The stream of Design Engineering has been consistently attracting bright students, and is one of the most popular M.Tech programs of the Institute among the students as well as industries. Product design is becoming increasingly interdisciplinary, often requiring the knowledge of electronics, instrumentation etc. in addition to solid mechanics, fluid mechanics and material science. Students take a wide range of specialized elective courses which enable them to successfully design and develop products.

KEY COURSES OF THE STREAM

- Product Design & Feasibility
- Advanced Solid Mechanics
- Fracture Mechanics
- Properties & Selection of Materials
- Finite Element Methods
- Product Reliability & Maintenance
- Continuum Mechanics
- Advanced Fluid Mechanics
- Advanced Dynamics
- Design Optimization
- CAD
- CFD

SOME OF THE ON-GOING PROJECTS BY M. TECH. STUDENTS

A. Simulations based on commercial FEA, CFD and other packages

- Design for low and high velocity impact of composites.
- Reliability assessment of lightweight composite armours.
- CFD analysis of aircraft carriers.
- Design optimization of groundnut harvester.

B. Simulations with self-written codes & verification by FEA packages

- Design of an airship platform for search & rescue mission.
- Optimization of processing parameters for porous shape memory fibre networks.
- Fatigue creep interaction analysis through continuum damage mechanics.
- Shock response spectrum analysis and design of frames.

C. Experimental & Fabrication related projects

- Design of polymeric seal, testing setup for DIC measurements.
- Design of experiments and fixtures for testing composite material of bullet proof jacket.
- Design, fabrication of impact head cushion.
- Design, fabrication and calibration of soft robotic actuator.

DESIGN ORIENTED COURSES

<table>
<thead>
<tr>
<th>Design Optimization</th>
<th>Product Design &amp; Feasibility</th>
<th>Finite Element Methods</th>
<th>Product Reliability</th>
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</thead>
<tbody>
<tr>
<td>This course focuses on optimizing an objective function involving multiple variables and constraints.</td>
<td>This course aims at developing a product which has utility in society or industrial application.</td>
<td>This course focuses on formulation of finite element model.</td>
<td>The main objectives of this course are</td>
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<tr>
<td>It focuses on formulating objective functions of product that have been developed as part of product design course.</td>
<td>Need analysis and targeting a problem keeping in focus the end user.</td>
<td>Writing own finite element code in MATLAB.</td>
<td>To understand the probabilistic and reliability analysis techniques.</td>
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<td>Optimizing objective functions for various constraints.</td>
<td>Developing alternate designs in CAD modelling softwares such as CATIA, SOLIDWORKS, CREO.</td>
<td>Automated pre- &amp; post-processing.</td>
<td>To understand the importance of quantifying the risk involved in any practical problem.</td>
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<td>Fabrication &amp; Testing.</td>
<td></td>
<td>Comparing FEM results with analytical results.</td>
<td>To facilitate the decision of most sensitive design parameter which considerably affects the risk involved in the problem.</td>
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