

# Advanced material processes and die design DSL 732

## Topic 6 CAD

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2<sup>nd</sup> September 2019

# Feedback for project proposal

- Overall you all have done well. You know how to view feedback. Few general comments:
  1. Your assignments could be a part of your project from now on.
  2. If you use someone else's images please give credit.
  3. Please make sure that you show individual mastery of mechanical + electronics based skills if you are a group of two in the project.
  4. Please remember Spiral development. For the next presentation around 2nd week of October, have the first prototype ready. Date for next Project Development for Minor Test 2: October 17<sup>th</sup>?
  5. Please cross-link your project proposal in assignment 2 and project proposal section both. This is the only assignment with this need.

# What is Design Thinking process?

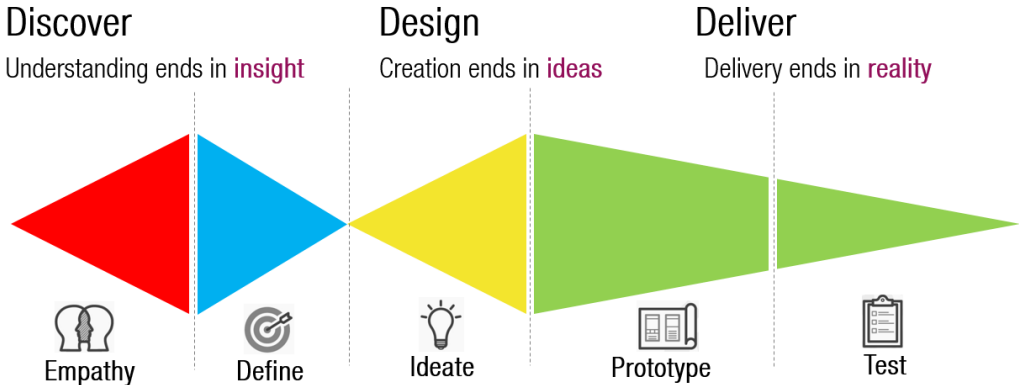


# Design Thinking - Tim Brown, CEO and President of IDEO



1. Divergent thinking (instead of convergent thinking, exploring possibilities)
2. Integrated, Holistic thinking (instead of analytically to one part of the problem). Work to resolve desirability, feasibility, viability.
3. Design is human-centered, meet needs – instead of starting from technology or business.
4. Can apply to any product or system (digital or physical)
5. Prototyping speeds up the innovation process.  
How fast at prototyping?
6. Build movements  
[OpenIDEO: Social Impact Powered By Design Thinking](#)
7. Design is moving from consuming to creating meaningful, participative experiences
8. Creative teams -> collaboration, trust, playfulness
9. Design in every aspect of life.
10. ASKING THE RIGHT QUESTION is important.

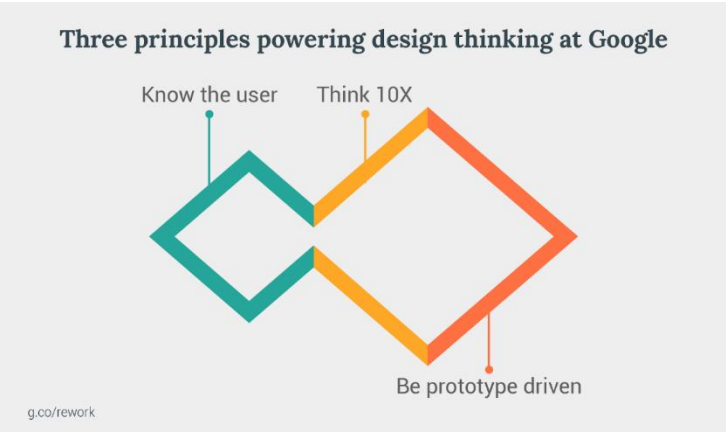
# DESIGN THINKING MODEL



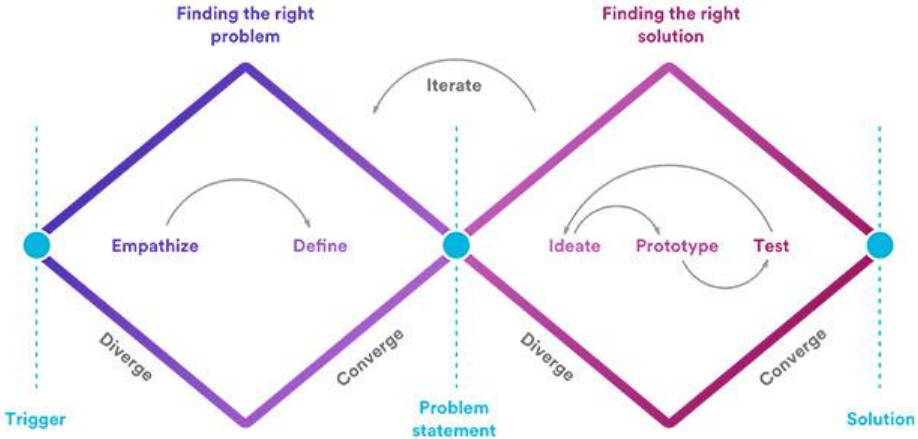
Design Thinking is an iterative and non-linear process in which we seek to understand the user, challenge assumptions, and redefine problems in an attempt to identify alternative strategies and solutions that might not be instantly apparent with our initial level of understanding.

[Image source](#)

[Image source](#)



[Image source](#)



# Idea Generation



Prof Ramesh Raskar, Faculty, MIT Media Lab

# Announcements

- Makerspace: Practice for your assignment on hand and power tools
- Mdes 1<sup>st</sup> year students TA duty for makerspace. Discuss with Jugpreet and divide the hand and power tools amongst you to teach IIT Delhi community.

# Announcements

- Project development till minor test 1: One slide and one video of up to 1 minute on your project page. Video editing with Kdenlive or Adobe Premier Pro or Quik mobile phone app or others. Start developing your project on the project page of your website. [Slide Video](#)
- Date: 5<sup>th</sup> September is the presentation with the link to the slide (jpg image) and youtube video on your final project webpage on the top with the heading of Project Development till Minor Test 1. [Example](#)
- At least the Project proposal expected for 1<sup>st</sup> presentation.
- Have you uploaded your slide and video? Please do so and continue working on it later until your presentation.
- Google doc for Feedback for projects
- Bills for your project.



# Computer Aided Design (CAD)

- Use of computers to aid in the creation, modification, analysis, or optimization of a design.
- [Fab academy Video](#) (17:20 to 22:00 minutes)
- [Vinod Khosla, IIT Delhi alumnus](#) article = AI in CAD
- [Generative Design](#) – the next big thing in CAD
- [Generative Design of Bike Frame](#)
- CAD is a part of PLM where it is used in an integrated manner with CAM with CNC machines, CFD, FEA, Photorealistic rendering and motion simulation, Building simulation – sun path, etc.

# 2D CAD (Vector vs Raster)

- [Vector vs Raster](#)
- [xy plotter](#) = gcode
- Software – GIMP, Adobe Photoshop (Raster)
- Software – Inkscape, Adobe Illustrator (Vector)
- Vector File formats – dxf
- Raster file formats – jpg, bmp
- Tutorial by Vijeyata



# Announcements

- Can you see the comments in the feedback sheet now?
- [Google doc for Feedback for projects](#)

# Announcements

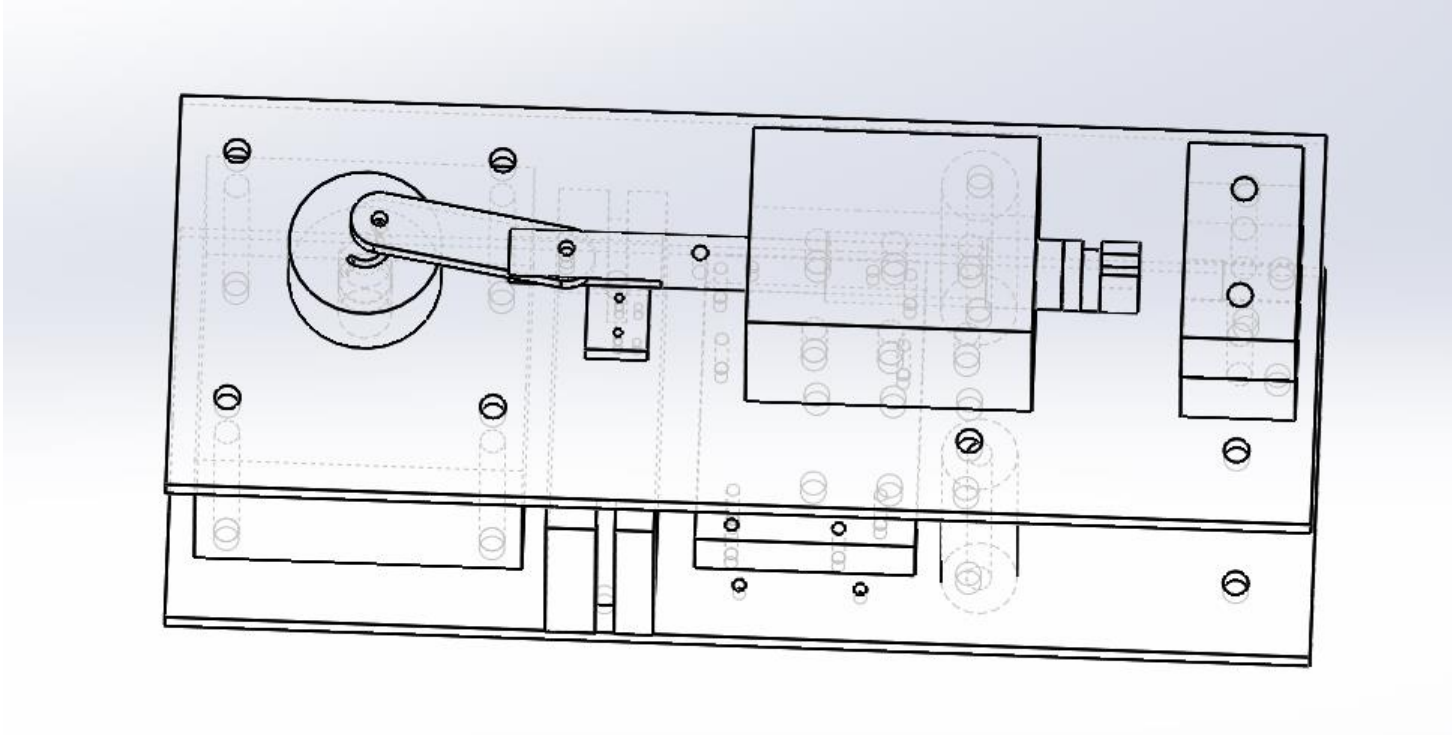
For M.Des. 1<sup>st</sup> year only:

- TAship for makerspace?
- We have to practice next week.
- Start training people the week after that.

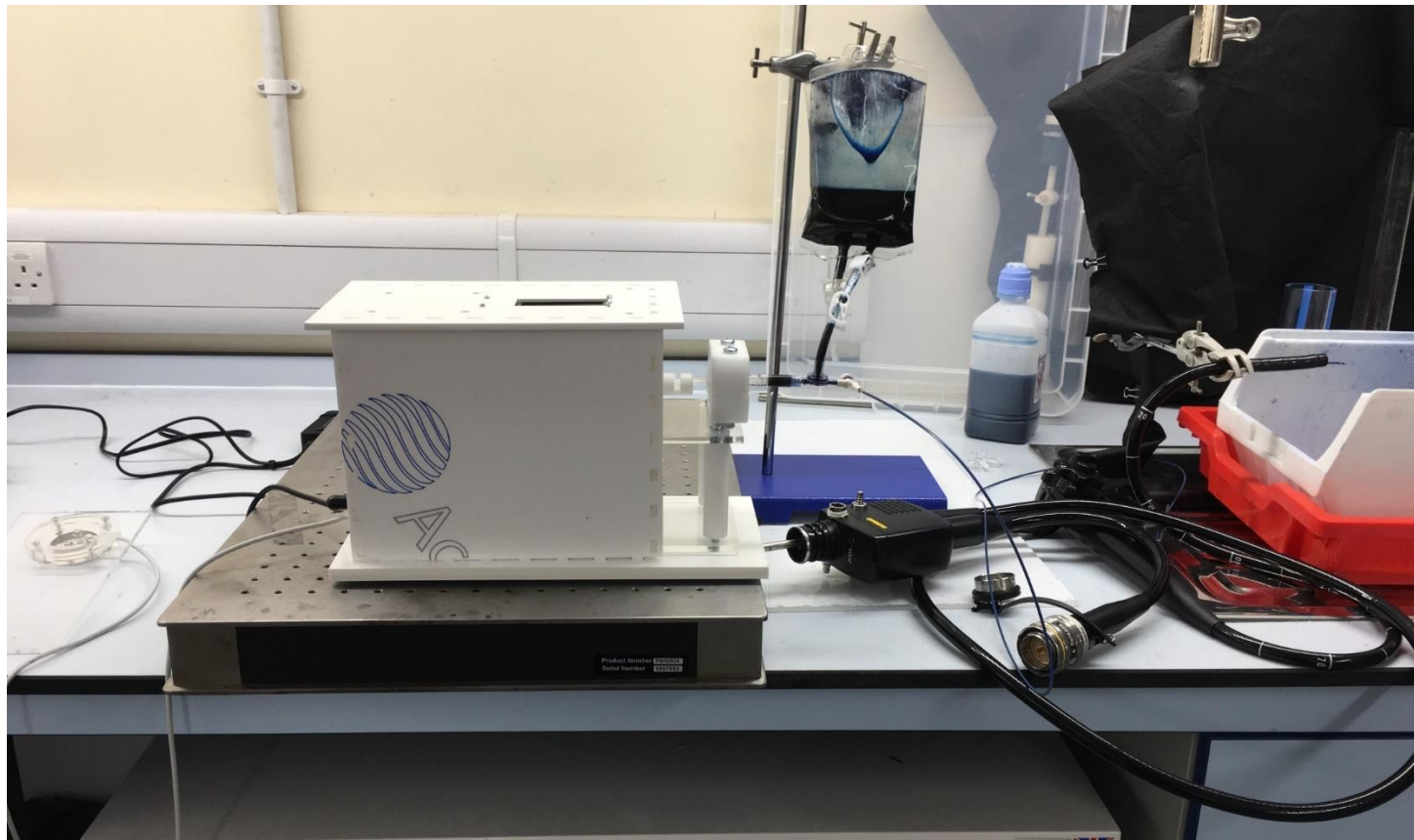
## 2.5D, 3D CAD

- Examples – Medical Device assembly, Solar Decathlon, [other CAD applications](#)
- Software – Fusion 360, Solidworks, Rhino + Grasshopper, Sketchup
- File formats – stl (for our CNC machines)
- Tutorial by Priyanka

# ChromoSpray CAD model (Solidworks)



# ChromoSpray (Laser cut and pressfit)



# Assignment 6 (CAD)

- With 2D CAD (Vector, Raster) and 3D CAD Software:
  - 1) Demonstrate and describe processes used in modelling
  - 2) Model parts (preferably related to your project)
  - 3) Show this with words/images/screenshots
  - 4) Include your original design files
- Use any of the vector/raster 2D, 3D CAD modeling software
- Extra credit: Show the process through an example about other possibilities with CAD. Example - parametric modeling in 3D CAD, Simulation/Game Engines, CFD, FEA, Building simulation, Urban Scale simulation, etc.