



Gujarat Technological University

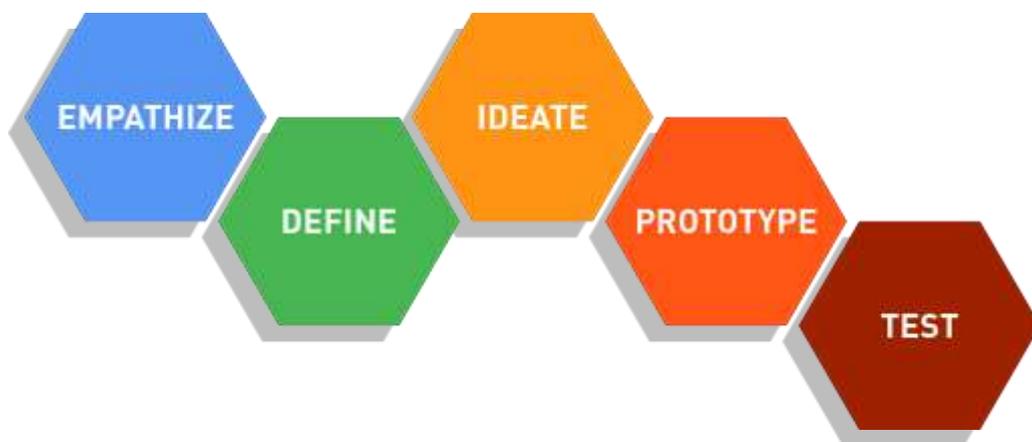
Centre for Industrial Design
(OPEN DESIGN SCHOOL)

A Combined report on-

Faculty Development Program (37th – 39th FDP)

DESIGN ENGINEERING

(Journey started From February 2012and it's continue.....)



Date: 20th August – 23rd August 2016 (37th FDP)
31st August – 3rd September 2016 (38th FDP)
2nd October – 5th October 2016 (39th FDP)

Time: 10:00 am to 05:00 pm

Venue: Room no. 131, 2nd Floor, ACPC building,
GTU Innovation Council,
L.D. Engineering College, Ahmedabad.

B – 0 GTU campus,
Visat Gandhinagar Highway,
Chandkheda, Ahmedabad

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Development of Design Based Learning:

On 2nd February 2012 (The first cohort of 4-year degree engineering students graduated out in May 2012), GTU started the process of updating its syllabi. It was decided to develop a design-based learning system. GTU has introduced courses of Design Spine in academic year 2014-15 from 3rd semester namely “**Design Engineering**”. Design Engineering is very unique and pioneering initiation in Engineering Education by GTU which is based on globally accepted and implemented “Design Thinking” methodology by designers and engineers.

GTU’s Centre for Industrial Design (OPEN DESIGN SCHOOL) is engaged in introducing design driven innovation at GTU. GTU’s Centre for Industrial Design – OPEN DESIGN SCHOOL has taken up the huge and remarkable challenge to leverage and implement this course in all affiliated engineering colleges of GTU. Since April 2013, GTU’s Centre for Industrial Design (OPEN DESIGN SCHOOL) has conducted a series of seminars/workshops/ FDPs to sensitize the design driven innovation intervention. It has also created a framework for the final year projects. Centre for Industrial Design – OPEN DESIGN SCHOOL has successfully completed two years of this course in which 36 Faculty Development Program (FDP) have been organized for 3rd, 4th and 5th semester with training of more than 2200 faculty members from around 120 Engineering colleges across the states from more than 15 branches.

Now, in this 6th semester also, the Centre has organized more FDPs for Faculty Members for Design Thinking as the goal is to train all nearly about 17,000 faculty members of GTU affiliating colleges. Centre has organized FDPs with new hands-on exercises, presentations, examples and techniques of Design Thinking. In these four FDPs, 228 faculty members participated actively. But this time, we observed that 76 faculty members had come for their second FDP. Hence we did advance level workshop with all those 76 faculty members with new tools and techniques for higher level learning. We completed these FDPs in two different mode; (1) Basic Level & (2) Advanced Level. This report will cover both the working and the advanced level workshop details.

At the Advanced level, the participants applied their learning while preparing case studies and learned more tools for the different phases of Design Thinking.

Workshop Program

Day 1:

Session 1 - **Welcome & Orientation session** – Introduction to Design Engineering Course

Session 2 – **Introduction** – What is Design Thinking? Its importance, socio-economic relevance

Session 3 – **Learning Tools to better Learn Design Thinking** – Bio Mimicry, Analogy, Gestalt Model and Heuristic Approach – All with examples

Session 4 – **Hands on Exercises** – Team Building and Log book

Day 2:

Session 5 - **Empathy** – Observation techniques & Field work

Session 6 – **Field Visit** – To gather observation data

Session 7 – **Summarization of Data** - Analysis of Data gathered during Observations

Session 8 – **Empathy Mapping** – Canvas Preparation

Day 3:

Session 9 – **Ideation** – Brainstorming techniques to Innovation

Session 10 – **Ideation Canvas** – Canvas Preparation

Session 11 – **Product Development** – Form, Function, Features

Session 12 – **Product Development Canvas** – Canvas Preparation

Day 4:

Session 13 – **Reverse Engineering** – Selection of Branch specific artefact/component/product

Session 14 – **Disassembly & Identify Technical aspects**

Session 15 – **Contents of 5th Semester**

Session 16 – **Contents of 6th Semester**

In advance workshop, all the above session was there with inclusion of some more tools and techniques related to Design Thinking for higher level learning with aim of refinement in prior learning. Please scroll down to end of this report for advance level FDP details.

Day 1:

On the very first day, after registration, The FDP sessions have started by Design team and given the information of Design Engineering syllabus in orientation session by the mentor, *Mr. Karmjitsinh Bihola, Assistant Professor (Centre for Industrial Design – OPEN DESIGN SCHOOL)*. He explained the basic guidelines and flow of Design Engineering from 3rd semester to 6th semester.

After the orientation session, the introduction of Design Thinking Methodology, with main objective of the University to introduce the Design Engineering subject, was presented by *Chief Mentor, Mr. Karmjitsinh Bihola, Assistant Professor (Centre for Industrial Design – OPEN DESIGN SCHOOL)*. One of the key objectives of this initiation is to infuse the Design Thinking mind-set into engineers of future with importing the methodology into the core subjects also. Design Thinking approach was introduced with different examples and visuals. He explained how so many innovations have been carried out in the world by following the Design Thinking process. **Design Thinking is Human Centered process with lots of iterative cycles to reach the final solution for satisfying User's Unmet Needs.**

After explaining the methodology in detail, *Mr. Karmjitsinh Bihola* started explaining Learning Tools which are introduced to help the faculty members and students to better understand the Design Thinking approach – tools like Bio Mimicry, System Approach, Analogy, Gestalt Model and Heuristic Approach were explained with examples and case studies. In the post lunch session, importance of Team Building and Logbook were explained with hands-on exercises. Then, Observation phase was described through AEIOU technique with the help of a Case Study in the last session for the day.

Day 2:

On the 2nd day, a discussion about the experience of the first day was begun and queries of the Faculty Members were solved by the Design Team. After discussion, all the teams were sent for observation in the vicinity of LD Engineering College. They were informed on how to and what to observe- with lots of notes, photographs, videos, interviews and so on.

After returning from field observation, all teams were guided for Mind Mapping – A graphical visualization technique by *Mentor, Karmjitsinh Bihola*. Mind Mapping is the visual representation technique that includes a central idea surrounded by connected branches of associated topics to better organize the messy and unorganized data. It helps to better organize, understand, communicate and recall the topics.

Then Empathy Mapping Canvas was explained by the mentor; Empathy Map helps to understand and identify the emotional and unmet needs of user. *Observation and Empathy process is the foundation of any Design Thinking project and one must spend enough amount of time for this phase by doing observation and interaction again and again.*

Then, each team worked on preparation of AEIOU framework, Mind Map and Empathy Map with their observation data of selected domain with use of canvas, colorful sticky notes, sketch pens and other crafty materials. Every Faculty Member visualized him/herself as a student/learner and started learning the new approach of Design Engineering. Mentors guided the teams personally for filling their canvases and cleared the doubts. After completing the canvas activity, all the teams presented their observation and empathization work to experts and other groups and also received the comments.

During the break time, the Faculty Members got energized through networking with each other and discussed common ground level issues faced by them at their institute to further discuss them with Design Team and experts.

Day 3:

Again, the 3rd day was started with common discussion about the experience of the second day and queries of the Faculty Members were solved by the mentors. Then Ideation Canvas was explained by the *mentor, Karmjitsinh Bihola* with the help of a presentation. Ideation is the idea generation activity with lots of innovative and creative ideas for the given problem statement. After getting lots of ideas, as per the User needs, all possible ideas need to be combined and refined for better solution as Design Thinking is convergent and divergent process in nature. The Mentor explained how things can be connected to get a better idea. In ideation stage one should not worry about the feasibility of their ideas, one should appreciate wild and vague ideas.

Then, the Faculty Members started working on their Ideation Canvas. The Ideation canvas comprises of people, activities for observed domain, variation of activities related to Situation/Context/Location and Props. All activities need to vary with different situation (What/Which), context (Why) and location (Where) which may be relevant or irrelevant to the selected domain. In the same way random props/tools/products/equipment/technology shall be listed down. The problem statement may be completely changed or refined at the end of the Ideation activity as the whole of the Design Thinking process is iterative in nature. The beauty of a systematic study of Design Thinking is that it breaks all old customs and barriers of identifying and solving problems.

Then Product Development Canvas was explained with a small hands-on in form of game in which participants need to give ideas on “Design for a Futuristic Product”. Every one enthusiastically participated in the game and gave excellent ideas for the same. PD canvas comprises the purpose of the project, the User Experience, Product Function, Feature and components of the solution. After completing this canvas, the designers need to verify their ideas (which they have noted down on the PD canvas) with the actual user and modify their concept. Now the iterative process starts again till user needs are met.

Day 4:

After getting basic introduction of Design Thinking Methodology, its tools & techniques and hands on exercises, the 4th day was introduced with the engineering aspects of Reverse Engineering and Prototyping. In the first half, the design team explained the Reverse Engineering (RE) with the useful tool called “SCAMPER” (SCAMPER is acronym of Substitute, Combine, Adapt, Modify/Magnify/Maximise/Minify, Put to other use, Eliminate and Revise/Reverse) and small hands on exercise to better understand the topic. SCAMPER tool can also be used for ideation when one is not able to move forward and is struck with the ideas or problem. We in GTU want to use it for RE. Then the Learning Needs Matrix (LNM) was explained; Learning Needs Matrix will help students identify the learning requirements at an early stage along with prioritization of specific learning along with defined time duration/ time allocation for each learning priority. In LNM, mainly out of syllabus topics will be listed out and each topic will be learnt by each team member in order to complete the project. It will also help students to learn Skillsets required by the industry after they graduate out.

In the second half, Prototyping techniques were explained by the experts Mr. Rohit Swarup, Mr. Amar Gargesh (Innovation & Research Foundation - Futurz Xplored, Ahmedabad) and Karmjitsinh Bihola in details. They discussed how sequential prototype will help to refine the projects as per the user needs. Prototyping could be in any form like paper model, specific material model, wire mesh, clay model, drama-act, working model, drawings, software model (modeling). They said that for the project of ATM machine design, one person acts as the ATM machine, when some button is pressed, he answers the way ATM machine perform to see how their final product will work.

In the valedictory session, all teams talked about their problem statement and unique features of their solution. Experts gave very important suggestions for each design project and concluded the workshop with their expert comments. Then certificates were awarded to all participants for their efforts and active participation in these 4 days FDP of Design

Engineering. All Faculty Members promised to organize similar FDPs at their institute for awareness of Design Engineering among their colleagues and students.

The above part of the report describes the Basic level FDP for those who came for the first time and don't know anything about Design Thinking and who wants to acquainted themselves with Design Thinking Methodology.

Advance Level FDP:

This workshop was mentored and conducted by Mr. Rohit Swarup & Mr. Amar Gargesh from Innovation & Research Foundation (Futurz Xplored), Ahmedabad. In advance level FDP, whole Design Thinking process that they learnt in previous FDPs was repeated with aiming to learn new tools and techniques. If these tools and techniques were used for different phases of Design Thinking Process, it leads to a deeper learning. The tools like Ethnographic study for observation & documentation; Understanding gaps and providing support for gap areas; Research & Analysis tools; Visualization & Interview Techniques; Lotus Blossom with Mind Mapping; Graphic organizers for knowledge management; Visualization Assignment for observation, problem solving and decision making; SCAMPER; etc. were introduced and practiced. They documented the learning process and written in the form of a case study for reference work. If these are made available by the Faculty Members, we shall upload it to the GTU website.

From next Academic Year, GTU Design Team is planning to organize the FDP sessions in different level (from Basic to Advance), so that every time faculty members will get new learning's and refine their previously learnt and practiced part. Design team is inviting suggestion and inputs from all stakeholders for the development of level wise FDP sessions. Also, we would appreciate your efforts to find out other tools and techniques related to Design thinking widely available on internet, please try to find out the tools and techniques and experiment it with your students' project, so better guidelines and contents for this subject shall be prepared for betterment of the students.

Photo Gallery: 37th FDP



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Photo Gallery: 38th FDP



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Photo Gallery: 39th FDP



Report Compiled by: Design Engineering Team