CAD/CAM, and Integration", 2003, Marcel Dekker Inc, New York
 - Radhakrishnan, P.; Subramanian, S.; Raju, V.; "CAD/CAM/CIM", 3rd edition, 2005, New age international (P) limited publishers, New York



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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)

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Course Description (Continued..)

▪ Contents:

- Virtual engineering

(2 sessions)

- Definition

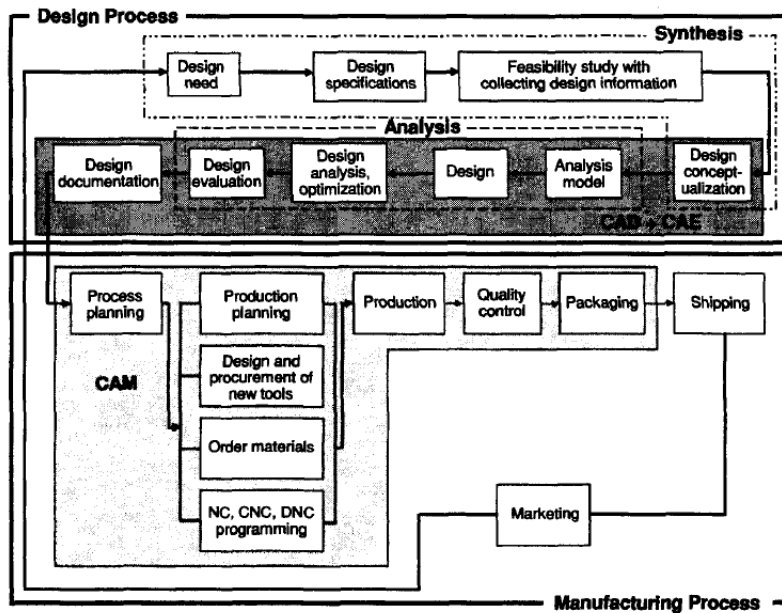
- Virtual design

- Virtual prototyping

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Introduction to CAD/CAM/CAE systems



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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.*

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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*

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Virtual engineering

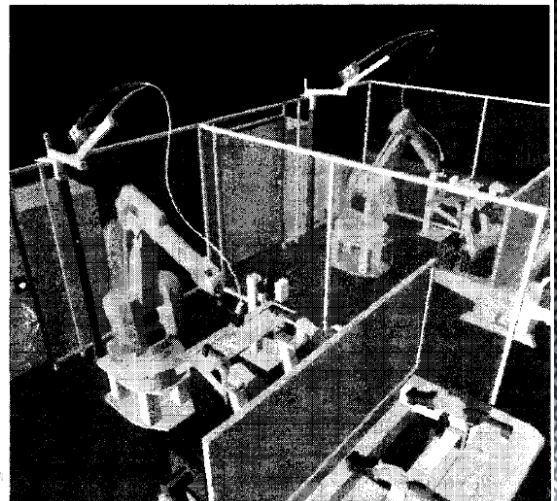
- *Components*
 - *Digital simulation*
 - *Virtual design is performed in a virtual environment, using reality technology.*
- *Virtual design focuses on an alternative user interface in the design process.*
- *The main objective of Virtual engineering is to*
 - *enable the designer to use intuitive and natural actions.*
 - *Incorporate early in the design process the viewpoint of a potential user of the product*
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Virtual engineering

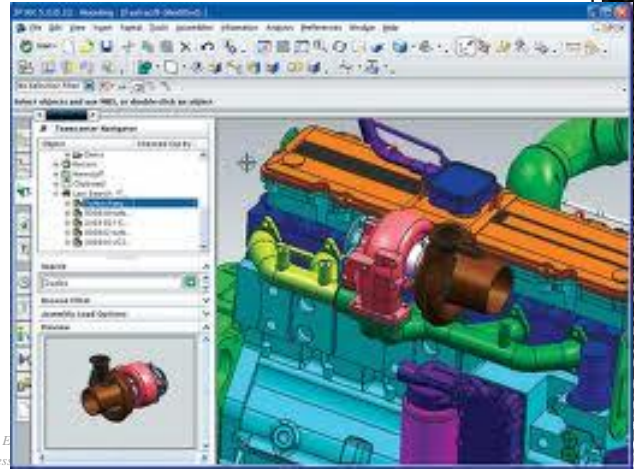
- *Components*
 - *Digital simulation*
 - *Process verification*
- *Examine the machine operation before the actual work begin*



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Virtual engineering

- **Components**
 - **Digital prototyping**
 - *Building a complete prototype assembly with geometric models o 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.*



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Virtual engineering

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



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