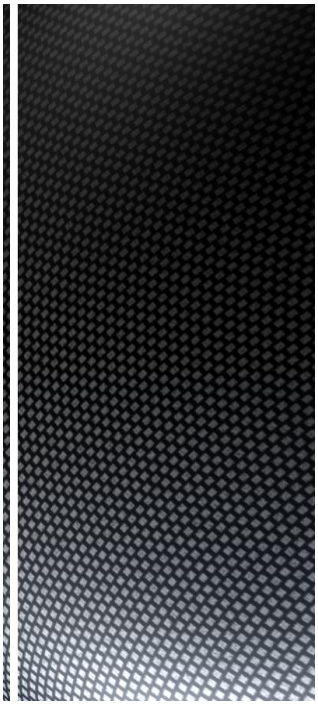

Product Planning & Development (21-423)

Advanced Manufacturing Laboratory
Department of Industrial Engineering
Sharif University of Technology

Session #4

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*
- *Recommended prerequisite*
  - *Manufacturing process I (21-418)*
- *Class time*
  - *Sunday-Tuesday 18:00-19:30*
- *Course evaluation*
  - *Mid-term (25%)*
  - *Final exam (40%)*
  - *Quiz (5%)*
  - *Exercise (Manufacturing Lab.) (30%)*

Course Description *(Continued ...)*

- *Mid-term session:*
  - *Wednesday: 9th Ordibehesht 1394, 16:30 ~ 18:30*
- *Final Exam:*
  - *Monday: 1st Tir 1394, 09:00 ~ 11:30*
- *Reference:*
  - *John Priest, Jose Sanchez; "Product Development and Design for Manufacturing: A Collaborative Approach to Producibility and Reliability, Second Edition", CRC Press, 2001*
  - *Mital et al. ,"Product Development A Structured Approach to Consumer Product Development, Design, and Manufacture", Butterworth-Heinemann, 2008*
  - *Benhabib, Beno; "Manufacturing: Design, Production, Automation, and Integration", 2003, Marcel Dekker Inc, New York*
  - *Abouel Nasr, Emad; Kamrani, Ali K.; "Computer-Based Design and Manufacturing: An Information-Based Approach", 2007, Springer, New York*

Course Description *(Continued..)*

- ***Contents:***
- *Product development in the changing Global world*
- *Stages of Product Development*
- *The Structure of the Product Design Process*
- *Early design: Requirement definition and conceptual Design*
- *Trade-off analyses: Optimization using cost and utility Metrics*
- *Detailed design: Analysis and Modeling*
- *Design Review: Designing to Ensure Quality*
- *Production System; Strategies, planning, and methodologies*
- *Production System Development*
- *Planning and Preparation for Efficient Development*
- *Supply chain: Logistics, packaging, supply chain, and the environment*

The Structure of the Product Design Process

- *Early Design:*
  - *Requirement definition and conceptual design*

The Structure of the Product Design Process

- *Early Design:*
  - *Requirement definition and conceptual design*

"A manager wants to find and fix software faults (i.e., bugs) more quickly. He offers an incentive plan: $20 for each bug the quality people find and $20 for each bug the programmers fix. These are the same programmers who created the bugs! As a result, an underground development in "bugs" sprung up instantly. The plan was rethought after one employee earned $1,700 in the first week"! (Wall Street Journa1,1995)

  - *The key is to design without mistakes, not to spend time and money correcting the mistakes.*

The Structure of the Product Design Process

- *Early Design:*
  - *Requirement definition and conceptual design*

The keys to successful product development are to know the customer's current and future needs and to provide a product that meets these needs at a competitive cost.

  - *Customers needs, technology, economy and the competition are always evolving and changing*
  - *Management's task is to provide a creative environment of adequate resources and leadership to make it happen. For long-term survival of a company this must be a continuous process.*

The Structure of the Product Design Process

- *Early Design:*
  - *Requirement definition and conceptual design*
  - *Requirement definition is an evolutionary process of identifying, defining, and documenting specific customer needs to develop product requirements for a new product, system, or process.*
  - *It focuses on "what needs to be done" and is the first phase in product development*
  - *It directs attention to critical customer, design, technology, manufacturing, vendor and support needs both within and outside the company.*

The Structure of the Product Design Process

- *Early Design:*
  - *Requirement definition and conceptual design*
  - *Conceptual design is a systematic analytical process used to*
    - *Identify several design approaches (i.e., alternatives) that could meet the defined product requirements,*
    - *Perform trade-off analyses to select the best design approach to be used, and*
    - *Transforms the product requirements into detailed lower level design requirements based on the selected approach.*
  - *It focuses on "how to get it done" and begins when a need for a new product is defined and continues until a detailed design approach has been selected that can successfully meet all requirements.*

The Structure of the Product Design Process

- *Early Design:*

A systematic evolutionary requirement definition process	***Conceptual Design Process***
Customer needs analysis	*Collaborative multidisciplinary process*
Product use and user profiles	*Identify all possible design alternatives*
Technological capability forecasts	*Extensive trade-off studies*
Benchmarking and company capability	*Design Requirements*
Prototyping, virtual reality and House of Quality	*Documentations*

The Structure of the Product Design Process

- *Early Design:*
  - *Requirement definition*
  - *Common pitfalls:*
    - *The first is that a specific solution (e.g., technology, resolution, bandwidth, or part types) is determined too early before conceptual design and trade-off studies have been performed*
    - *The second is that product requirement must be extremely innovative*
    - *The third is that requirements can be stated in general terms*
    - *The fourth is the common temptation to accept customer, marketing, or a consultant's suggestions as the only and final input*

The Structure of the Product Design Process

- *Early Design:*
  - *Requirement definition*
  - *Common pitfalls:*
    - *The fifth pitfall may appear when the problem statement is continuously changing.*
    - *The sixth pitfall is when the product's requirements become too complex and detailed*
    - *The seventh and final pitfall is trying to develop only one set of requirements for all customer*

The Structure of the Product Design Process

- *Early Design:*
  - *Requirement definition*
  - *Customer needs analysis*
    - *Need, want, desire or innovation are fundamental to all acquisitions or purchases.*
    - *Need is typically a specific deficiency or lack of something in a current product.*
    - *Deficiency is an opportunity for improving performance, cost, reliability, producibility, human factors, or a combination of these.*
    - *Desire is something someone wishes or longs for.*
    - *Innovation is something new that the customer never thought about before the product became available.*

The Structure of the Product Design Process

- *Early Design:*
  - *Requirement definition*
  - *Customer needs analysis*

The Structure of the Product Design Process

- *Early Design:*
  - *Requirement definition*
  - *Customer needs analysis*