

Digital manufacturing Practice Course outline



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Importance of learning hands on skills:

IIT Kanpur Student Says Engineering Skills Helped Save Man's Life On Flight

Karttikeya Mangalam was travelling from Switzerland to India when the incident happened.

New Delhi: A student from Indian Institute of Technology (IIT) Kanpur says that the engineering knowledge he acquired in college helped him save the life of a man who suffered diabetes-related complications mid-air.

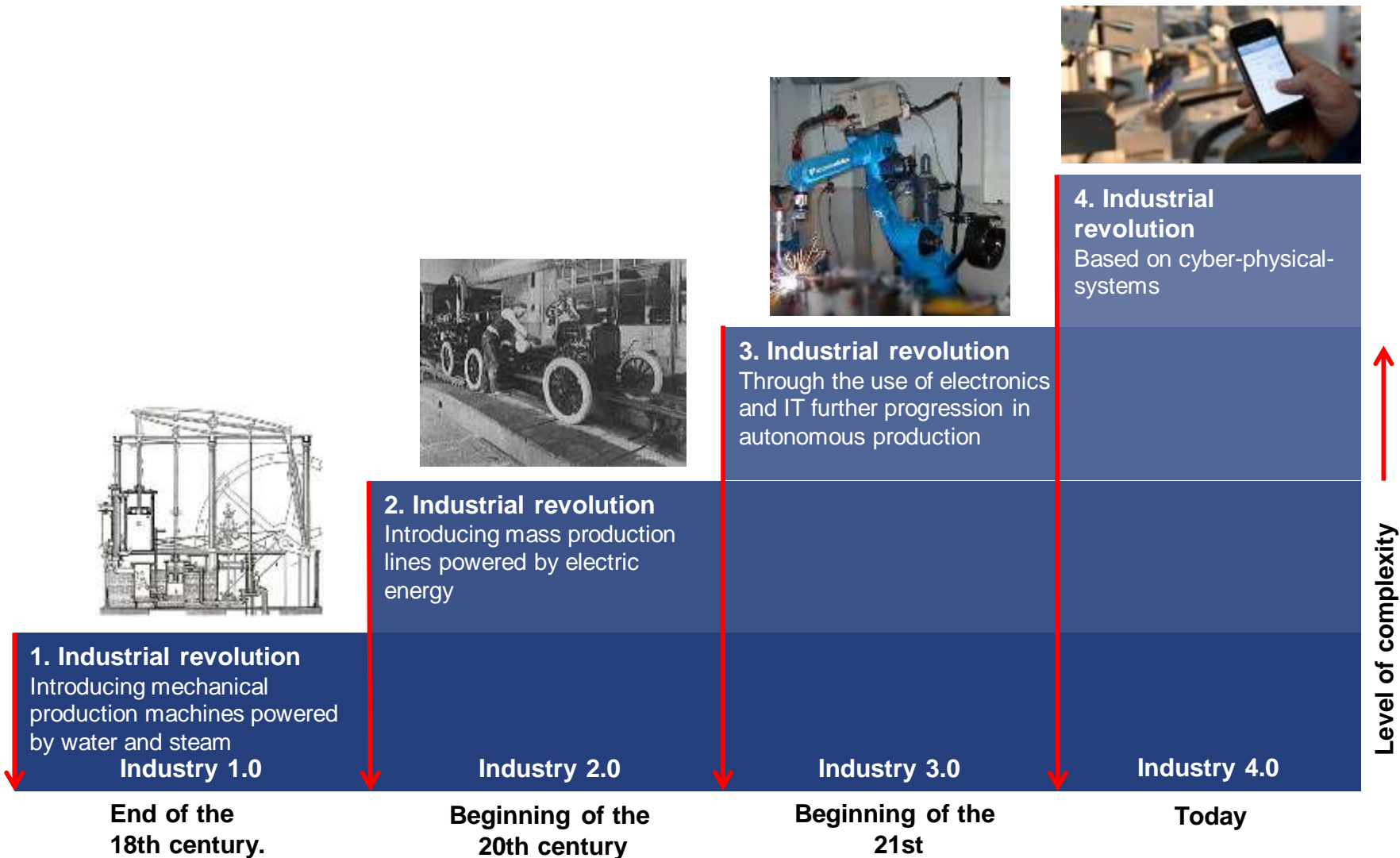
In a write up for IIT-Kanpur's in-house magazine, Karttikeya Mangalam, a final year B. Tech student studying electrical engineering, recollects the incident. The 21-year-old was flying to New Delhi from Geneva via Moscow in February when he realized a man seated two rows behind him needed medical help.

Using the airplane WiFi, **the student found an engineering drawing style diagram of an insulin pen and realized that the doctor's insulin pen was missing a spring.**

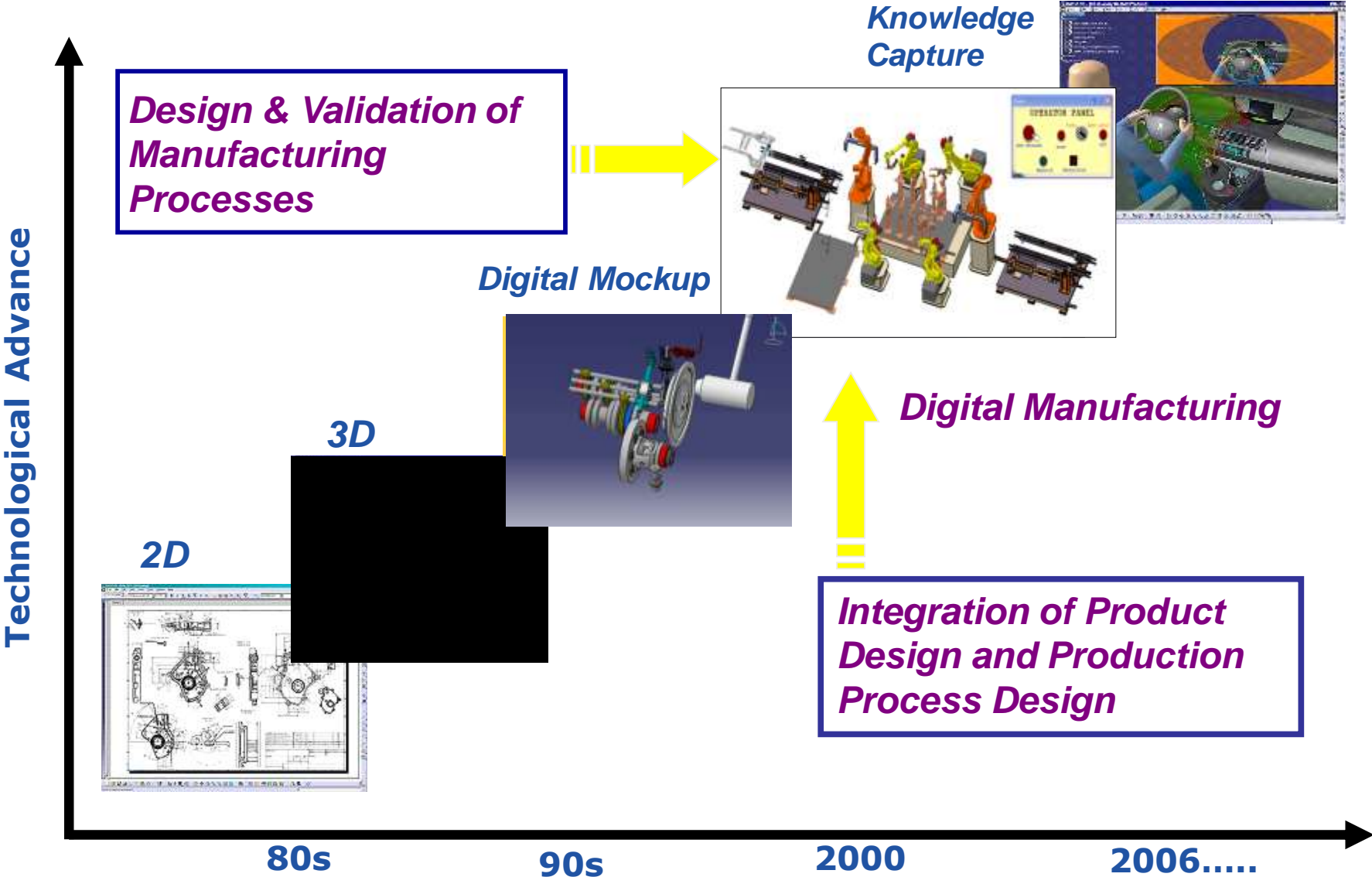


Image posted on Facebook by karttikeya.mangalam

From the first to the fourth industrial revolution



Evolution of the Design/Build Process



Course Syllabus Core Subjects:

- Engineering Materials
- Manufacturing Processes
- 3D Modelling
- Additive Manufacturing (3D Printing)
- Computer-Aided Manufacturing (CAM)
- CNC Programming & Machining

Hands-On Practice sessions on

- 3D Modelling
- 3D Printing
- Conventional & CNC Machining
- Welding and Fabrication
- CNC Wire EDM

3D Printing, Scanning and CAE Facility, IIT Madras

The following have been installed:

1. Stratasys, USA make, Model: J55™ Prime 3D Printer
2. Monotech, Chennai make FDM type printer of printing range 500mmx500mmx500mm
3. Artec Make 3D scanner, Germany, Europe.
4. CAE facility to create 3D models.



J55 printer can print transparent plastics, multi color polymer from soft rubber to hard plastics



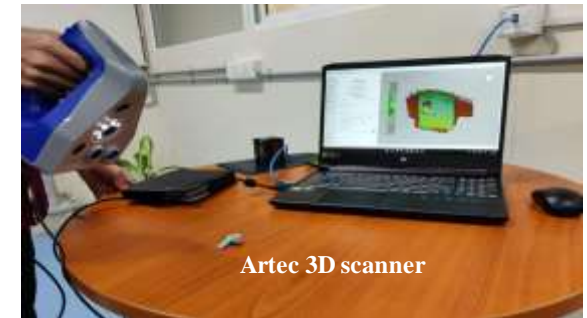
Metaform PRO-500 3D FDM printer.
500mm x 500mm x 500mm



Stratasys J55 3D printer.
Round Print Tray with
up to 1,174cm² Print
Height: 190mm



CAE Facility



Artec 3D scanner



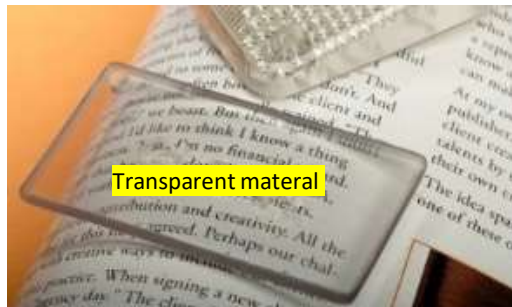
Artec 3D scanner

Samples of 3D Printing

Transparent and colour plastic models by jetting type 3D printer



PLA/ABS PARTS PRINTED by FDM type 3D printer



Understanding of Manufacturing process of a product



CNC Machining of Complicated parts



These parts was made from solid Aluminum blocks and rods using CAM software, 3 axis CNC and gear shaping machines.

Indigenous product development

Design and Development of Wave maker - Asia's largest wave basin at IIT Madras Chennai Campus

National Technology Centre for Ports, Waterways and Coasts (NTCPWC) Project

- Wave basin of size 60mx100m.
- Total number of paddles are 152 nos.
- 19 sets each having 8 paddles.
- The paddle pushes the maximum water depth of 1 m with a maximum stroke of 1m.
- Rack and pinion mechanism based.



Research, Start-up, Product develop & case studies

Caravan in India for a Common man:

Campervan factory is collaborating with Mahindra & Toyota to launch Caravan in India. Pilot prototype is made and it is under trial.



Version 1 Caravan in Mahindra Bolero



Version 2 Caravan in Mahindra Bolero



Bullet Resistant cabins to Indian Army



Repair of Oil & Gas Pipe lines:

The present invention can be applied to any type of damaged pipe scenarios like pitting corrosion, dents, leaking/non leaking defects, T's, bends, damage in coating, wall thinning, etc.

Opportunities based on this training

- R & D organizations
- Automotive Industries such as TVS, Hyundai Motors etc.,
- Start-up companies and product development activities
- Trade tests for technical positions in Educational Institutions
- Heavy and light engineering industries
- Self employment

Outcome of the Course builds skills sets on

- Modelling using commercial 3D modelling software
- Operation of Conventional & CNC Machines
- Operation of 3D printers
- Quality control & inspection
- Basics in Manufacturing, prototyping and product development

Thank you