

Product Planning & Development (21-423)

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

Session #18



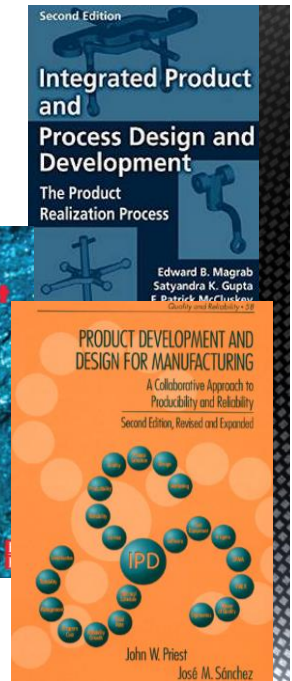
Course Description

- ***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%)*

Session reference

Reference:

- Edward B., “Integrated product and process design and development : the product realization process”, CRC Press, 2010
- 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



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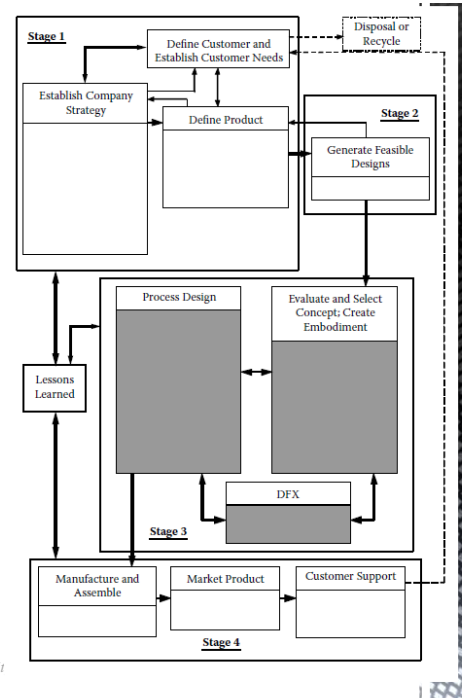
Course Description (Continued..)

- **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

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Production System; Strategies, planning, and methodologies

▪ *The Concept of Domains*



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Production System; Strategies, planning, and methodologies

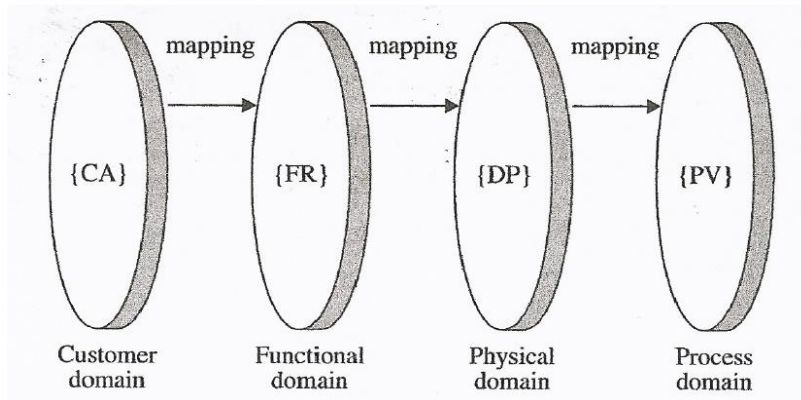
- *The Concept of Domains*
- *The design world consists of four domains.*
- *Design involves an interplay between "what we want to achieve" and "how we choose to satisfy the need (i.e., the what)."*
- *To systematize the thought process involved in this interplay, the concept of domains that create demarcation lines between four different kinds of design activities provides an important foundation of axiomatic design.*

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Production System; Strategies, planning, and methodologies

- *The Concept of Domains*
- *The design world consists of four domains.*



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Production System; Strategies, planning, and methodologies

- *The Concept of Domains*
- *The customer domain is characterized by the attributes (CAs) that the customer is looking for in a product or process or system or materials.*
- *In the functional domain, the customer needs are specified in terms of functional requirements (FRs) and constraints*
- *In order to satisfy the specified FRs, we conceive design parameters (DPs) in the physical domain.*
- *Finally, to produce the product specified in terms of DPs, we develop a process that is characterized by process variables (PVs) in the process domain. (Cs).*

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Production System; Strategies, planning, and methodologies

- *The Concept of Domains*
- *The process domain specifies the manufacturing PVs that can produce the DPs.*
- *Process Variable: Process variables (PVs) are the key variables (or other equivalent terms in the case of software design, etc.) in the process domain that characterize the process that can generate the specified DPs*
- *For the design of processes involving mapping from the {DP} vector in the physical domain to the {PV} vector in the process domain*

$$\{DP\} = [B] \{PV\}$$

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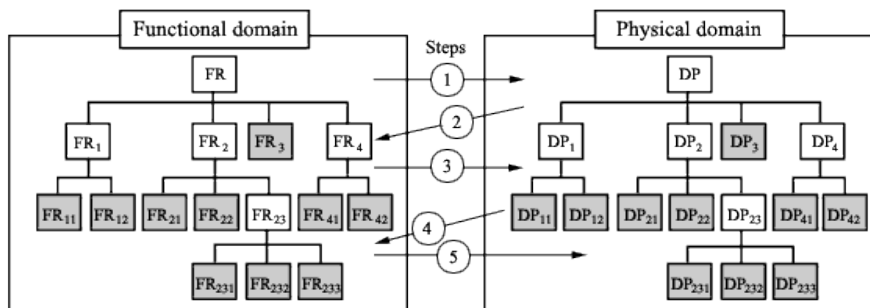
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Production System; Strategies, planning, and methodologies

- *The Process domain*

$$\{DP\} = [B] \{PV\}$$

- *To decompose DP and PV characteristic vectors, we must zigzag between the domains.*
- *We start out in the "how" domain and go to the detailed process domain*



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Project

- *Phase 9*
 - *Product PV Analysis*

