



DEPARTMENT OF MECHANICAL ENGINEERING

RESEARCH FACILITY

Centre for Engineering Design and Analysis Research (CEDA)

Objective

The main objective of this cell is to foster knowledge based interaction between our Institute and Industry by conducting various programs. These programs will act as a knowledge sharing platform between the Industry and Institution. Through this Interaction cell, we arrange various programs like guest lecturers, visiting faculty arrangement and research projects in various fields of mechanical engineering.

Regularly we conduct design related CAD courses for our students with ALTEM Technologies for CATIA, and SIMTEK for Master CAM & SOLIDWORKS, CADD Centre for NxCAD/NxCAM, AutoCAD, Pro-E/Cero, ANSYS, We also give collaborative training program with GIWI International for Non Destructive Testing and Welding Technology. To improve the knowledge on numerical based solution for engineering problems, we have been organizing short term course on numerical based CAD tools of ANSYS - CFD, Structural Analysis, and CESAR-Piping software.

Research Activities

- Design and analysis of prosthetic leg using composite material
- Investigation on mechanical behavior analysis of tooth implant using
- Functionally graded material
- Residual stress analysis of functionally graded material using FEA
- Design and analysis of topologically optimized micro cantilever beam
- Experimental analysis on pin fin to improve the effectiveness of cooling
- Using various geometrical profiles by FEA
- Image Enhancement through Contrast Improvement in Image Using MATLAB.
- Mechanical behavior analysis of composite leaf spring for small truck using FEA.

- Programmable Logic Control of Soot Blowers In The Recovery Boilers
- Investigation on Tribological behavior of femur head using finite element analysis

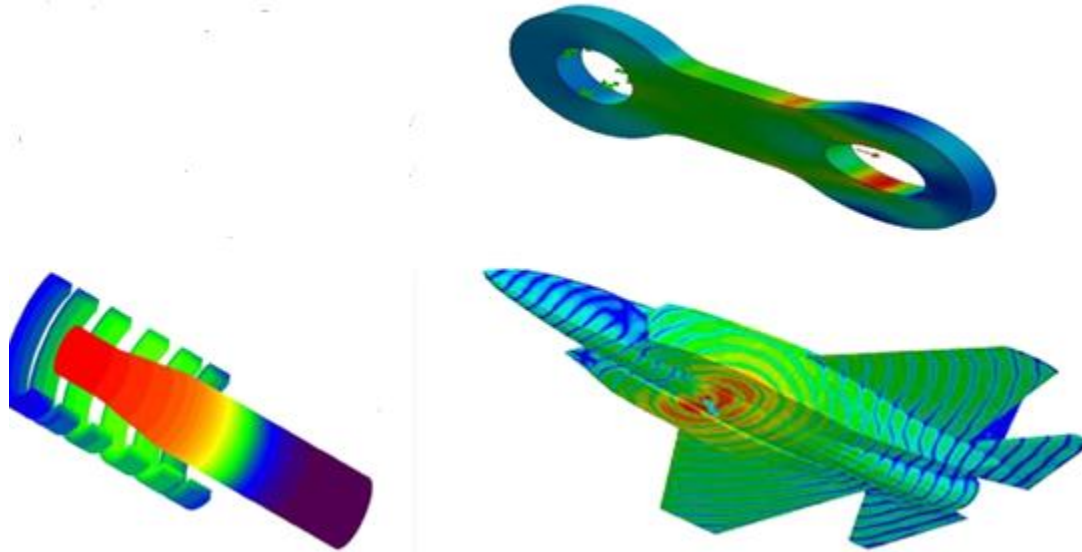


Figure1: 3D Cross Sectional



Figure1: Laboratory Facility View



Centre for Materials and Joining Research (CMJR)

Objective

Development of new Metal Matrix Composites, Polymer Matrix Composites for specific applications. Development of nano Composite Materials for bio medical applications. Development of Welding processes for improving Joining Characteristics. Optimization and selection of Welding parameters for specific application.

Research Activities

- Experimental investigation of mechanical properties and tribological behavior of FRP composites.
- Structural analysis of hybrid natural fiber reinforced polymer matrix composite (Roselle, Sisal and Pine apple).
- Mechanical property evaluation of Neem leaf and Coconut leaf with latex resin polymer matrix hybrid composite material.
- Fabrication of AMMC by using stir casting method for hand lever application.
- Synthesis and characterization of metal matrix composites using high energy ball milling technique.
- Fabrication and analysis of water hyacinth fiber with epoxy Resin composite.
- Investigation of passive Damping capability of Natural fiber reinforced composite and visco elastic sandwich structure.
- Experimental investigation of thermal properties of hybrid natural fiber polymer matrix composite (Roselle fiber, sisal fiber and pine apple fiber).
- Fabrication and characterization of Aluminium-Fly ash composite using stir casting method.

Stir casting Machine

Operating Voltage	: 400/440V, 3-Phase and AC 50 Hz
Capacity	: 2 Kg
Retort	: Stainless steel AISI 310
Dimension of Retort	: 100 mm x 300 mm (ID x Depth)
Maximum Temperature	: 900 °C
Pouring	: Motorized – Automatic
Skin Temperature	: Up to 75 °C



Figure 1: Stir Casting Machine

Load Range	: Up to 200 N
Rotational Speed	: Up to 2000 rpm
Frictional Force	: Up to 200 N
Compound wear	: Up to 1200 μ m
Wear Disc	: 165 mm Dia x 8 mm Thick
Ball Size	: Diameter 10 mm
Pin Size	: Φ 3, 4, 6, 8, 10 and 12 mm
Pin Length	: 32 mm



Figure 2: Pin on Disc Wear Tester

Metallurgical Analysis

Metallurgical microscope with computer image capturing system.

- ✓ Image Analyzing software
- ✓ Binocular Metallurgical microscope
- ✓ Rockwell and Brinell hardness tester
- ✓ Heat treatment furnace
- ✓ Vacuum molding machine



Figure 3: Metallurgical Microscope with Computer Image Capturing System

Centre for Thermal and Energy Research (CTER)

Objective

The research is concerned with questions related to industrial applications of thermodynamics, fluid mechanics and heat and mass transport. Using a combined approach of theoretical analysis, numerical calculations and experimental investigations, the centre aims to develop new or advanced knowledge for application in industrial design. Priority is given to the efficient use of energy and the minimization of environmental pollution.

Research Activities

- Performance improvement of Solar PVT system
- Performance enhancement of Solar Collector
- Effective heat exchange mechanism for cross flow heat exchanger
- Experimental investigation of CHF enhancement in Boiling
- Emission analysis of Pongamia Biodiesel in CI engine with Variable Compression Ratio
- Designing an efficient heat exchanger used for PCM based TES in heating and cooling buildings
- Biodiesel Blend, fuel properties and its emission characteristics sterculiafoetida oil in diesel engine
- Emission reduction and Performance enhancement on Internal Combustion engine
- Investigation on Heat Exchanger using Twisted tapes, Baffles and Dimples with Different Flow Pattern

Single Cylinder Multi-fuel variable Compression ratio computerized IC Engine research test setup

Engine	:	Stroke 110 mm, Bore 87.5 mm, Capacity 661 CC
Diesel Mode	:	Power 3.5 kW, Speed 1500 RPM, CR Range 12:1 -18:1, Injection Variation 0-25 Deg BTDC
ECU petrol Mode	:	Power 4.5 kW, Speed 1800 RPM, Speed range 1200-1800 RPM, CR range 6:1-10:1
Dynamometer	:	Eddy Current, water Cooled and with Loading Unit
Software	:	Engine soft, pe Monitor, pe Viewer



Figure 1: Single Cylinder Multi-fuel variable Compression ratio computerized IC Engine Research test setup

AVL Exhaust Gas Analyzer

Operating Voltage	:	100-300V AC, 50-60Hz, 11-22V DC
Power Consumption	:	Max.25 W
Measurement data	:	CO, HC, CO ₂ , O ₂ , NO _x

AVL Smoke Meter

Measurement length : 430 mm + or – 5 mm
Operating Voltage : 220V, 50Hz, 11.5 -36 V DC
Measurement Data : Opacity, Absorption (K value)



Solar PV, PVT Testing setup

Solar Panel : 200 W x 5 Nos, 100 W x 2 Nos, 30 Wx 2 Nos
Indoor Setup : 500 W Halogen Lamp X 12 Nos.
Solar Power meter : EQUINOX TM-207
Infrared Thermometer : MT- 4 Thermocouples