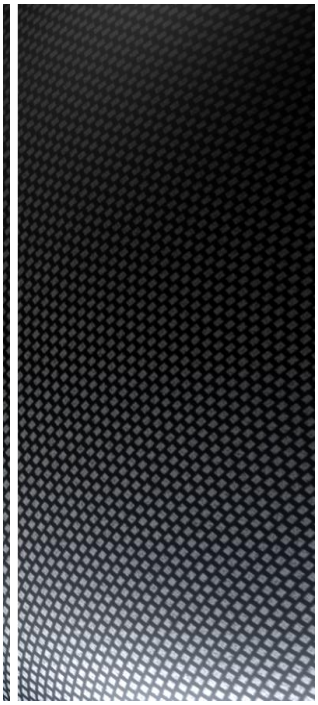


CAD/CAM (21-342)

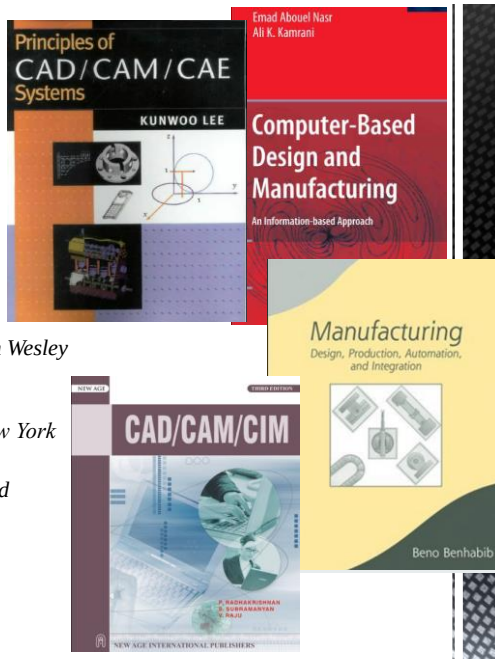
Advanced Manufacturing Laboratory
Department of Industrial Engineering
Sharif University of Technology

Session # 12

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, Addsion 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*

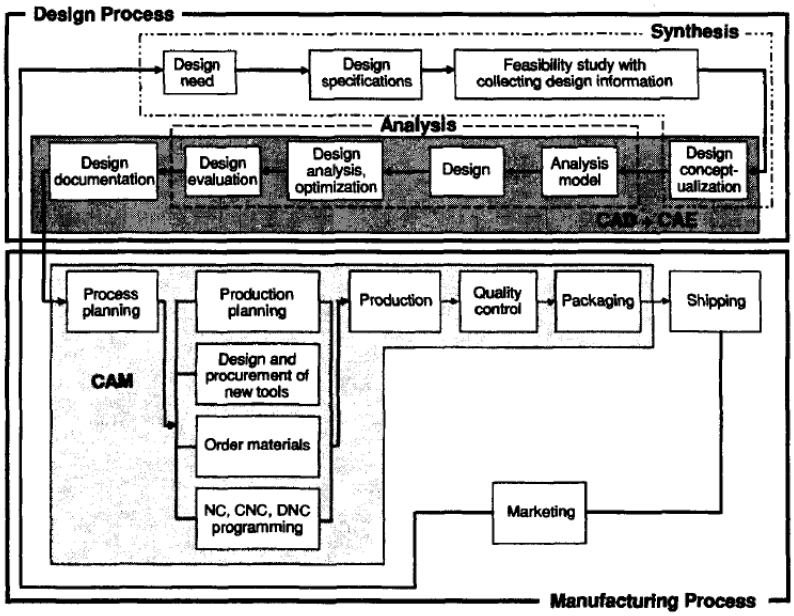
Course Description *(Continued..)*

- *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)*

Course Description *(Continued..)*

- *Contents:*
  - *Rapid prototyping and manufacturing* *(3 sessions)*
    - *RP primitives*
    - *Application of RP*

Introduction to CAD/CAM/CAE systems

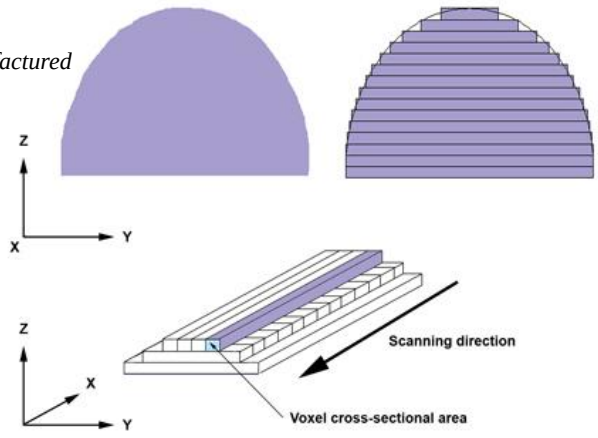


Rapid prototyping and manufacturing

- *RP primitives*
  - *Rapid prototyping' is a group of techniques used to quickly fabricate a scale model of a physical part or assembly using three-dimensional computer aided design (CAD) data.*
  - *Construction of the part or assembly is usually done using 3D printing or "additive layer manufacturing" technology.*
    - *Alternatively, it is also called:*
      - *Layered manufacturing*
      - *3D printing*
      - *Desktop manufacturing*
      - *Solid free form manufacturing*

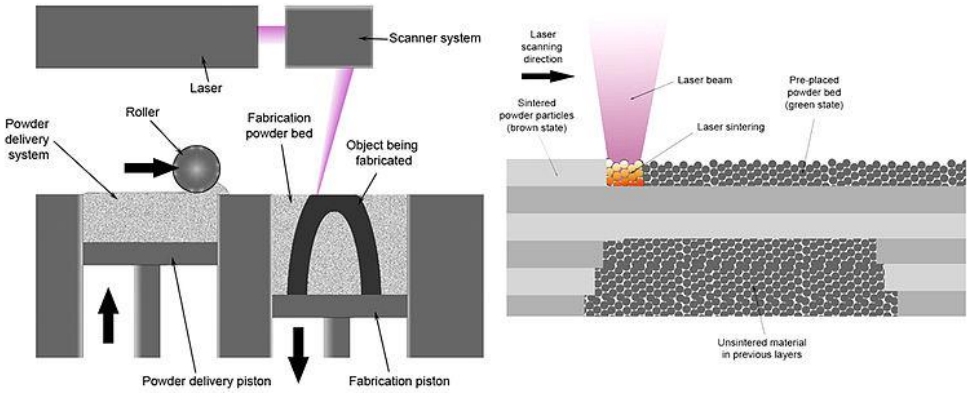
Rapid prototyping and manufacturing

- *RP primitives*
  - *The process of RP is consists of three steps:*
    - *Form the cross sections of the part to be manufactured*
    - *Lay the cross section layer by layer*
    - *Combine the layers*



Rapid prototyping and manufacturing

- *RP*
  - *Selective laser sintering :*



Rapid prototyping and manufacturing

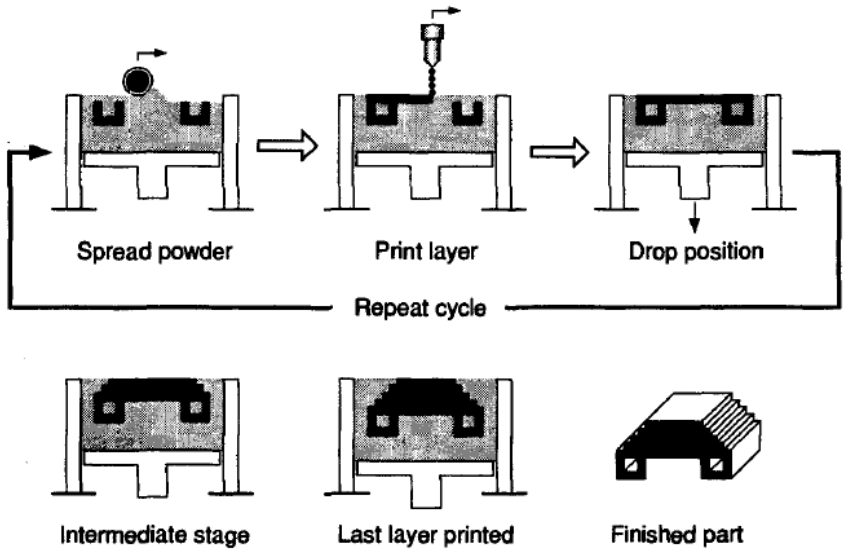
- *RP*
  - *Selective laser sintering :*
    - *Selective laser sintering (SLS) is an additive manufacturing technique used for the low volume production of prototype models and functional components.*
    - *Selective laser sintering uses lasers as its power source to sinter powdered material, binding it together to create a solid structure.*
    - *Compared with other methods of additive manufacturing, SLS can produce parts from a relatively wide range of commercially available powder materials.*
      - *These include polymers such as nylon (neat, glass-filled, or with other fillers) or polystyrene, metals including steel, titanium, alloy mixtures, and composites and green sand*
      - *SLS technology is in wide use around the world due to its ability to easily make very complex geometries directly from digital CAD data.*

Rapid prototyping and manufacturing

- *RP*
  - *Selective laser sintering :*
    - *A support structure is not needed because the voids are filled by the unprocessed powder at each layer*
    - *The integration with the CAD model is achieved well in this method.*

Rapid prototyping and manufacturing

- *RP*
  - *3D printing:*

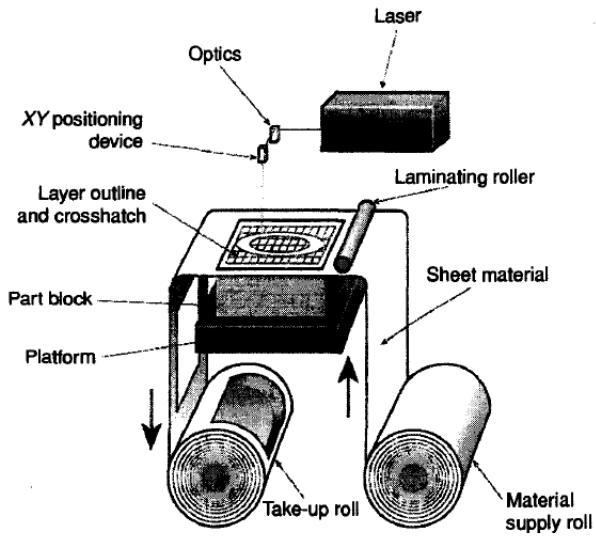


Rapid prototyping and manufacturing

- *RP*
  - *3D printing:*
    - *In 3D printing a liquid binder instead of ink in common printers is ejected.*
    - *The layer of ceramic powder is selectively raster-scanned with a print head that delivers a liquid binder causing the particles to adhere to each other*

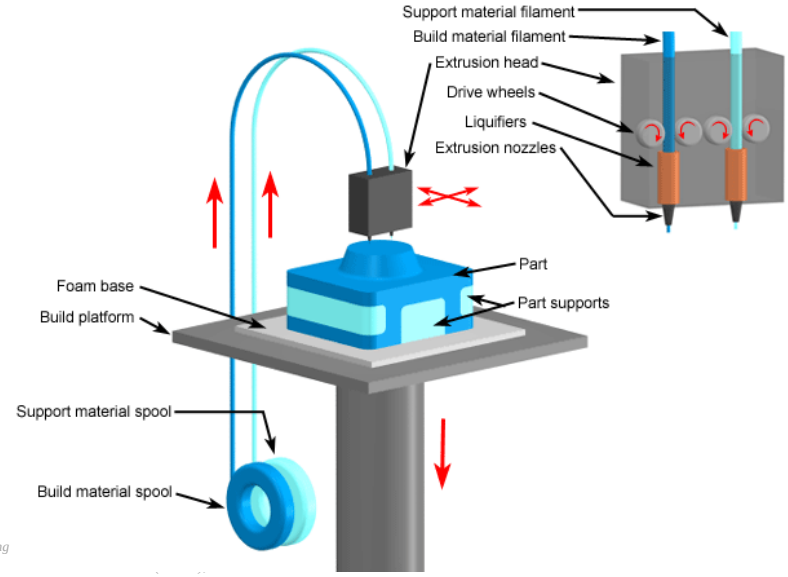
Rapid prototyping and manufacturing

- *RP*
  - *Laminated-Object manufacturing*

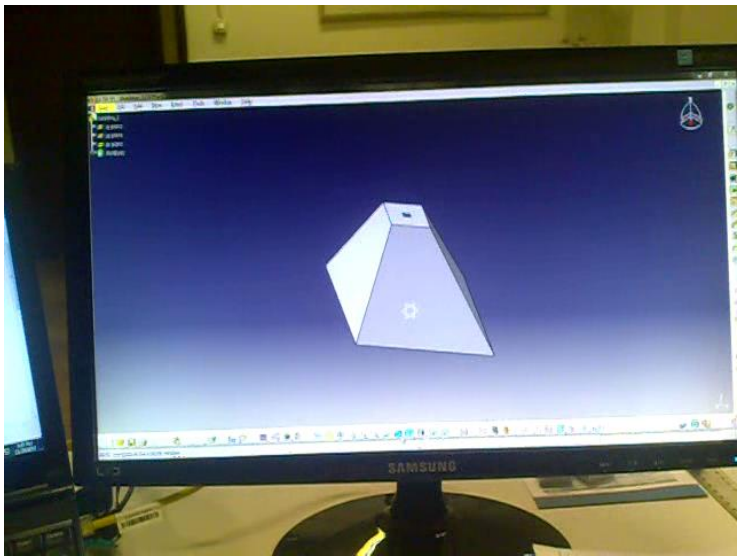


Rapid prototyping and manufacturing

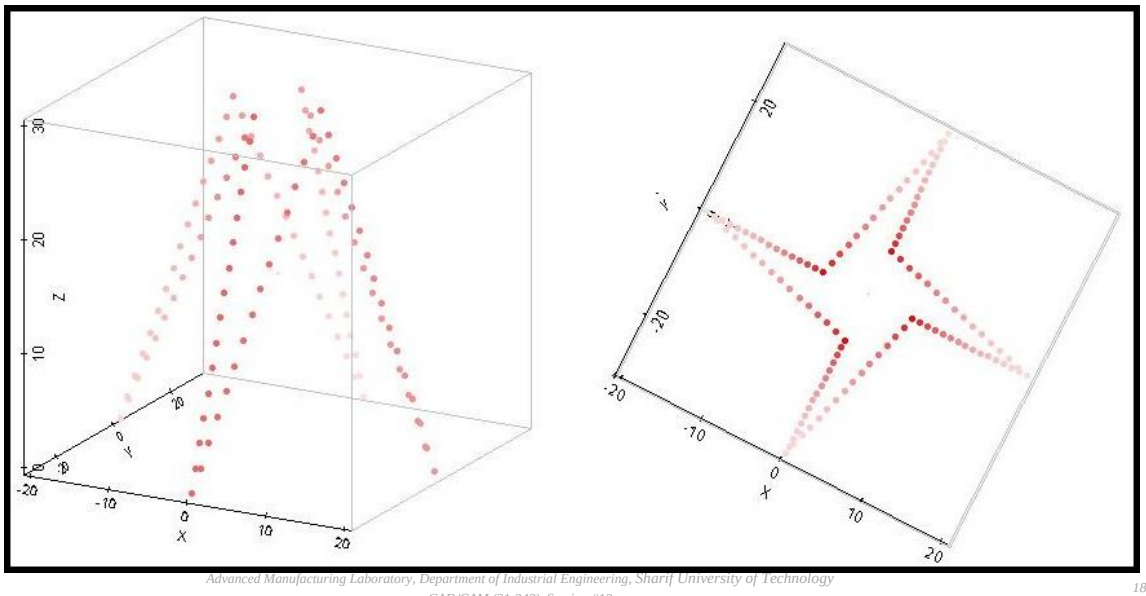
- *RP*
  - *Fused Deposition modeling*



Rapid prototyping and manufacturing



Rapid prototyping and manufacturing



Rapid prototyping and manufacturing