

## Department of Mechanical Engineering



Thapar Institute of Engineering and Technology University , (formerly Thapar Institute of Engineering and Technology) is located in sprawling green campus comprising of more than 250 acres Thapar Technology Campus (TTC) in the historic city of Patiala.

Thapar Institute of Engineering and Technology University was established in 1956 through an imaginative and innovative collaboration between the then State of PEPSU (Patiala and East Punjab States Union), the Central Government and the Patiala Technical Education Trust (PTET) founded by one of the great captains of Indian Industry, the late Lala Karam Chand Thapar. The mission of the University as embodied in the Trust Deed Dated April 9, 1956, are truly remarkable for their scope and vision. They provide for undergraduate and post graduate education in engineering & technology, a close interaction with industry, and a strong emphasis on basic and applied research.

Thapar Institute of Engineering and Technology University is today recognized among the premier Deemed Universities imparting technical education of the country and the best of its kind in the north-western region of India. It is an example of pioneering experiment of joint venture between public and private sector in Higher Technical Education. TU is a unique campus with extraordinary potential for development of indigenous technology and its transfer to engineering industries.

Thapar Institute of Engineering and Technology University strives to maintain an environment that encourages scholarly inquiry and research, a spirit of creative independence and a deep commitment to academic excellence. Its students as unique individuals with different interests and aspirations. The diverse programs and activities aimed at developing quality of mind, ethical standard, social awareness and global perspectives, let the students shape their own TU experience and grow. The Alums of Thapar Institute of Engineering and Technology University are well placed for their quality and performance across the globe which is reflected in their excellent contribution to society in varied fields such as business and industry, administrative and regulatory services, research and education and social and human rights organizations.

### Contact

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## Mechanical Engineering Department at Thapar University

The Department of Mechanical Engineering was established in 1956 with the inception of the Institute to produce high quality engineers in the field of Mechanical Engineering to cater the needs of the newly Independent India. Since the Institute became a Deemed University in 1985, the department has increasingly focused on post graduate education and research. The B.E. Mechanical Engineering Program is accredited by the Engineering Accreditation Commission of ABET. The department has aligned its curriculum with that of Trinity College Dublin (University of Dublin, Ireland) as part of the academic collaboration to impart global standard education to the students. This collaboration offers exchange programs for students and faculty, joint research initiatives and dual campus degrees where students can complete half of their course at Thapar University's Patiala campus and the other half in Dublin. The Department aims to produce quality professionals in Mechanical Engineering to compete globally and excel by carrying out basic and applied research in emerging areas by forging strong industry - institute interaction. The Department is also notable for its laurels in international forums like Society of Automobile Engineers (SAE) Formula Student, Europe and has an active staff/student exchange program with the University of Waterloo, Canada. The Department has been able to attract numerous prestigious research and infrastructural grants in recent years from agencies such as AICTE, DRDO, DST, UGC, to list a few. The department is having high quality laboratories in areas of Bulk Solids and Particulate Technologies, Heat & Mass Transfer, I.C engine, Manufacturing, Automation/Robotics, Computer Aided Designs etc. The faculty and staff are actively involved in fostering industrial collaborations through training programs, workshops, consulting projects etc.

SK Mohapatra, PhD

Senior Professor and Department Chair

2013-16

94

Referred Journal Publications

14

New Sponsored Research Projects

7

Consultancy Projects

## Research

The department of mechanical engineering is rich in research resources and offers doctoral program leading to Ph.D. degree. A number of research projects have been bagged from the reputed funding agencies as DST, CSIR. Following are the highlights of ongoing research in the department.

- Experimental Investigation and CFD modelling of slurry pipeline for flow of multi-particulate slurry at higher concentrations.
- Design and development of a novel honing type magneto-rheological finishing process.
- Development of floating wick basin type vertical multiple effect diffusion solar still with waste heat recovery.
- Research in the newly emerging area of role of nano-fluids in the performance of solar collector is initiated in the department.



## Research Cluster Areas

- Thermo-mechanical engineering
- Biomass gasification
- Solar thermal energy
- Fluidised bed combustion
- Alternate fuels
- Bulk Solids Handling
- Slurry Conveying
- Nano-fluids
- Polymer nano-composites
- Vibration and noise engineering
- Biomechanics
- Structural and aero elastic analysis
- Vehicle dynamics
- Robotics
- Industrial automation
- Exoskeleton



₹ 1.379 cr.

Sponsored and consultancy projects (completed + ongoing)



₹ 1.586 cr.

Research equipment procured

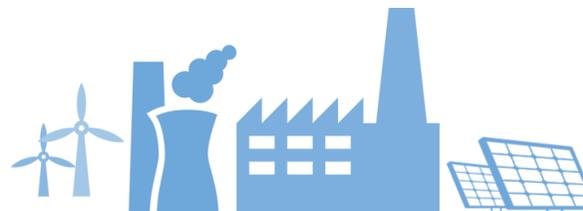
## Major Research Facilities

- |   |   |
|---|---|
| Synthesis of Magneto Rheological Fluids     | Dual Fuel Engine Test Rig                       |
| LEGO and Tetrix Kits                        | Coordinate Measuring Machine                    |
| Anemometer                                  | Surface Profilometer for Contour Measurement    |
| Vacuum Assisted Resin Infusion Molding      | Ultrasonic Flaw Detector                        |
| High Shear Homogenizer                      | Submerged Arc Welding                           |
| TGA   | Fused Deposition Modelling Machine              |
| Slurry Transport Facility                   | 3D Blue Light Scanner – Artec Spider            |
| Solar Concentrator System                   | CNC Machining Centers 2Axis, 3Axis              |
| Gasifier to Produce Producer Gas            | SPM CNC Lathe-Mill Wood Working Machines        |
| 5 kW Dual Fuel Engine System                | Abrasive Blaster                                |
| Smoke Analyzer                              | Universal Testing Machine                       |
| VCR Diesel Engine                           | Wear Testing Machine                            |
| Pyranometer                                 | Bulk Solids Handling Facilities                 |
| Electrodynamic Shaker for Vibration Testing | Fluidization and Deaeration Chamber             |
| Sound Level Meters                          | Thermal Property Analyzers for Nano Fluids      |
| Bomb Calorimeter                            | SYMBOLS Software for Bond Graph Modelling       |
| COMSOL-Multiphysics Simulation software     | Ultrasonic Probes (Contact and Immersion Types) |
| Tribo Tester                                | Acoustic Emission Setup                         |
| Multi-Channel Noise and Vibration Analyzer  | Slurry Rheology Tester                          |

# Faculty

## Thermal Engineering

Faculty in this group are engaged in a wide range of research activities related to thermal systems that involves disciplines of thermodynamics, heat and mass transfer, combustion, fluid mechanics, and multi phase flow to investigate technology improvements. Applications include compressors, heat pumps, refrigeration equipment, fluidized bed combustion, transportation and storage of bulk solids, slurry conveying, heat exchangers, thermal storage, small-scale power production, appliances, etc.



**Dr. S. K. Mohapatra**

Senior Professor and Head

Ph.D., Indian School of Mines, Dhanbad

The main drive of Professor Mohapatra's research remains advancing the modelling and simulation of fluidised bed combustors. Bubbling fluidised beds are extensively used in northern India for incineration of agri-residue for generation of power. Apart from predicting the performance parameters of a bubbling fluidised bed combustor, CFD analysis of temperature and velocity profiles in a fluid-bed incinerator are also being extensively studied.



**Dr. S. S. Mallick**

Associate Professor

PhD, University of Wollongong, Australia

Dr. Mallick's research group is interested in modelling gas-solids flows of fine powders through pipelines. This research has wide industrial applications – in thermal power stations, cement, chemical, petrochemical, food, pharmaceutical plants etc. Specific areas of research include modelling and scale-up validation of solids-gas friction, flow regimes and minimum transport boundary.



**Dr. Satish Kumar**

Assistant Professor

PhD, Thapar University, Patiala

The main drive of Dr. Satish's research remains advancing the modelling and simulation of solid-liquid flows through pipelines. His areas of expertise include rheological characterization of solid-liquid suspension like coal, Iron, Zinc, coal ash etc.; design of engineering components using CFD and design review of hydraulic transportation systems in power plants; and investigation of flow characteristics of solid-liquid mixture in pipeline.



**Dr. Madhup Mittal**

Assistant Professor

PhD, Indian Institute of Technology, Roorkee

Dr. Mittal's research interests are in solar thermal systems, two-phase flow, heat transfer and Dual fuel internal combustion engine technology. The major area of current research includes development of cost effective, high-efficient and eco-friendly solar distillation technology for producing safe drinking water. This distillation technology has applications in pharmaceutical industry which uses distilled water, mineral water industry, battery water, packed food and cosmetics industry.



**Mr. Kundan Lal Rana**

Assistant Professor

PhD Pursuing, Thapar University, Patiala

The major area of current research includes studies in areas on nanofluid technology with nanofluids application in refrigerants, transformer oil, solar collectors etc, modelling thermo-physical properties and improving suspension stability of nanofluids.

### Other Faculty



**Mr. Sumeet Sharma**  
Associate Professor



**Dr. Vikrant Khullar**  
Assistant Professor



**Dr. Neeraj Kumar**  
Assistant Professor



**Dr. Sandeep Kumar**  
Assistant Professor



**Dr. S. S. Ragit**  
Assistant Professor



**Dr. Anu Mittal**  
Lecturer



**Mr. Atul Sharma**  
Lecturer

# Faculty

## Production/Industrial Engineering

The faculty and students in production and industrial engineering group focus on developing various processing techniques along with predictive models for these processes. Researchers in this area are developing modelling and prediction capabilities for high speed machining, grinding and drilling processes. Further the faculty members are also involved in the investigation of usage of different materials for performing unconventional machining processes .



**Dr. Ajay Batish**

Professor and Dean of Contemporisation and Accreditation

PhD, Thapar University, Patiala.

Professor Batish's research is primarily focussed on conventional and non-conventional machining, welding incremental sheet metal forming, rapid prototyping, fused deposition modelling. In-addition, he is involved in modelling of manufacturing system, process modelling and finite Element Analysis. His group has carried out number of studies including Ergonomics studies, man power productivity studies.



**Dr. Anant Kumar Singh**

Assistant Professor

PhD, Indian Institute of Technology, Delhi

Dr. Anant's research focuses on magneto rheological micro and nano finishing of 3D surfaces. These fluids have got great level of applications in manufacturing and automation in Indian industries. Dr Anant has also filed a patent on "An improved magnetorheological finishing apparatus for stable, scalable and continuous finishing application" 2611/DEL/2011.

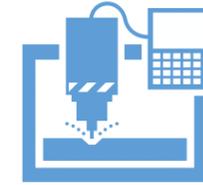
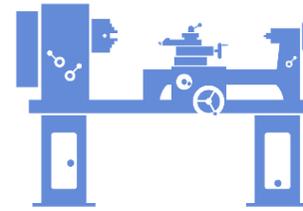


**Dr. Vivek Jain**

Assistant Professor

PhD, Indian Institute of Technology, Roorkee

The major area of Dr Jain's research includes drilling of bovine bone. Major problems faced during bone drilling were crack initiation, thermal necrosis and burr formation. The current attempt has been made to show the feasibility of bone drilling with non-conventional technique and it's after effect on the bone structure. This research has wide applications in the field of biomedical.



**Dr. Dheeraj Gupta**

Assistant Professor

PhD, Indian Institute of Technology, Roorkee

Dr. Gupta's research interests include enhancement of poor tribological surfaces materials through microwave heating. This research has wide industrial applications – in thermal power stations, hydraulic power plant, automobile, aviation, cement, chemical, petrochemical, food, pharmaceutical plants etc.



**Dr. Vineet Srivastava**

Assistant Professor

PhD, Indian Institute of Technology, Delhi

Dr. Srivastava's research involves the fabrication of ceramics and using the ceramics as tool and workpiece materials in machining. Further the idea of using ceramics in established unconventional machining processes is being explored. The advent of Rapid Prototyping has opened new avenues in rapid manufacturing and rapid tooling, hence the application areas of RP is being explored.

## Other Faculty



**Mr. Supreet Bhullar**  
Associate Professor



**Dr. V.K. Singla**  
Associate Professor



**Dr. Tarun Nanda**  
Assistant Professor



**Dr. Gulshan Kumar**  
Visiting Assistant Professor



**Dr. Harshavardhana**  
Lecturer



**Dr. Atanu Das**  
Lecturer

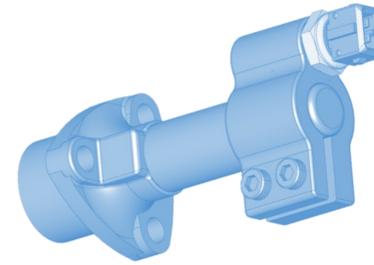


**Dr. Deepa Mudgal**  
Lecturer

# Faculty

## CAD/CAM Design

The faculty and students in this group are involved in a range of research topics that integrate basic studies leading to a fundamental understanding of mechanical systems and the design process, analysis and manufacture of mechanical systems, linear and nonlinear vibrations, dynamics, acoustics, robotics inspired research, noise and vibration control in suspensions, brakes, and other mechanical components.



**Mr. Ajayinder Singh Jawanda**

Associate Professor and In-charge of Laboratory 'State Initiated Design Centre for Ornamental Woodworking'

Pursuing PhD, Thapar University, Patiala

The major area of current research includes development of open architecture control based tool paths for sculptured surfaces using STL, MACROS for B-rep in CAD. The development of a real time intelligent CNC controller with a virtual machinist. OpenGL based machining simulator for quality assessment and controller feedback. Use of CAD CAE sw for optimum design of machine elements.



**Dr. T K. Bera**

Associate Professor  
PhD, IIT Kharagpur

The major area of current research includes modelling, simulation and control of different components of vehicle. This research has wide industrial applications – in automotive sector. Specific areas of research include modelling and simulation of variable camber mechanism, semi active suspension, inverse vehicle dynamic model, electrical power steering etc. Studies in areas on robotics include modelling of hybrid manipulator and obstacle avoidance of mobile robots.



**Dr. Sandeep K. Sharma**

Assistant Professor  
PhD, Thapar University, Patiala

Dr. Sandeep is actively involved in health monitoring of submerged Naval Vessels using wave propagation techniques, ultrasonic guided wave approach for monitoring setting and hardening of concrete and detection of corrosion by acoustic emission and ultrasonic techniques.



**Dr. Ravinder Kumar Duvedi**

Assistant Professor  
PhD, Thapar University, Patiala.

The main area of research is the development of toolpath planning algorithms for multi-axis machining of triangulated surfaces which is being carried out under a collaborative research program with University of Waterloo and Thapar University. My recent research activities includes the development of a prototype of a customized PC based CNC controller for 3-axis simultaneous interpolation for ornamental carving of wood.



**Dr. J.S. Saini**

Assistant Professor  
PhD, Thapar University, Patiala

The major area of current research includes the preparation and analysis of pinned joints using fiber reinforced composites with the addition of different nanoparticles

### Other Faculty



**Mr. Bikramjit Sharma**  
Assistant Professor



**Dr. Karanvir Saini**  
Assistant Professor



**Dr. Ashish Purohit**  
Visiting Assistant Professor



**Dr. Neeraj Grover**  
Visiting Assistant Professor



**Dr. Gagandeep Bhardwaj**  
Visiting Assistant Professor



**Dr. Deepak Jain**  
Assistant Professor

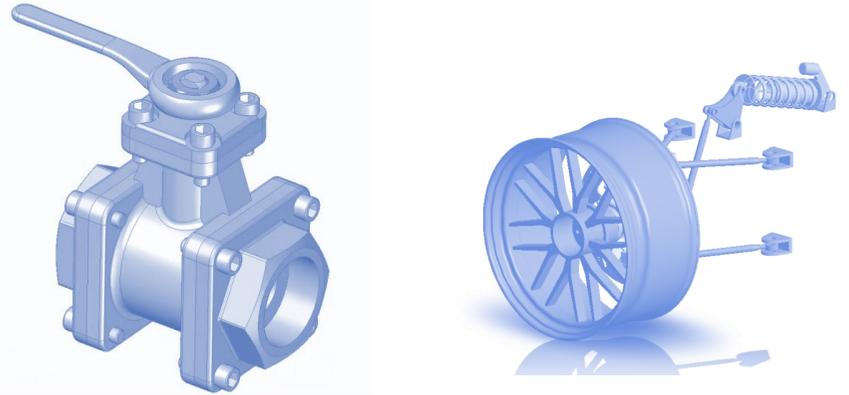


**Mr. Gurpreet S.Saini**  
Lecturer

# Faculty

## CAD/CAM Design

Ongoing refinements in CAD/CAM and automation systems continue to save manufacturers tens of millions of rupees in time and resources over non-computerized methods. As a consequence, CAD and CAM technologies are responsible for massive gains in both productivity and quality, particularly since the 1980s. CAD/CAM technologies will continue to provide growing opportunities for employment as more companies are seeking out cost-efficient methods to develop new products.



**Dr. Ashish Singla**

Assistant Professor and In-charge of Mechatronics Laboratory

PhD, Indian Institute of Technology, Kanpur

The major area of current research includes modelling, analysis and control of flexible, redundant, modular and medical robots. The current areas of research are related to various industrial applications like – space applications, medical surgery, nuclear plants, automobile and agriculture sector, mining, welding, painting etc. Specific areas of research include modelling, analysis and vibration suppression of flexible systems.



**Dr. Hiralal Bhowmik**

Assistant Professor & Associated Faculty member for Incubation Centre

PhD (Mechanical), Indian Institute of Science Bangalore

Dr. Bhowmik's research interest is to explore the multiscale tribological studies. Accordingly, my current research is focused on the tribology of light weight materials, nanocomposites, formulation of novel nanolubricants and machine element design for tribological application.



**Mr. Devender Kumar**

Assistant Professor

Pursuing PhD, Thapar University, Patiala.

The major area of current research includes development of new age Tungsten Carbide Nano Ceramics and related refractory materials. This research has wide industrial applications – in cutting tool industry, tool and die manufacturing. Research work also includes studies and experimentation in the field of Automotive Product Development.



**Mr. Kishore Khanna**

Assistant Professor and In-charge of Solid Mechanics Laboratory

Pursuing PhD, Thapar University, Patiala.

The major area of current research includes modelling of creep behavior in a thin rotating functionally graded rotating disc of variable thickness. The other area of research includes studying the mechanical behavior of metal matrix composites by varying/changing the reinforcement material.



**Mr. Daljeet Singh**

Assistant Professor

Pursuing PhD, Thapar University, Patiala.

The major area of current research includes traffic noise assessment and prediction modelling for highways and urban roads. This research has wide applications for addressing the prevalent traffic noise problems. Specific areas of research include assessment and modelling of traffic noise on highways and urban roads using different techniques like multiple regression, genetic algorithm, artificial neural networks, graph theory etc.



**Dr. Rohit K. Singla**

Lecturer

PhD, Indian Institute of Technology, Ropar

Mr. Singla's research is aimed at applying the concept of inverse analysis to mechanical engineering systems involving heat and mass transfer. His research also focus on experimental and inverse analysis of combined heat and mass transfer of systems comprising of forced and induced draft cooling towers.