

## *CIM (21-548)*

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

*Session # 8*



## *Course Description*

### ▪ *Instructor*

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

### ▪ *Class time*

- *Sunday-Tuesday*                      *09:00-10:30*

### ▪ *Course evaluation*

- *Mid-term*                                      *(30%)*
- *Final exam*                                    *(50%)*
- *Quiz*    *(5%)*
- *Exercise*                                        *(15%)*



## Course Description (Continued ...)

- **Mid-term session:**
  - Sunday: 16<sup>th</sup> Azar 1393, 09:00 ~ 10:30
- **Final Exam:**
  - Tuesday: 30<sup>th</sup> Dey 1393, 15:00 ~ 17:30
- **Reference:**
  - Schaefer, D., *Cloud-based Design and Manufacturing (CBDM): A Service-Oriented Product Development Paradigm for the 21st Century*, . London: Springer, 2014
  - Koren, Y., *"The Global Manufacturing Revolution"*, Wiley, 2010
  - Nasr, A., *"Computer-Based Design and Manufacturing An Information-Based Approach"*, Springer, 2007
  - Mitchell, F.H., *"CIM Systems: An Introduction to Computer-Integrated Manufacturing"*, Prentice Hall College Div; 1St Edition edition (January 1991), ISBN: 978-0131332997

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CIM (21548), Session # 8



## Course Description (Continued..)

- **Contents:**
  - Globalization and Manufacturing Paradigms (8 sessions)
  - System Concepts (3 sessions)
  - Evolution of Manufacturing systems (2 sessions)
  - Manufacturing System Design (4 sessions)
  - Manufacturing Equipment Design (3 sessions)
  - Information flow in Manufacturing Systems (4 sessions)
  - Product design and Manufacturing System (3 sessions)
  - Manufacturing System Implementation (5 sessions)

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CIM (21548), Session # 8

## Course Description (Continued..)

### ▪ Contents:

- *Manufacturing System Design*
  - *Problem definition*
  
- *Computer Integrated Manufacturing*
  
- *Design principles*
  
- *A multi-layer model for study of design principles*
  
- *Implementing system design concept*

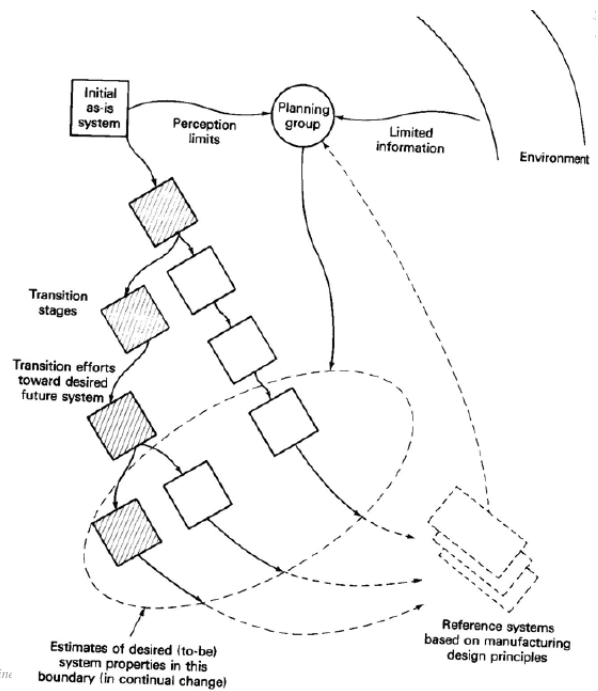
(4 sessions)

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6

## Manufacturing System Design

- *Problem definition and system approach*



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CIM (21548), Session # 8

## *Manufacturing System Design*

- *Computer Integrated Manufacturing*
  - *The Committee on the CAD/CAM Interface (CCCI) of the National Research Council proposes that the computer integrated manufacturing in a manufacturing enterprise occurs when:*
    - *All the processing functions and related managerial functions are expressed in the form of data.*
    - *These data are in a form that may be generated, transformed, used, moved and stored by computer technology.*
    - *These data move freely between functions in the system through out the life of the product , with the objective that the enterprise as a whole have the information needed to operate at maximum effectiveness.*

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CIM (21548), Session # 8

8

## *Manufacturing System Design*

- *Computer Integrated Manufacturing*
  - *an alternative definition:*

*The integration and automation of data, information and the control of product, from perception through production, to shipment and support, is referred to as Computer-Integrated Manufacturing (CIM)*

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CIM (21548), Session # 8

9

## *Manufacturing System Design*

- *Computer Integrated Manufacturing*
  - *CIM as a strategy is defined to obtaining these objectives:*
  - *The purpose of manufacturing system design is to produce an enterprise that best meets stated performance objectives.*
  - *A computer-integrated manufacturing (CIM) system results when the design effort includes the use of computers to achieve an integrated flow of manufacturing activities, based on integrated information flow that links together all organizational activities.*

## *Manufacturing System Design*

- *Computer Integrated Manufacturing*
  - *There is a danger that the "CIM equals integrated computer networks" identification will be formed.*
  - *This can lead to unfortunate results in terms of enterprise objectives.*
    - *The overall system must be rationalized, requiring that the work flow, organizational structure, and management methods be redesigned to best obtain performance objectives.*
    - *The entire meaning of product design must be assessed and modified as necessary to optimize system performance.*
    - *The most appropriate use of technology, including information flow and computers, can then be selected in this context.*

## Manufacturing System Design

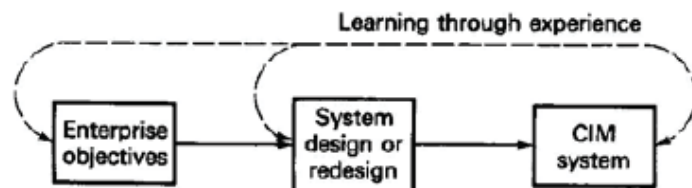
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CIM (21548), Session # 8

12

## Manufacturing System Design

- **Computer Integrated Manufacturing**
  - *CIM-oriented manufacturing systems will include information integration obtained through computer networks.*
  - *The uses of this technology, however, will be based on system rationalization and a product design strategy that is an integrated aspect of the system*



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CIM (21548), Session # 8

13

## *Manufacturing System Design*

- *Computer Integrated Manufacturing*
  - *It is essential to recognize that moving toward a CIM system does not mean simply introducing higher levels of automation into an existing system.*
  - *Adding automation to an inefficient system will likely produce a highly automated, inefficient system.*
  - *The challenge is to make the most appropriate use of technology and management to optimize the business enterprise.*
    - *Because the core of the concept is a strong emphasis on system wide integration of activities, CIM will often require a change in emphasis and management attitudes and developing new ways of thinking about the business enterprise*

## *Manufacturing System Design*

- *Computer Integrated Manufacturing*
  - *Experience has indicated that the preparation of a functional flow chart of current operations is an appropriate way to begin study of the as-is system.*
  - *This flowchart can then represent one source of information for design of the to-be system. The design of a CIM system can then emphasize the formulation of a "conceptual specification" of the functional operation of the "new (to-be) way of doing business." This specification will be part of the "search and learn" procedure that is to follow*

## Manufacturing System Design

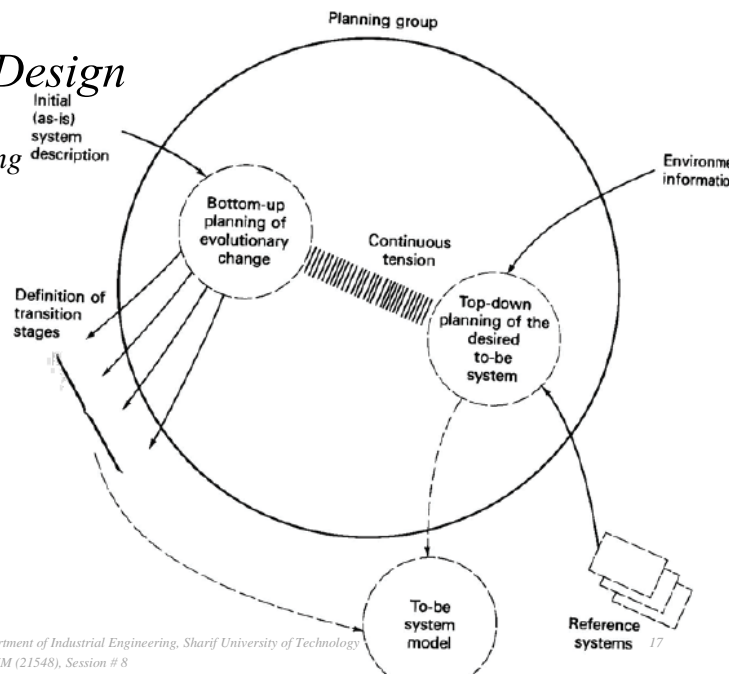
- **Computer Integrated Manufacturing**
  - *The design of any effective manufacturing system is a difficult task, and CIM applications might be regarded as the most difficult.*
  - *To achieve the desired integration objective, it is necessary to incorporate top-down planning that considers how all aspects of the enterprise will eventually function together to optimize business performance.*
  - *At the same time, realism regarding budgets, technology, risk, the search process, learning time, and the present as-is system requires an incremental evolution from the bottom-up (implemented through transition stages).*

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CIM (21548), Session # 8

16

## Manufacturing System Design

- **Computer Integrated Manufacturing**



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CIM (21548), Session # 8

17



## Manufacturing System Design

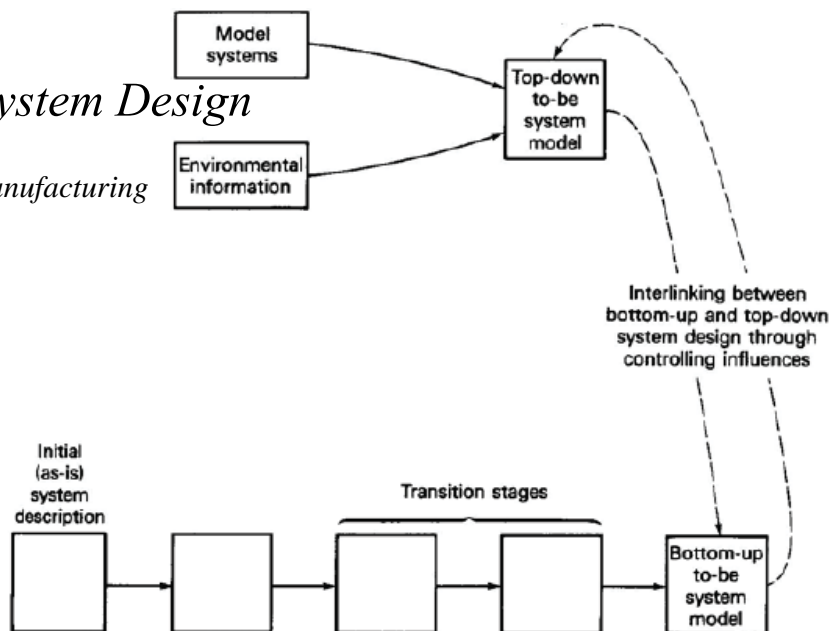
- *Computer Integrated Manufacturing*
  - *Both design and implementation strategies must reflect this dual approach and the requirements associated with combined top-down and bottom-up change.*
  - *If the top-down portion of the approach becomes too strong, it can produce high-risk transition stages, leading to organizational collapse. On the other hand, if the top-down portion becomes too weak, the resultant growth will not lead to the desired system configuration.*
  - *Similarly, if the bottom-up portion of the approach becomes too weak, high-risk transition stages can again result. If the bottom-up portion is too strong, overriding strategic guidance, the risk is that the final system will reflect an updated version of the as-is capability, not growth toward the integration objectives.*

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18

## Manufacturing System Design

- *Computer Integrated Manufacturing*



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19