

Lab Infrastructure and Research Facilities

INFRASTRUCTURE FACILITIES



Well-equipped



Innovation-driven



Research-focused



Student-centric



Future-ready

AMPHENOL LAB FOR ADVANCED COMPUTING & ANALYSIS

HIGH PERFORMANCE COMPUTING. DEEPER INSIGHTS.
SMARTER ENGINEERING.

A state-of-the-art computing facility powered by high-spec systems and advanced software to enable simulation, data analysis, modeling and intelligent design for next-generation engineering solutions.



HIGH-SPEC COMPUTING

Latest generation workstations with high performance processors & GPUs.



ADVANCED SOFTWARE SUITE

Industry-leading tools for simulation, modeling, data analytics and optimization.



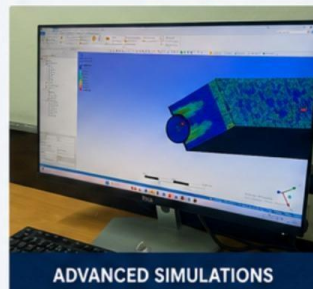
LARGE SCALE ANALYSIS

Handle complex computations, big data sets and multi-physics simulations.



SECURE & RELIABLE

Enterprise-grade network, data security and uninterrupted computing environment.



ADVANCED SIMULATIONS

Perform structural, thermal, fluid, electromagnetic and multi-physics simulations with accuracy.



DATA ANALYTICS

Analyze large datasets, visualize results and extract meaningful insights.



POWERFUL INFRASTRUCTURE

High-end workstations, GPUs, ample storage and high speed connectivity.

WHAT YOU CAN ACHIEVE



Complex Modeling & Simulation

Solve real-world engineering problems with precision.



Performance Evaluation

Assess, compare and optimize system behavior.



Machine Learning & AI Applications

Apply AI/ML techniques for intelligent engineering.



Research & Innovation

Support advanced projects, publications and innovation.



Industry Relevant Skills

Work with industry standard tools and real-world data.



Future Ready Engineers

Build capability to tackle tomorrow's challenges.

CAD | CAM | CAE COMPUTER LAB

DESIGN. ANALYZE. SIMULATE. MANUFACTURE.

Engineering ideas into real-world solutions.

Our state-of-the-art CAD CAM CAE lab empowers M.Tech students with industry-standard tools and high-performance systems to innovate, validate and bring their ideas to life.



Industry Standard Software

Autodesk, Ansys, Siemens & more



High Performance Systems

For complex modeling & simulations



End-to-End Engineering

From 3D modeling to manufacturing



Learn. Practice. Innovate.

Hands-on experience with real projects



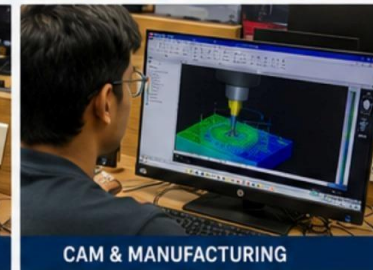
CAD DESIGN

3D Modeling, Assembly & Drafting for innovative product development.



CAE SIMULATION

Structural, Thermal, Fluid & Multiphysics analysis for performance validation.



CAM & MANUFACTURING

NC Programming, Toolpath Generation & Manufacturing Process Planning.

WHAT YOU GET



3D CAD Modeling & Assembly



Engineering Drawing & GD&T



Simulation & Performance Analysis



CAM Programming & Process Planning



Rapid Prototyping & Additive Manufacturing



Industry Projects & Research Support

ADVANCED MANUFACTURING & MATERIALS PROCESSING FACILITIES

Enabling Innovation in Materials, Manufacturing and Precision Engineering



CVD COATING
Thin Film
Deposition



**HEAT
TREATMENT**
High Temperature
Processing



**PRECISION
MACHINING**
Wire EDM
Technology



**VACUUM
PROCESSING**
High Vacuum
Systems

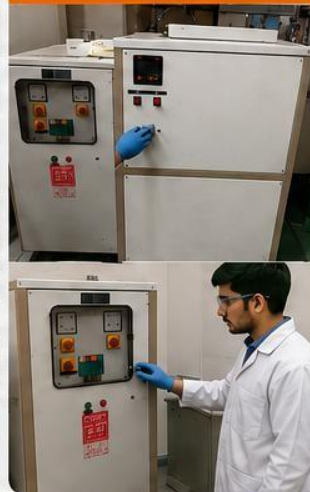


**MATERIALS
RESEARCH**
Advanced
Applications

1. CHEMICAL VAPOUR DEPOSITION (CVD) FURNACE



2. CHILLER UNIT



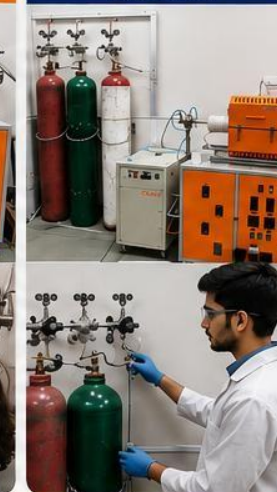
3. WIRE EDM MACHINE



4. HORIZONTAL TUBE FURNACE



5. VACUUM PROCESSING SYSTEM (GAS SUPPLY)



KEY CAPABILITIES

- ✓ Thin film deposition and coating research (CVD)
- ✓ High temperature processing and heat treatment
- ✓ Precision micromachining using Wire EDM
- ✓ Vacuum based material processing and synthesis
- ✓ Support for advanced materials research and development
- ✓ Training and hands-on experience for students and researchers
- ✓ Industry relevant facilities for innovation and prototyping

TECHNICAL SPECIFICATIONS

EQUIPMENT	1. CHEMICAL VAPOUR DEPOSITION (CVD) FURNACE	2. CHILLER UNIT	3. WIRE EDM MACHINE	4. HORIZONTAL TUBE FURNACE	5. VACUUM PROCESSING SYSTEM (GAS SUPPLY)
Temperature / Operating Range	Up to 1100 °C	Temperature range 5 °C to 35 °C	–	Up to 1200 °C (Max.)	Room Temp. to Vacuum Operation
Process / System Details	Quartz Tube CVD System Vacuum + Gas Flow	Refrigeration based cooling system	Wire EDM with Dielectric Flushing System	Horizontal Tube Furnace with Atmosphere Control	High Vacuum System with Gas Supply
Dimensions / Capacity	Quartz Tube Dia: 50 mm Heating Zone Length: 450 mm	Cooling Capacity: 3000 W	X-Y Travel: 300 x 250 mm Z Travel: 200 mm	Quartz Tube Dia: 60 mm Heating Zone Length: 600 mm	Chamber Volume: ~10 L Stainless Steel Chamber
Performance	Vacuum: 10 ⁻³ mbar Gas Flow Control: 0–500 sccm	Temp. Stability: ±0.1 °C Flow Rate: 10–30 L/min	Wire Diameter: 0.18 mm Accuracy: ±5 µm Surface Finish: Ra ≤ 1.0 µm	Heating Zones: 2 Temp. Uniformity: ±5 °C (at 1000 °C)	Ultimate Vacuum: 10 ⁻⁴ mbar Pumping System: Rotary + Diffusion Pump
Applications	Thin Film Coating, Hard Coatings, Optical Coatings, Research	Cooling for CVD, EDM and other equipment	Precision Cutting, Die Making, Micro Machining	Heat Treatment, Annealing, Sintering, Material Processing	Thin Film Deposition, Material Synthesis, Research

APPLICATION AREAS



INNOVATE • RESEARCH • DEVELOP • EXCEL



Empowering Students | Advancing Technology | Serving Society

STRESS ANALYSIS LAB

MEASURE. ANALYZE. VALIDATE.
BUILD STRONGER SOLUTIONS.

Our advanced Stress Analysis Lab enables M.Tech students to evaluate material behavior and structural integrity under various loading conditions using precision instruments and industry-standard testing methodologies.



PRECISE MEASUREMENTS

High accuracy instruments for reliable stress and strain evaluation.



INDUSTRY STANDARD

Testing as per IS, ASTM and international standards.



DATA DRIVEN INSIGHTS

Analyze, interpret and correlate data for deeper engineering insights.



INNOVATE & IMPROVE

Validate designs, enhance safety and optimize performance.



UNIVERSAL TESTING MACHINE (UTM)

Tensile, compressive, flexural and shear tests on various materials.



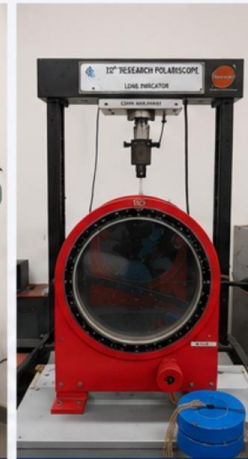
FATIGUE TESTING MACHINE

Evaluate fatigue life and performance under cyclic loading conditions.



PILLAR DRILLING MACHINE

Specimen preparation with precision drilling for accurate testing.



POLARISCOPE (PHOTOELASTIC)

Stress distribution analysis in transparent models.



WHAT YOU WILL LEARN & ACHIEVE



Material Behavior Assessment

Understand stress-strain response of different materials.



Structural Integrity Evaluation

Evaluate strength, stiffness and durability of components and structures.



Fatigue & Failure Analysis

Study failure mechanisms and life prediction under cyclic loads.



Experimental Proficiency

Gain hands-on experience with advanced testing instruments.



Design Validation

Validate design assumptions and improve product reliability.



Research & Innovation

Build analytical skills for research, innovation and real-world applications.

DYNAMICS & VIBRATION LAB

UNDERSTAND MOTION. MEASURE VIBRATION. DESIGN FOR REAL-WORLD PERFORMANCE.

Our Dynamics and Vibration Lab provides hands-on experience in evaluating dynamic behavior of mechanical systems. Equipped with advanced instruments and test rigs, the lab enables students to analyze motion, vibration, and system response for design optimization and failure prevention.



PRECISE MEASUREMENTS

High accuracy sensors and instruments for reliable dynamic analysis.



INDUSTRY STANDARD

Experiments as per IS, ASTM and international standards.



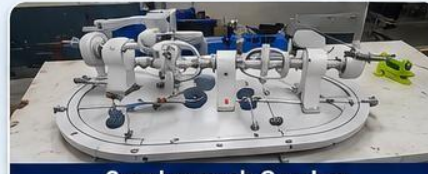
DATA DRIVEN INSIGHTS

Analyze, interpret and correlate data for deeper engineering understanding.



INNOVATE & IMPROVE

Optimize designs, reduce vibrations and enhance system reliability.



Synchromesh Gearbox

Study of gear shifting and synchronizer mechanism.



Crack shaft mechanism

Study of slider-crank mechanism, rotational motion and kinematic behavior.



Belt Drive Transmission Test Rig

Analysis of belt drive dynamics, speed ratio and power transmission characteristics.



Universal Joint Model

Study of Hooke's joint kinematics.



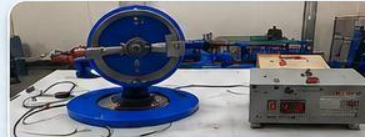
Whirling Shaft Apparatus

Critical speed and shaft whirling experiments.



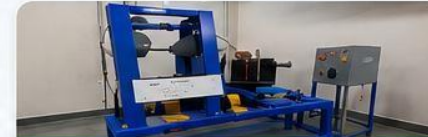
Multidisc Clutch Apparatus

Study of multidisc clutch performance and torque transmission.



Governor/Centrifugal Apparatus

Governor characteristics and speed control.



Gear Train Apparatus

Internal gear train demonstration.



Engineering Demonstration Model

Cut-section model for teaching.



Balancing of rotating and reciprocating mass

Study of balancing techniques to reduce vibrations in rotating and reciprocating systems.



Natural frequency and viscous damping Apparatus

Determine natural frequency, damping coefficient and system response characteristics.

WHAT YOU WILL LEARN & ACHIEVE



Vibration Measurement

Measure vibration using accelerometers, vibration meters and data acquisition systems.



Modal & Frequency Analysis

Determine natural frequencies, mode shapes and damping characteristics.



Rotordynamics & Balancing

Study rotor behavior, imbalance and dynamic balancing techniques.



System Response Analysis

Evaluate time-domain and frequency-domain response of mechanical systems.



Failure & Fatigue Analysis

Understand fatigue behavior and predict life under real-world loading.



Design Optimization

Apply dynamic principles to design robust, efficient and reliable systems.

FLUID POWER & HEAT TRANSFER LABORATORY

UNDERSTAND FLUIDS. MASTER ENERGY.
DESIGN EFFICIENT SOLUTIONS.

Our well-equipped laboratory enables M.Tech students to explore fundamental principles and real-world applications of fluid power systems and heat transfer processes through hands-on experiments and industry-relevant setups.



PRACTICAL LEARNING

Experiments that strengthen core engineering concepts.



INDUSTRY RELEVANT

Exposure to real-world systems and industrial components.



ANALYZE & OPTIMIZE

Data-driven approach to improve system efficiency.



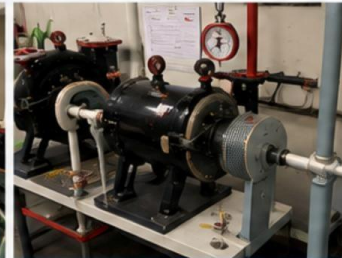
INNOVATE & APPLY

From theory to application for future-ready engineers.



FLUID POWER SYSTEMS

Study of hydraulic components, valves, pumps, actuators and control circuits.



HEAT TRANSFER STUDIES

Experiments on conduction, convection, radiation and heat exchanger performance.



HANDS-ON EXPERIMENTATION

Real-time measurements, analysis and interpretation for engineering insights.

WHAT YOU WILL LEARN & EXPLORE



Hydraulic & Pneumatic Circuit Design

Understand and build fluid power circuits.



System Performance Analysis

Evaluate efficiency, losses and system behavior.



Heat Exchanger Experiments

Analyze LMTD, effectiveness and heat transfer rate.



Measurement & Instrumentation

Hands-on with pressure, flow, temperature and more.



Data Acquisition & Results Interpretation

Use modern tools for data collection and analysis.



Energy Efficiency & Optimization

Design efficient systems for sustainable engineering.

REFRIGERATION & AIR CONDITIONING LAB (R&AC LAB)

Hands-on Learning | Industry Relevant | Future Ready

ABOUT THE LAB

The R&AC Lab is a state-of-the-art facility designed to provide practical exposure to students in the field of refrigeration, air conditioning and heat transfer systems. The lab is equipped with modern training rigs and instruments to bridge the gap between theory and real-world applications.

LAB OBJECTIVES

- ✓ To understand the fundamentals of refrigeration and air conditioning systems.
- ✓ To study the performance of components and systems under varying conditions.
- ✓ To analyze thermodynamic cycles and their practical applications.
- ✓ To develop troubleshooting skills and maintenance practices.
- ✓ To promote energy efficient and environmentally friendly technologies.

MAJOR EQUIPMENT



Vapour Compression Refrigeration Cycle Trainer



Refrigeration Plant Test Rig



Air Conditioning Test Rig



Thermodynamic Instruments



Data Acquisition System

LEARNING OUTCOMES

- Strong practical knowledge of R&AC systems
- Ability to test, analyze and optimize system performance
- Enhanced problem solving and analytical skills
- Industry ready competencies for careers in HVAC&R

APPLICATIONS



HVAC Systems



Cold Storage



Automobile AC



Heat Pumps



Industrial Refrigeration



Innovate. Analyze. Apply.

Building Skills for a Sustainable Tomorrow

BIOMASS CONVERSION & ENERGY LAB

Converting Biomass into Sustainable Energy

ABOUT THE LAB

The Biomass Conversion & Energy Lab is equipped with advanced equipment for the processing, conversion and analysis of biomass into useful forms of energy. The lab provides hands-on learning experience in biomass briquetting, gasification, combustion and performance evaluation of energy conversion systems.

LAB OBJECTIVES

- ✓ To understand the principles and technologies of biomass conversion.
- ✓ To study biomass preprocessing, briquetting and pelletization techniques.
- ✓ To analyze the performance of biomass gasification and combustion systems.
- ✓ To evaluate the energy, emission and environmental impacts.
- ✓ To promote the use of renewable biomass resources for sustainable energy production.

BIOMASS FEEDSTOCK



Agro Residues



Saw Dust



Biomass Pellets



Lignocellulosic



Energy Crops

APPLICATIONS



Renewable Energy



Rural Electrification



Heat Generation



Industrial Processes



Waste Utilization



BIOMASS BRIQUETTING MACHINE



BIOMASS BRIQUETTING MACHINE



BIOMASS BRIQUETTES



KEY EXPERIMENTS

- Biomass moisture content determination
- Briquetting of biomass and evaluation
- Calorific value testing
- Gasification process studies
- Combustion analysis
- Emission measurement
- Energy balance and efficiency evaluation

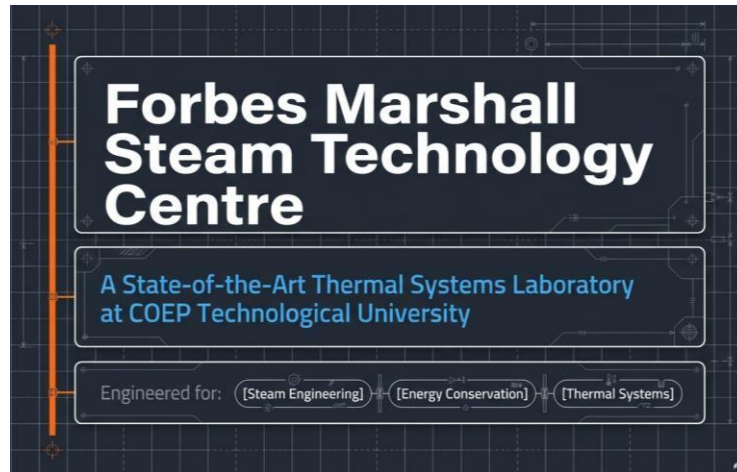
“ From Waste to Worth,
From Biomass to Clean Energy ”

LEARNING OUTCOMES

- ✓ Practical knowledge of biomass conversion technologies
- ✓ Ability to operate and analyze biomass energy systems
- ✓ Understanding of sustainable energy and circular economy
- ✓ Industry ready skills for careers in renewable energy



Sustainable Today, Powerful Tomorrow | Innovate. Convert. Conserve. Building a Greener Future with Biomass Energy



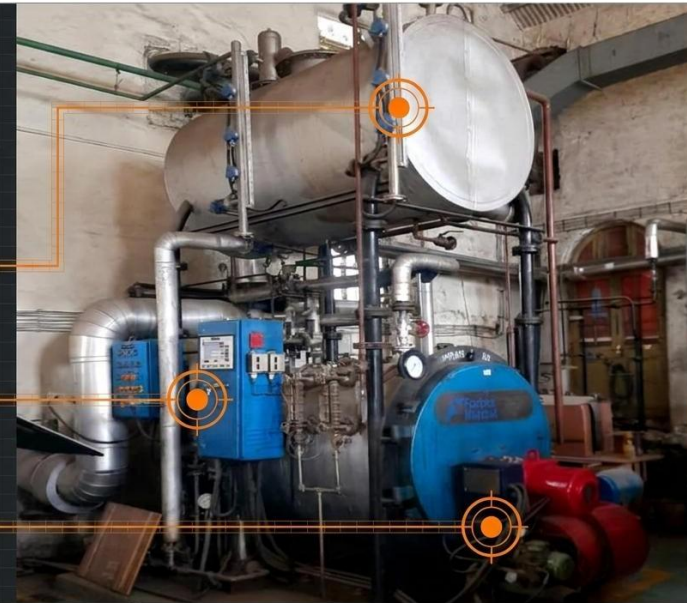
Industrial Scale. Academic Access.

Providing direct exposure to real industrial equipment and best engineering practices within a university setting.

High-Capacity Steam Generation

Digital Control & Monitoring Systems

Industrial-Grade Combustion Units



NotebookLM

Delivering Specific Value to Every Stakeholder



Undergraduate & Postgraduate Students



Practical experiments and foundational skill development in thermal engineering, bridging the gap between textbook physics and plant operations.



Research Scholars



An advanced, fully-instrumented platform dedicated to pushing the boundaries of energy conservation and thermal systems research.



Industry Professionals

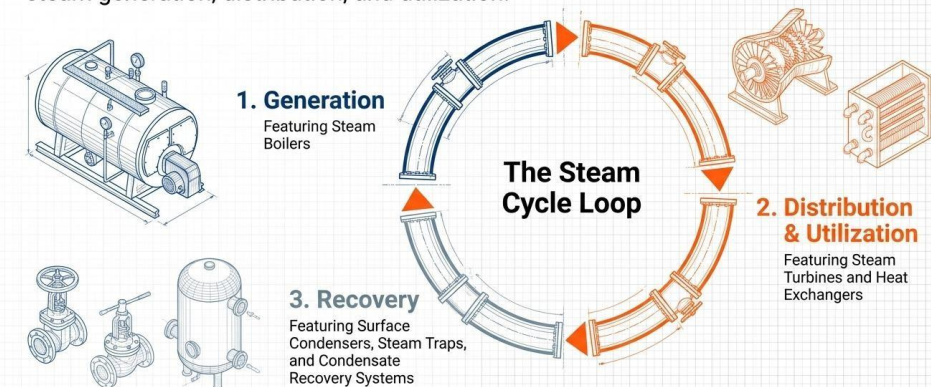


Specialized certification programmes and highly applied industrial training to upskill workforces on modern thermodynamic equipment.

NotebookLM

The Complete Lifecycle of Steam

Hands-on training mapped to every critical stage of steam generation, distribution, and utilization.



NotebookLM

RESEARCH FACILITIES / CENTER OF EXCELLENCE

Sr.	Name of Lab	Major Equipment
1	Hirachand Daulat 'AR/ VR LAB' 	 1. VR Headset  2. Motion Tracking System  3. High End PCs  4. Sensors and Measurement tools
2	FAB Lab 	 1. CNC Router  2. Epilog Laser Cutter  3. 3D printer flash forge guider 2  4. Instek Function generator  5. Modela mini mill machine  6. Advanced electronic work bench
3	Centralized Robotics & Automation Laboratory 	1. Mitsubishi Movemaster – 5-dof Industrial Robot, Japan 2. SCORBOT - ER V plus – 5-dof Industrial Robot Arm, Intelitek, USA 3. SCORBOT - ER VIII – 5-dof Industrial Robot, Intelitek, USA 4. YASKAWA – 6-dof Motomen series Industrial Robot, Japan 5. ABB 6400 IRB – 6-dof Industrial Robot, ABB, Switzerland 6. Delta Robot – Nugenix, Ichalkaranji, India 7. ABB 1520 ID – 6-dof robot with complete training cell, ABB, Switzerland 8. Mitsubishi Assista RV-5AS-D – 6-dof Collaborative Robot, Mitsubishi Electric Corp, Japan
4	Siemens Smart Factory Lab 	 Learning Areas  Robotics and SCARA pick-and-place automation  Machine vision inspection and quality checking  Milling, drilling, assembly, storage and AGV material movement  3D printing and connected workflow coordination  Key Outcomes & Impact  Provides hands-on exposure to Industry 4.0, robotics and industrial automation  Supports laboratory courses, interdisciplinary student projects and applied research  Enables training in PLC, HMI, SCADA, machine vision and connected manufacturing  Strengthens students' practical skills, employability and industry readiness  Serves as a platform for faculty training, workshops and industry-academia collaboration.
5	Amphenol Post Graduate Computational & Research Lab	 System Configuration 30 PC PIV , 60 Workstations - 32 Gb RAM Processor 96 CORE, 1 qty., 64 CORE, 1 qty., 32 CORE, 1 qty. 8 CORE, 10 qty  Software Installed • Ansys • GT-Suite • MATLAB • Flownext • Altair Hypermesh • COMSOL • Fusion 360 • PTC Creo • DelCAM