

Product Planning & Development

(21-423)

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

Session #13



Course Description

- ***Instructor***
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 - *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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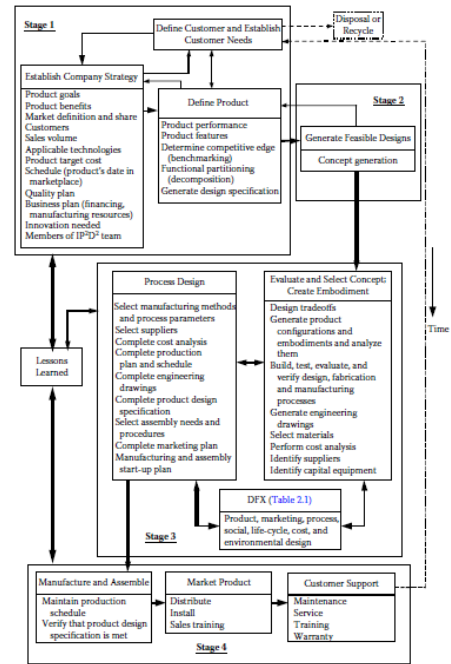
Course Description (Continued..)

- **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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Detailed design: Analysis and Modeling

■ Detailed Design:



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Detailed design: Analysis and Modeling

■ Detailed Design:

- Concept generation and the search for solutions

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6

Detailed design: Analysis and Modeling

- **Detailed Design:**
 - *Concept generation and the search for solutions*
 - *Ideas may occur to the team members during the information-gathering phase and during the benchmarking phase of the process, where various competing products have been tested, analyzed, and torn down.*
 - *Additional ideas also can sometimes be obtained from:*
 - *U.S. patent office's database at <http://www.uspto.gov/>.*
 - *Web site of Design News at <http://www.designnews.com/>*
 - *Web site of Machine Design at <http://machinedesign.com/>.*
 - *R&D Magazine annually issues their research and development 100 awards, which can be found at <http://www.rdmag.com/awards.html>*

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7

Detailed design: Analysis and Modeling

- **Detailed Design:**
 - *R&D Magazine annually issues their research and development 100 awards, which can be*

The screenshot shows the R&D Magazine website interface. At the top left is the R&D logo. A navigation bar includes links for ENGINEERING, GLOBAL FUNDING FORECAST, TOPICS, PRODUCTS, AWARDS, RESOURCES, R&D 100 AWARDS, and FREE SUBSCRIPTIONS. On the right, there are links for COMPANY PROFILE SEARCH, LOG IN, and REGISTER. Below the navigation is an advertisement section. The main content area features a blue header for 'Technologies & Strategies That Enable R&D' with a search bar on the right. The primary article is titled 'Improving rechargeable batteries with MoS₂ nano "sandwich"' and includes a 3D model of the battery structure. The article text states: 'The key to better cell phones and other rechargeable electronics may be in tiny "sandwiches" made of nanosheets, according to mechanical engineering research from Kansas State Univ. The research team are improving rechargeable...'. To the right of the article is an 'Exclusives' section with two items: 'Biofuel Struggles with Economics and the Environment' and 'Science Connect: Positive Energy: Sustaining a Great Lab Environment'.

8

Detailed design: Analysis and Modeling

- Detailed Design:
 - Web site of Design News at <http://www.designnews.com/>

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Analysis

BLOG
The Samsung Galaxy S6 Teardown
 Miroslav Djuric, ifixit.com
 4/17/2015
 Samsung's Galaxy line of smartphones used to fare quite well in the reparability department, but last year's flagship S5 model took a tumble, scoring a meh-inducing 5/10.

BLOG
The EU Forges a Pan-European Push to Enable IoT
 Rob Spiegel, Senior Editor, Automation & Motion Control
 4/17/2015

First Stop

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 If you think the Apple Watch will turn heads, wait until you build the Apple II version.

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A STEM Lesson from an IoT Electronic Thermometer
 The business and educational opportunities of Internet of Things (IoT) are abundant. Cisco's ...

Detailed design: Analysis and Modeling

- Detailed Design:
 - U.S. patent office's database at <http://www.uspto.gov/>

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▪ Detailed Design:

- U.S. patent office's database at <http://www.uspto.gov/>.

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[CPC Definition - B41K STAMPS; STAMPING OR NUMBERING ...](#)

www.uspto.gov/web/patents/classification/cpc/html/defB41K.html
Hand-operated devices and **machines** always including a static stamping element carrying a graphical and/or numerical design, e.g. a single letter or **nu** ...

[Issue Years and Patent Numbers - United States Patent and ...](#)

www.uspto.gov/web/offices/ac/ido/oeip/taf/issuyear.htm
Notes: (*) The current patent **numbering** system began with a patent issued on July 13, 1836. Prior to that date, an estimated 9,957 patents had been ...

[Class Schedule for Class 101 PRINTING](#)

www.uspto.gov/web/patents/classification/uspc101/sched101.htm
Numbering attachment : 71 : Mail-box **machines** : 72 : **Numbering** : 73 : Measuring **machines** : 74 : ... **MACHINES** PRINTING BY BOTH INTAGLIO AND ANOTHER ...

[Entries Beginning with " P ". Index to the U.S. Patent ...](#)

www.uspto.gov/web/offices/ac/ido/oeip/taf/c_index/p.htm
numbering 101 / 338_____+ - - - - roller and plate inker 101 / 359 ... - - - - ticket **machine** 100 / 214_____+ - - - - reciprocating ...

[P - Index to the U.S. Patent Classification System](#)

www.uspto.gov/web/patents/classification/uspcindex/indexp.htm
Patent Leather ... Permanent Wave **Machins** for Hair ... D28 / 11 Permeability Tuned Transformer ... Personal Identification Number (Pin)

Detailed design: Analysis and Modeling

▪ Detailed Design:

- U.S. patent office's database at <http://www.uspto.gov/>.

B41K

STAMPS; STAMPING OR NUMBERING APPARATUS OR DEVICES (marking meat A22C 17/10; embossing combined with printing B41F 19/00; selective printing mechanisms B41J; embossing decorations or marks B44B 5/00; marking or coding completed packages B65B 61/26; ticket printing and issuing, fare registering, nonprinting aspects of franking apparatus G07B)

Definition statement

This subclass covers:

Hand-operated devices and machines always including a static stamping element carrying a graphical and/or numerical design, e.g. a single letter or number in the form of a raised part forming the stamping image. This raised part has usually elastic properties, e.g. it comprises mainly an elastomeric material. After applying ink on the surface of said stamping form, said inked image is applied by contact pressure onto the surface of a substrate of any dimension, which will form a stamped subject-matter, portable devices or machines as a whole as well as all parts, details and objects specifically adapted for use in such devices or machines, e.g.

- handles,
- stands,
- labelling means,
- inking devices,
- stamping surfaces

Detailed design: Analysis and Modeling

▪ Detailed Design:

- U.S. patent office's database at <http://www.uspto.gov/>.

<ul style="list-style-type: none"> [-] B41K 1/00 B41K 1/003 B41K 1/006 [-] B41K 1/02 B41K 1/04 B41K 1/06 [-] B41K 1/08 B41K 1/10 B41K 1/12 [-] B41K 1/14 [-] B41K 1/16 B41K 1/18 B41K 1/20 [-] B41K 1/22 	<p>Portable hand-operated devices without means for supporting or locating the articles to be stamped, i.e. hand stamps; Inking devices or other accessories therefor</p> <ul style="list-style-type: none"> . {combined with other articles (combination of writing appliances with stamps B43K 29/005)} . {Pocket stamps} . with one or more flat stamping surfaces having fixed images <ul style="list-style-type: none"> .. with multiple stamping surfaces; with stamping surfaces replaceable as a whole .. with means for locating the image to be obtained . with a flat stamping surface and changeable characters <ul style="list-style-type: none"> .. having movable type-carrying bands or chains .. having adjustable type-carrying wheels .. having automatic means for changing type-characters ... Numbering devices <ul style="list-style-type: none"> for pages .. with means for locating the image to be obtained . with curved stamping surfaces for stamping by rolling contact
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Detailed design: Analysis and Modeling

▪ Detailed Design:

- *Engineering problems*
- *The methods can be classified into two groups:*
 - *Prototype testing and*
 - *Mathematical modeling*
- *Detailed design is a group of tasks used to finalize a product design that meets the requirements and design approach defined earlier*
 - *This requires decisions, even though some technical information may not be available. The design team must use "best estimates," otherwise known as assumptions, to develop the design.*

Detailed design: Analysis and Modeling

- *Detailed Design:*
 - *Design analysis*
 - *Design and reduce the technical risk in product development.*
 - *Design analysis is the use of scientific methods, usually mathematical, to examine design parameters and their interaction with the environment.*
 - *Modeling and simulation are tools for evaluating and optimizing designs, services and products.*

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15

Project

- *Product Functional Requirements*

