MECHRONICLE

APRIL, 2025

Message from the HOD

It is my pleasure to present to you the second issue of the newsletter '*MECHRONICLE*' from the Department of Mechanical Engineering. This publication is a reflection of the collective efforts, accomplishments, and aspirations of our dynamic academic community.

In recent months, our faculty members have made notable strides in research alongside teaching and administrative work, publishing in reputed journals, applying for patents and submitting competitive project proposals aimed at solving real-world engineering challenges. These contributions reinforce the academic standing of the department and advance technological innovation, serving the broader needs of society. There are also collective efforts for information exchange through international symposia and invited lectures.

Our students continue to make us proud with their academic achievements and enthusiastic participation in technical competitions. The department has arranged meaningful industry visits to bridge the gap between classroom learnings and real-life applications. Most of the final year students have secured placements in esteemed organizations out of their dedication and the department's emphasis on holistic growth.

We have also successfully hosted our annual flagship technical event, *IMPETUS 8.0*, which offered a vibrant platform for the students to exhibit their talents, engage with experts, and foster a spirit of innovation and collaboration.

Besides all of these, the department is undergoing a transformation in terms of civil and electrical renovations for several months now.

I would like to extend my heartfelt appreciation to all faculty members, staff members, students, and alumni for their unwavering support and contributions. I hope this edition captures the essence of our collective journey and inspires us to achieve even greater heights.

With best regards,

Prof. Subhas Chandra Mondal
Professor and Head,
Department of Mechanical Engineering

Editorial

The Mechanical Engineering (ME) Department of Indian Institute of Engineering Science and Technology, Shibpur (formerly Bengal Engineering College) has a glorious history spanning over a century, dating back to 1921 when a diploma course in Mechanical Engineering was introduced. The Department subsequently evolved, offering degree-level programs starting in 1925 and postgraduate programs in 1954. The first batch of graduates in

Mechanical Engineering from this Department came out in 1930.

Although at the initial stage, primary focus was on imparting world class undergraduate teaching, with the passage of time and requirement, the Department introduced programs in the form of post-graduation and doctoral research. Gradually, the Department developed three core specializations in the form of Machine Design, Thermal Engineering and Production Engineering. Central funds started to come to the Department to support GATE qualified post-graduate students during mid-eighties.

In 1993, the Govt. of west Bengal decided to free the Bengal Engineering College from administrative delays due to its affiliation to the CU and was given academic and administrative autonomy by elevating it to the status of a Deemed University. The Department was highly praised for its effort in making changes in the curriculum (from yearly to a semester system) and other matters related to this transformation. The UG computer laboratory was thoroughly revamped and given a new face. The 3rd floor of the Department came up and subsequently a grant was allotted to the Department to set up the Flexible Manufacturing System laboratory.

Laboratories in newer areas of research were developed and number of research scholars increased substantially; especially when faculties of nearby Institutes utilized the opportunity to pursue their research careers at the ME Department. Due to the growth of facilities and hiring of innovative faculties, research activities intensified at the Department and publications in peer reviewed international journals of repute became manifold.

In 2004, the Institute underwent through another transformation and was elevated to the status of a full-fledged state university named BESU, Shibpur. Meanwhile, in 2005, the Ananda Krishnan Committee visited the Institute and later declared the then BESU as the number one from the shortlisted six institutions, (earlier done by the Joshi Committee), to be elevated to the status of an Institute of National Importance (INI) and recommended to be transformed to the FIRST Indian Institute of Engineering Science and Technology (IIEST) of the country. The official transformation, however, took place on March 04, 2014 and IIEST, Shibpur became a reality.

After an initial delay to get the academic and administrative restructuring, in a proper form similar to those of IITs, the Institute is now in full swing to get to the levels of the highest seats of learning in India. The ME Department is also putting its best effort to be at par with the global standards. Based on a rich heritage of quality UG teaching, the Department is also flourishing in different frontiers. With the active support of alumni, the Department celebrated its centenary via year long series of online lectures mostly delivered by reputed alumni of this Department spread across the globe. Modification of statutes, regulations and introduction of several statutory committees are streamlining academic and research activities.

Apart from quality teaching, the Department is fully focused on research projects and consultancy. At present, three projects have been selected under the ANRF PAIR Scheme, two in the area of Bio-Medical Engineering with an equipment budget of INR 1.5 crore and one in the area of Metal Additive Manufacturing with an equipment budget of INR 4.2 crore are currently in progress. PIs of all these projects are from this Department. Apart from that, a WBDST project amounting to INR 24.5 lakh has been sanctioned. A DRDO project, already approved, is under consideration of the Ministry of Defence, Govt. of India. The students of the Department are also not behind. Student fight and unrest (2007-08) are now a thing of the past. After the formation of Students' Senate, Students' unit of the Department, the SME, have become disciplined, active and are taking part in constructive activities such as holding of seminars, workshops together with their flagship event IMPETUS under the proper guidance of their FIC, Chairman and the President, Students' Senate.

Key Historical Milestones:

1921: Establishment of the Mechanical Engineering Department with a diploma course, marking the beginning of the department's journey.

1930: Introduction of the first degree-level course in Mechanical Engineering.

1954: Commencement of postgraduate programs in the department.

1956: The Department of Electronics & Telecommunications Engineering and the Department of Mining Engineering were sanctioned.

1956-1957: Celebrated the centenary function of the college, with Dr. B.C. Roy and Pandit Jawaharlal Nehru attending.

1976-1977: The College started its first Computer Centre.

1979: A Microprocessor Laboratory was established in the Computer Centre.

Department's Development and Significance:

Early Years:

The department was one of the earliest to be established at the Bengal Engineering College (now IIEST Shibpur).

Evolving Curriculum:

The department has continuously evolved its curriculum, incorporating new and emerging fields like AI, ML, and robotics.

Research and Development:

The department has made significant contributions to research and development in mechanical engineering.

Postgraduate Programs:

The department offers postgraduate programs in Machine Design, Thermal Engineering, and Manufacturing Science.

Dual Degree Program:

A Dual Degree B. Tech. - M. Tech. program is also available, according to the IIEST website.

Global Alumni Network:

The department boasts a global network of alumni who have made significant contributions to the field.

Prof. Debasis Datta

Professor,
Department of Mechanical Engineering

Content

Departmental Activities

Academic Arena

According to the NEP 2020, the restructuring of the UG and PG courses have been finalized to incorporate new and emerging fields into curriculum. More elective choices are being offered.

Dr. D. Das and Dr. S. Bhattacharjee jointly offered UG 7th Semester Departmental Elective Subject: 'AI&ML Applications in Mechanical Engineering'

54 out of 64 final year students of the 2025 pass-out batch, have already been placed in reputed industries.

4 out of 64 final year students of the 2025 pass-out batch have opted for higher studies in India and abroad.

74 out of 78 of the 3rd year students have already been selected for internships at reputed industries.

Infrastructural Planning and Development

A Stereo-Zoom microscope integrated with imaging device and embedded computer for image processing (Leica make) has been installed on 17 March 2025, in the Department at Modern Manufacturing Laboratory, Ground Floor under Prof. S. C. Mondal

The Renewable Energy Lab in the 3rd floor has been renovated with new electrical connections.

The faculty room, ME-310 is going to be interchanged with the PG Machine Design classroom in the 2nd floor.

Renovations of the 1st, 2nd and 3rd floor corridors are being done.

Renovations and electrical wiring of the classrooms G5, BIV2S and in classrooms on the 3rd floor are being done, and classrooms G6 is scheduled to be done in the summer vacation.

Now the Department has 3 ‘Ladies Toilet’s in the ground, first and second floor.

Conference/Workshop/Lecture Series

Prof. D. Datta organized Institute Lecture delivered by Dr. Gopinath Chattopadhyay, Institute of Innovation, Science and Sustainability (IISS), Federation University, Australia, on "Asset management of long-life ageing assets for reducing costs and risks and retaining performance" in ME Dept. Conference Hall on 13 January 2025

Prof. D. Datta and Dr. Rajib Chakraborty together with Dr. Niloy Khutia of AE&AM Dept. were involved in organizing One Day International Symposium on "Structural Integrity" on March 11, 2025 held at ME Department

Prof. D. Datta delivered an Invited Talk on "U-NDE for Defect and Process Characterization" at the Intl. Symposium on Structural Integrity.

Department has organised an online talk on "Keeping Pace with Cyber-Physical Evolution of Systems" by Dr. Aniruddha Mukhopadhyay, Ansys Fellow and Lead Chief Technologist, Digital Transformation at

Ansys Lebanon, New Hampshire, United States, on 26 March 2025

Other happenings in the Department

Prof. Amitabha Ghosh visited the Department and met with the faculties on 17 January 2025

Prof. S. K. Karmakar retired from the service in the Department on 28 February 2025.

Dr. D. Das and Dr. M. Kumar visited Braithwaite & Co. Ltd. with 40 students across all years, on 11 January 2025

Dr. D. Das and Dr. A. Das has coordinated an Industry visit in New Allenberry Works for the 2nd year (4th Sem) students on 12 February 2025

Prof. Takamoto Itoh and his research group from Ritsumeikan University, Kusatsu, Shiga 525-8577, Japan visited the dept. for possible collaboration in research and academics, on 4 December 2024. Dr.. R. Chakraborty from ME Dept. and Dr. N. Khutia of AE&AM Dept. have coordinated the visit.

The students of the department have organized the flagship event IMPETUS 8.0, from 7 to 9 February 2025. More details are in the students' section.

Research and Development

The department runs a full-time PhD program, where currently about 34 research scholars are engaged, among which 1 is DST sponsored and 1 is under QIP.

Sponsored Projects

Development of solar-assisted self-sustained circular greenhouse for protected horticulture and floriculture. PI: Dr. Sudip Ghosh, Co-PI: Dr. Kaustav Pradhan, Budget: 24.5 lacs,

Consultancy Projects

Dr. Apurba Das, Model Shaft for 1MPS-13 Capacity (884 kgs) Elevator: LT Elevator Pvt Ltd, Consultancy

Dr. Apurba Das, Geotechnical and Feasibility study for Vanabar Ropeway Section I, Gaya, Consultancy

Dr. Apurba Das, Design and planning of construction of Railway Wagon Facility for Ramsarup Industries Ltd, Kharagpur, Consultancy

Patents

Apparatus for Temperature-Controlled Abrasive Multi-Jet Machining; Inventors: D. Dhupal, **S. Pradhan** and K. Kumari; Status: Granted; Patent No.: 563893; Date of Grant: 27.03.2025; Institute affiliated to: IIEST, Shibpur

Collaborations

Dr. B. Pal. Has collaborations with Imperial College London, IIT Kharagpur, IIT Delhi, IIT Guwahati, and IIT (ISM) Dhanbad

Dr. D. Das has collaborations with IIT Kharagpur and NIT Calicut

Dr. S. Bhattacharjee has collaboration with Jadavpur University

Publications

Journal Publication

S.Bhosale, A.Ganguly, P.Mondal, Performance analyses of a solar-biomass Assisted Absorption cold storage through artificial neural network and genetic algorithm, 46, Article in Press, International Journal of Ambient Energy Taylor and Francis (Scopus Indexed), 2025

P.K. Iyer, V.R. Abishraj, A. Ganguly, M.P. Maiya, Experimental investigations of a desiccant-coated M-cycle cooler as a step towards net zero air-conditioning, 322, 119146, Energy Conversion and Management, Elsevier (SCI Journal Impact Factor 9.9), 2024

Chandan Mandal, Aritra Ganguly, Thermodynamics and economic analysis of a two-stage desiccant cooling (TSDC) system based on biomass heating used for greenhouse application, 149, 12857-12879, Journal of Thermal Analysis and Calorimetry, Springer (SCI Journal Impact Factor 3.2), 2024

Chandan Mandal, Aritra Ganguly, Analysis and Optimization of a Biomass Heated Two-Stage Desiccant Cooling System Used for Greenhouse Cultivation in Hot and Humid Climates, 16, 061006-1-16, ASME Journal of Thermal Science and Engineering Applications (SCI Journal Impact Factor 2.1), 2024

Ajay Vishwakarma; Uttam Rana, Exploring serpentine cold-plate designs for efficient cooling of Li-ion pouch cells: A computational analysis, 244 (2025) 126896, International Journal of Heat and Mass Transfer, 2025

Mahapatra B, Pal B (2025), "From Healthy to Osteoporotic: Exploring How Bone Quality Alters Implant Performance in Pauwels Type III Fracture", Proc. Instn. Mech. Engrs, Part H, Journal of Engineering in Medicine, Accepted, In Press

Banerjee T, Pradeep K, Karar A, Pal B (2025), Effect of cage surface textures on load transfer and ranges of motion in a fused lumbar spine model: a comparative finite element analysis, Proc. Instn. Mech. Engrs, Part H, Journal of Engineering in Medicine, Accepted, In Press.

Pradeep K, Pal B, Mukherjee K, Shetty GM (2025), Transforaminal Lumbar Interbody Fusion (TLIF) Surgery: A Finite Element Analysis of Open and Minimally Invasive Approach on L4-L5 Segment, Heliyon, 11(2), e41842 (1-8).

Kishore P, Pal B (2024), Open Laminectomy plus Posterolateral Fusion versus Open Laminectomy plus Transforaminal Lumbar Interbody Fusion Surgical Approaches for Fusing Degenerated L4-L5 Segment: A Comparative Finite Element Study, Medical Engineering and Physics, 134, 104261 (1-10).

Loha T, Mukherjee K, Pal B (2024), Prediction of bone ingrowth into a porous novel hip-stem: A finite element analysis integrated with mechanoregulatory algorithm, Proc. Instn. Mech. Engrs, Part H, Journal of Engineering in Medicine, 238 (10), 992-1004.

S., Sah, Sardar, S., Guha, A. and Das, D., Electrical discharge machining of hybrid metal matrix composites: a comprehensive review, International Journal of Advanced Manufacturing Technology, 136, pp. 447-536, 2025. DOI: 10.1007/s00170-024-14805-z

PK Sahoo, S Chatterjee, 2024, Effects and applications of non-resonant high-frequency excitation on nonlinear systems: a literature review, Nonlinear Dynamics, 1-60

SM Dholale, S Chatterjee, 2024, Synthesis of a hybrid control algorithm for chaotifying mechanical systems, Chaos, Solitons & Fractals, 189, 115670

SM Dholale, S Chatterjee, 2024, Efficacy of a class of resonant nonlinear controllers of fractional-order for adaptive vibration control—Analysis, simulations and experiments, Control Engineering Practice, 143, 105788

SM Dholale, S Chatterjee, 2024, A novel resonant parametric feedback controller (RPFC) for suppressing nonlinear resonances and chaos in a cantilever beam, Nonlinear Dynamics, 112 (2)

PK Kundu, S Chatterjee, 2024, Limit cycle oscillations in a mechanical system under fractional-order literard type nonlinear feedback, Communications in Nonlinear Science and Numerical Simulation, 128, 107612

N Mandal, A Das, R Datta, 2025, Unravelling a mechanistic link between mitophagy defect, mitochondrial malfunction, and apoptotic neurodegeneration in Mucopolysaccharidosis VII, Neurobiology of Disease, 106825

S Majumdar, A Sinha, A Das, P Datta, D Nag, 2024, An Insight View of Evolution of Advanced Aluminum Alloy for Aerospace and Automotive Industry: Current Status and Future Prospects, Journal of The Institution of Engineers (India): Series D, 1-18

S Sardar, PP Dey, 2025, Analysis of intermetallics and oxide formation by plunging action of the tool in bimetallic AA2018-T4 and C10200 friction stir spot welded products, Sadhana, Accepted on 11 March 2025

SP Rao, S Sivaprasad, HN Bar, PP Dey, 2025, Experimental investigation and computational modelling of 304LN stainless steel under constant and variable strain path multiaxial loading conditions, International Journal of Fatigue, 190, 108581

P Das, N Khutia, PP Dey, P Arora, SK Gupta, 2024, Damage-Coupled Cyclic Plasticity Model for

Prediction of Ratcheting–Fatigue Behavior under Strain and Stress Controlled Ratcheting for Two Different Nuclear Piping Steels, Journal of Materials Engineering and Performance 33 (20), 10745-10756

Subhadip Pradhan, Soumya Ranjan Samantaray, Debabrata Dhupal and Sudhansu Ranjan Das*. Comparative performance evaluation between AJM and hot-AJM during machining of zirconia ceramic using silicon carbide abrasives. Surface Review and Letters, p.2550071, Nov 2024. [SCIE], DOI: 10.1142/S0218625X25500714

K Paul, K Pradhan, BK Mandal, 2025, Effect of variation of the aspect ratio of rectangular twisted tapes inserted in a circular pipe on the thermal performance, Journal of Thermal Science and Engineering Applications, 17 (2)

Ultrasonic NDE for Real-Time Monitoring of Vulcanization in NBR" by Debasis Datta and Subhasis Mondal has been accepted by the Planning Committee of the PANNDT Conference to be held during June 9-11, 2025 in Canada

Ballistic impact Analysis on the effect of layering and stacking sequence of bi-layer and multi-layer ceramic-composite targets by Krishna Biswas and Debasis Datta, Proc IMechE Part L: J Materials: Design and Applications, IMechE 2025, DOI: 10.1177/14644207251327920

Experimental and numerical analysis of ballistic impact and material characterization of GFRP and Kevlar 29/epoxy composite laminate, by Krishna Biswas and Debasis Datta, J Materials: Design and Applications, 2025, Vol. 239(3), 603–616, DOI: 10.1177/14644207241269584

Subrata Mondal, Goutam Paul, Koustov Mondol, Subhas Chandra Mondal, Electric Discharge Machining with Graphene Reinforced Aluminium Metal Matrix Composite (Gr Al MMC) Tool for EN 31 Die Steel Work Piece. J. Inst. Eng. India Ser. C (2025). DOI: 10.1007/s40032-025-01163-2

Subrata Mondal, Goutam Paul, Subhas Chandra Mondal, Koustov Mondol, Ziyauddin Seikh and Mukandar Sekh, Fabrication of Graphene Reinforced Aluminium Metal Matrix Composites for Advanced Tool Materials, accepted for publication, Journal of The Institution of Engineers (India): Series D SCOPUS, 2024

Conference Proceedings

Bibhas Nayak and Aritra Ganguly, Model Development and Analysis of a Greenhouse Air-Conditioning System Coupled with a Desiccant-Coated Heat Exchanger and a Dew Point Indirect Evaporative Cooler, 235_IEC72043, 346, 39th Indian Engineering Congress, Kolkata organized by The Institution of Engineers (India), 2024

V. P. Prajina, Nirmal K. Manna, Uttam Rana & Ashim Guha, Performance Analysis of Sudden Expansion and Dump Diffuser Geometries Across Three Reynolds Number Regime, pp 389–401, International Conference on Mechanical Engineering (INCOM 2024), 2025

V. P. Prajina, Nirmal K. Manna, Uttam Rana & Ashim Guha, Influence of Central Restriction Height on Average Static Pressure in Dump Diffusers, Page (347-360), International Conference on Mechanical Engineering, 2025

Roy A, Pradeep K, Pal B (2025), Comparative Finite Element Analysis of Auxetic Structures for Lumbar Intervertebral Disc Reconstruction, European Society of Biomechanics Congress 2025, to be held in Zürich, Switzerland, 6-9 July 2025, Accepted

Loha T, Pal B (2025), Effect of Implant Design Parameters on Bone Ingrowth Simulation: A Design of Experiment Approach, European Society of Biomechanics Congress 2025, to be held in Zürich, Switzerland, 6-9 July 2025, Accepted

Mahaptra B, Pal B (2025), Analysis of Long-Term Performance of Internal Fracture Fixations Used for Treating Femoral Neck Fractures, European Society of

Biomechanics Congress 2025, to be held in Zürich, Switzerland, 6-9 July 2025, Accepted

Nath Soumaydeep, Pal B (2025), Finite Element Analysis of Novel Auxetic Porous Knee Implant Designs, European Society of Biomechanics Congress 2025, to be held in Zürich, Switzerland, 6-9 July 2025, Accepted

B Patra, S., Biswas, A., Boddana, S., Das, D*. Statistical and neural network modelling of tensile strength during friction stir welding of aerospace grade Aluminium alloys. In 5th International Conference On Advanced Engineering Optimization Through Intelligent Techniques (AEOTIT) SVNIT Surat, India, 28-30 Nov, 2024

Pal, A., Mandal, B.K., Pradhan, K., A Computational Analysis of Thermal Management Technology in Lithium-ion Battery, International Conference on Energy, Environment and Green Technology, April 3-4, 2025, Organized by the Department of Electrical Engineering, NITTTR Kolkata.

Pal, A., Mandal, B.K., Pradhan, K., A Computational Analysis of Thermal Management System in Lithium-ion Battery, International Conference on Multidisciplinary Research in Mechanical Engineering and Nanotechnology, April 11-12, 2025, Organized by Department of Mechanical Engineering, GEC Samastipur

Books and Book Chapters

Chandan Mandal, Aritra Ganguly, Biomass Regenerated Two-Stage Desiccant Cooling (TSDC) System Used for Greenhouse Farming in Hot and Humid Regions: A Seasonal Performance Study in Advances in Energy and Sustainability Select Proceedings of INCOM 2024, Springer Singapore 71-84, 2024

Suman Pramanik, Aritra Ganguly, Performance Analysis of Pressurized SOFC-Based Generation System from an Energy, Exergy, and Economic Viewpoint in Advances in Energy and Sustainability Select Proceedings of INCOM 2024, Springer Singapore31-42, 2024

Ayona Biswas, Aritra Ganguly, Potential of Solar-Biomass-Based Hybrid Microgrid System in Indian Context in Advances in Energy and Sustainability Select Proceedings of INCOM 2024, Springer Singapore57-69, 2024

A. Ganguly, Mukesh Kumar, The Fuel Injection System in MPFI Engines, Advances in Energy Research Nova Publishers Inc. USA40, , 2024

Gupta S, Ceby MS, Pal B, Chanda S, Mukherjee K (2024), Biomechanics of Joints and Implants: Concepts to Applications, 1st Edition, Springer Nature, Singapore, corrected proof submitted

A Mukherjee, A Wazeer, A Das, A Sinha, S Vidya, 2024, 3D-printed composite sensors: advancements, opportunities, and prospects in 3D Printed Smart Sensors and Energy Harvesting Devices: Concepts, fabrication and applications, IOP Publishing

K Pradhan, M Kumar, 2025, Application of heat exchangers in electronics cooling and thermal management in Heat Exchanger Technologies for Sustainable Renewable Energy Systems, CRC Press, 139-157

Faculty Activities

Prof. D. Datta worked as the mentor of the students of Society of Mechanical Engineers in organizing the P.C. Ganguly Memorial Industry-Academia Meet / Workshop on 9 February, 2025, the concluding day of IMPETUS 8.0

Dr. B. Pal was the FIC for Impetus 8.0, on 7-9 February 2025

Dr. S. Das attended 2-days workshop under the Manak Pravardhak Programme (BIS workshop for Engagement of Young Professionals) on 05-06 December 2024 at NITS, Noida. Our institute nominated me to attend the above-mentioned program.

Outreach Activities

FDP / EDP / Invited Talks

Prof. S. C. Mondal delivered a lecture on "Advanced Manufacturing Technologies for Mechanical Engineers" at ATAL Online 6 Days FDP on Industry 4.0 and Smart Manufacturing: Transforming Traditional Practices, 3-8 February, 2025

Prof. D. Datta conducted an FDP on Introduction to Dynamics of Rigid Body via Kane's Method by Dr. A.K. Banerjee (1962, ME) together with Dr. I. Mukherjee (AE&AM) and Dr. A. Das (ME) during March 03-07, 2025 at ME Department

Dr. A. Das was the Course Coordinator to the FDP on 'Introduction to Dynamics of Rigid Bodies via Kane's Method', 3 March, 2025 – 7 March, 2025

Dr. B. Pal delivered an invited talk on 'Evaluation of porous lattice Ti6Al4V structures for orthopaedic implant applications' in an Indo-German Workshop on Additively manufactured patient-specific implants, organized by the Department of Mechanical Engineering, IIT Delhi, in association with IGSTC, AIIMS New Delhi, KIT Germany and OTEC, 3rd February 2025.

Dr. B. Pal delivered an invited talk on 'Porous lattice Ti64 structures for orthopaedic implants' in an Indo-Australian Symposium on Lightweight metals and alloys for bioengineering applications' organized by the Department of Aerospace Engineering and Applied Mechanics, IIEST Shibpur and Department of Metallurgical and Materials Engineering, IIT Kharagpur, in association with Monash University, Australia and BIT Mesra, 23-24th January 2025.

Prof. D. Datta got Invited and acted as the Expert for the Interview for promotion to the post of Works Manager, CSTC on 11 February 2025 at Parivahan Bhawan, Kolkata

Industry Visit as Expert

Dr. A. Das visited the Brand Alloys Pvt. Ltd, Serampore for Casting defects and Casting methodology inspection for CASNUB 22HS Bogie components (Side Frame, Bolster and centre pivot top and bottom) on 19 March 2025.

Achievements

Faculty Achievements

Dr. A. Ganguly is a National Reviewer of the ARAI Journal of Mobility Technology published quarterly by the Automotive Research Association of India (ARAI) under Government of India, Ministry of Heavy Industry

Dr. B. Pal is an Editorial Board Member, Scientific Reports - A Nature Portfolio journal published by Springer Nature (Joined in October 2024)

Students Achievements

UG 4th Year:

Shreyas Kumar (2021MEB052)

Awards, Scholarships, or Fellowships:

1. GAABESU Research Award 2025
2. 1965 ME Alumni Award for Technical Excellence
3. IEEE Travel Grant, December 2024

Admission for Higher Studies:

1. Direct PhD offer from IIT Gandhinagar.
2. Awarded 1-Year Pre-Doctoral Fellowship at RBCCPS, IISc Bangalore.

Soham Banerjee (2021MEB069)

Awards, Scholarships, or Fellowships:

1. BEC84 Change Maker Student Award, 2025
2. IIT Madras Summer Research Fellowship, 2024

Qualified Competitive Exams:

1. GATE XE 2025 (AIR - 14)
2. GATE ME 2025 (AIR - 1079)

Ishita Chaudhary (2021MEB070)

Awards, Scholarships, or Fellowships:

1. National Runner Up in Speak Out for Engineers [SOFE] conducted by IMechE, Jan 13, 2025

2. Best Paper Award at the 1st International Conference on Energy, Environment, and Green Technology (ICEEGT 2025), organized by the Department of Electrical Engineering, NITTTR Kolkata.

NATIONAL INSTITUTE OF TECHNICAL TEACHERS' TRAINING AND RESEARCH, KOLKATA
(Established by the Ministry of Education, Government of India)

NITTTRK/ ICEEGT/2025/002

Certificate of Best Paper

Paper Title: Numerical Simulation of a New Model of Thermoelectric Generators

Authors : Soham Banerjee, Ishita Chaudhary, Pabitra Bhuyan, Bijan Kumar Mandal

This is to certify that Prof./Dr./Mr./Ms ISHITA CHAUDHARY of IIEST, Shibpur, Howrah has been awarded the Best Paper Award for their outstanding presentation of the Paper ID: 175 at the 1st International Conference on "Energy, Environment, and Green Technology" (ICEEGT 2025), organized by the Department of Electrical Engineering, National Institute of Technical Teachers' Training & Research (NITTTR), Kolkata, during 3rd – 4th April 2025.

Prof. Gayadhar Panda
Organizing Chair, ICEEGT 2025

Prof. Debi Prasad Mishra
General Chair, ICEEGT 2025

Qualified Competitive Exams:

1. GATE XE 2025 (AIR - 627)
2. GATE ME 2025 (AIR - 3959)

Abir Roy (2021MEB039)

Qualified Competitive Exams:

1. GATE ME 2025 (AIR - 2133)

Admission for Higher Studies:

1. Direct PhD Offer from IIT Kanpur

Souvik Tewary (2021MEB021)

Qualified Competitive Exams:

1. GATE ME 2025 (AIR - 4400)

Aditya Kumar Rajak (2021MEB002)

Qualified Competitive Exams:

1. GATE XE 2025 (AIR - 544)
2. GATE ME 2025 (AIR - 4580)

Selected for government or PSU jobs:

Management Trainee offer from Engineers India Ltd., a Navratna Public Sector Undertaking under the Ministry of Petroleum and Natural Gas, Government of India [20 LPA].

Soumyadeep Dey (2021MEB046)

Awards, Scholarships, or Fellowships:

1. GAABESU Research Award 2025.

Qualified Competitive Exams:

1. GATE XE 2025 (AIR - 1149)

Admission for Higher Studies:

1. Integrated MS+PhD offer in Mechanical Engineering at University of Washington, Seattle, US.
2. Direct PhD offer in Mechanical Engineering at IIT Kharagpur.

Anurag Chakraborty (2021MEB042)

Qualified Competitive Exams:

1. GATE ME 2025 (AIR - 513)

Admission for Higher Studies:

1. M. Tech. offers in Mechanical Engineering from IITB and IIT KGP.
2. M. Tech. offer in Industrial and Systems Engineering from IIT KGP.

UG 3rd Year:

Bishesha Dash (2022MEB059)

Awards, Scholarships, or Fellowships:

1. GAABESU Research Award 2025
2. IEEE Travel Grant, December 2024
3. BARC Academic Excellence Scholarship, December 2024

Internship and Industrial Training:

1. 6-month Internship Offer from Rolls-Royce, 2025
2. Summer Internship Offer from AIRL, IISc Bangalore, Summer 2025

Sneha Rani (2022MEB063)

Awards, Scholarships or Fellowships

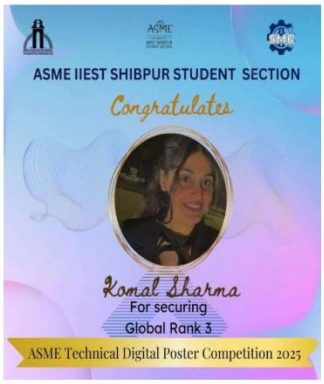
1. GAABESU Scholarship for AY 2024-25

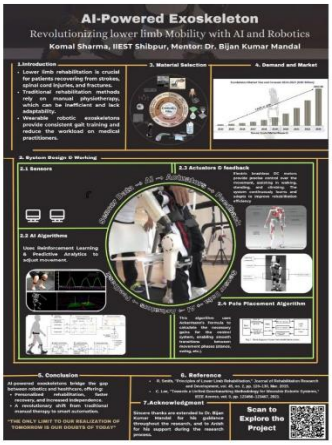
UG 2nd Year:

Komal Sharma (2023MEB041)

Awards, Scholarships, or Fellowships:

1. Global Rank #3 in ASME Technical Digital Poster Competition 2025.





Students Corner

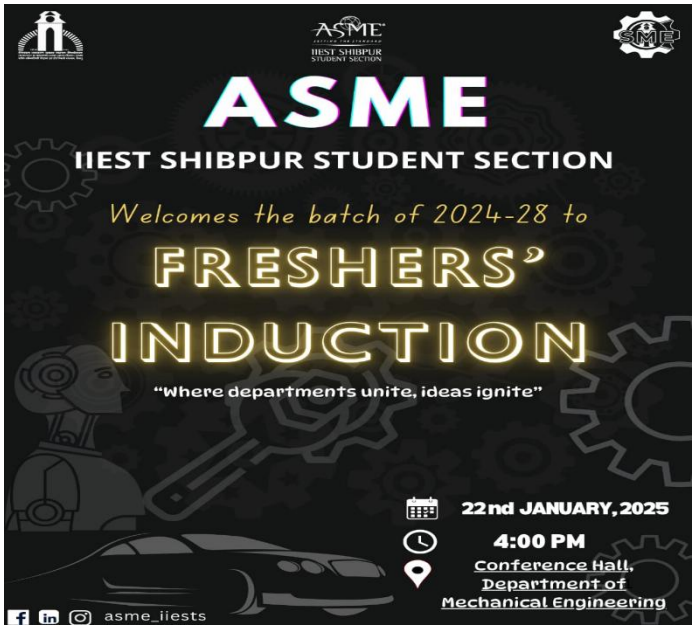
Society Activity

SME Induction, 15 January 2025

Induction program for the first-year students aimed to introduce them to four student chapters (SAE, ASME, IMechE and ISHRAE) under the banner of SME and make them aware of the activities happening in each student chapter.

ASME Freshers' Induction, 22 January 2025

Orientation for the freshers of the institute was conducted. The students' chapter was enthusiastic to see the participation and interest of freshers.



IMechE IIEST, Shibpur Students' Chapter Induction, 30 January 2025

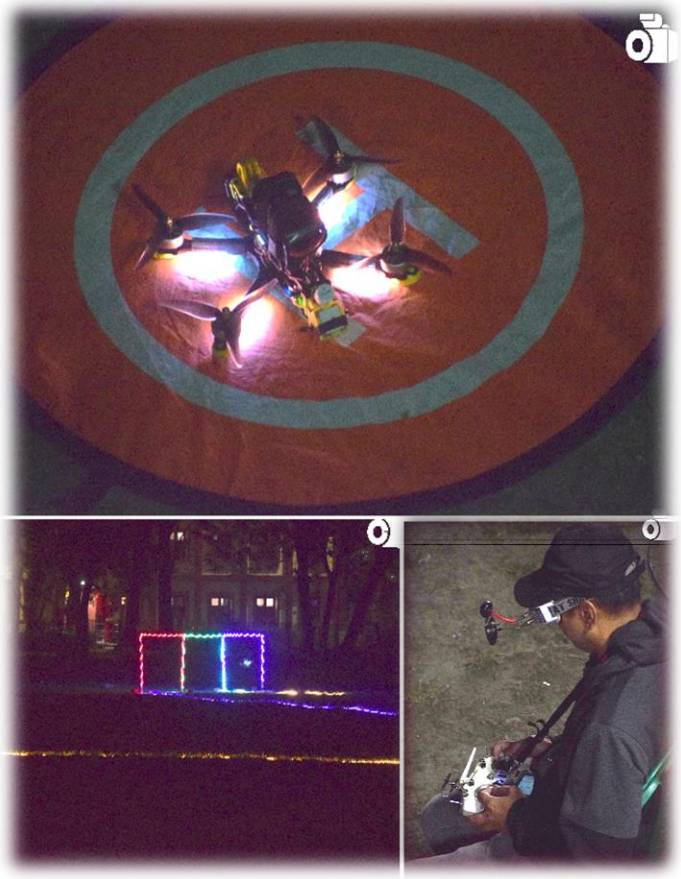
Induction event for the first-year students, highlighting the activities undertaken by the IMechE IIEST, Shibpur Students' Chapter

Impetus 8.0: Momentum in Motion,
(the annual technical festival of the Department)
7-9 February 2025

The event featured a range of technical competitions like CADathon, IQ Ignition, Heatovation, and Scrapyard, where the participants demonstrated their engineering acumen and creativity. Recreational events such as Yantra Search, a mechanical treasure hunt, and e-sports tournaments added vibrancy and inclusivity to the experience. A major highlight was the Aerial Drone Pursuit, where participants expertly navigated drones through challenging circuits, showcasing the fest's focus on cutting-edge technology and hands-on learning.

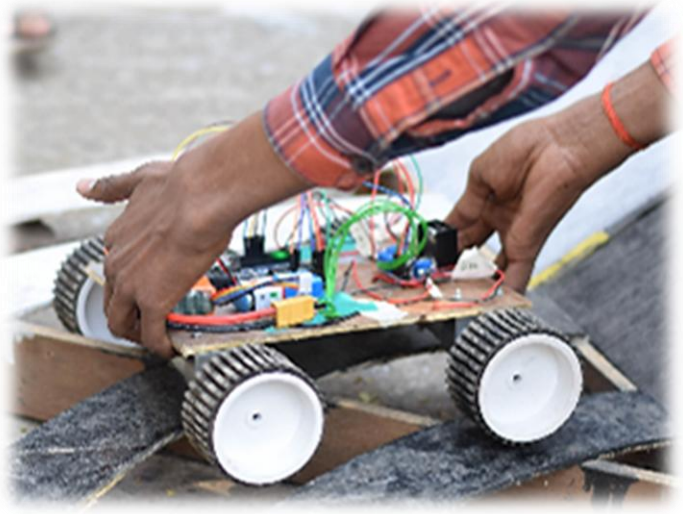
CADathon

Drone Pursuit



Heatovation

Death Race



IQ Ignition

Scrapyard

Valorant

P.C. Ganguly Memorial Industry-Academia Meet, 9 February 2025

As part of Impetus 8.0, an Industry-Academia Meet was organized with an aim to bridge the gap between academia and industry. The event witnessed inspiring discussions and knowledge exchange between students, faculty, and experts from prestigious organizations, including the Ordnance Factory, DRDO, Jupiter Wagons, Unacademy, and IBM

Induction and Aeromodeling Spark Event 2025 (Phase 1), 11 February 2025

The induction program (SAE IIEST, Shibpur Students' Chapter) for the 1st-year students. The program aimed to introduce the new students to the SAE IIEST, Shibpur Students' Chapter and its activities.

Techvarnan, 25 March 2025

A technical poster making competition conducted by ASME IIEST, Shibpur Students' Chapter (under SME) was successfully conducted, providing a platform for students to showcase their creativity and technical knowledge on topics like Biofuels, Industry 4.0, and the evolution of transportation.

Bicycle Autopsy, 27 March 2025

This learning-by-doing activity organised by the Society of Mechanical Engineers (SME), in collaboration with the Capacity Building Program for Design and Entrepreneurship (CBDE), with Dr Bidyut Pal (as the FIC, SME and Faculty Mentor, CBDE), provided students with an opportunity to disassemble a bicycle and understand the function and significance of each component of a bicycle.

Aeromodelling Spark Event 2025 (Phase 2), 28 March 2025

This phase, organised by SAE IIEST, Shibpur Students' Chapter in collaboration with ASME IIEST, Shibpur Students' Chapter (under SME), focused on providing hands-on experience and advanced knowledge in aeromodelling.

TrussMe, 3 April 2025

IMechE IIEST, Shibpur Students' Chapter (under SME) organised a truss-making competition from

popsicle sticks, which was tested using weights. It saw the participation of about 60 students.

Students Talk

Development of LCA Tejas: From Drawing Board to HAL's Production line

The **Light Combat Aircraft (LCA) Tejas** represents India's most ambitious indigenous fighter program, marking the country's entry into the exclusive club of nations capable of developing modern fighter jets. The aircraft's journey from concept to production showcases India's growing aerospace capabilities while highlighting the challenges of developing advanced military technology.

Conceptualization and Early Design Phase

The Light Combat Aircraft (LCA) Tejas program originated in 1983 when the Indian Air Force (IAF) issued Air Staff Requirements (ASR) for a lightweight, multirole fighter to replace aging MiG-21s. In 1984, the Aeronautical Development Agency (ADA) was established to lead the project, with Hindustan Aeronautics Limited (HAL) as the primary manufacturer. Early design work benefited from consultancy by Dassault Aviation (France) and Lockheed Martin (USA), particularly in aerodynamics and systems integration. The aircraft's defining features - an unstable delta wing configuration with relaxed static stability (RSS) and digital fly-by-wire (FBW) control - were conceptualized during this period. Composite materials were selected for 40% of the airframe to reduce weight and radar signature, with National Aerospace Laboratories (NAL) developing carbon-fibre reinforced polymer (CFRP) technologies.

Prototype Development and Technological Challenges

The first Technology Demonstrator (TD-1) was rolled out in 1995, but the program faced severe setbacks following 1998 U.S. sanctions which cut off access to critical technologies. Most significantly, the embargo forced India to develop its own quadruplex-redundant digital FBW system, a task undertaken by ADA and NAL. The indigenous effort delayed the first flight by several years as engineers worked to create fault-tolerant flight control algorithms. Concurrently, the Gas Turbine Research Establishment (GTRE) struggled with the Kaveri turbofan engine development, ultimately leading to the selection of General Electric's F404-GE-IN20 as an interim solution. The airframe incorporated leading-edge vortex controllers (LEVCONs) for enhanced high-angle-of-attack performance, while HAL established composite manufacturing facilities in Bangalore using autoclave curing processes.

Flight Testing and Systems Integration

After extensive ground testing, the TD-1 prototype achieved its maiden flight on 4 January 2001 with Air Commodore Rajiv Kothiyal at the controls. This milestone validated India's indigenous FBW system and composite airframe design. Subsequent prototypes (TD-2, PV-1 to PV-5) expanded the flight envelope and tested weapon integrations. The avionics architecture evolved during this period, with Bharat Electronics Limited (BEL) developing the open-architecture mission computer and Samtel providing multifunction displays for the glass cockpit. However, delays in the indigenous Multi-Mode Radar (MMR) forced the adoption of Israel's Elta EL/M-2032 radar. The defensive systems suite incorporated DRDO's Tarang radar warning receiver and missile approach warning system. By 2010, HAL had established production

lines in Bangalore and Hyderabad for modular assembly of front, centre, and rear fuselage sections.

Operational Clearance and Initial Production

The Tejas achieved Initial Operational Clearance (IOC-1) in January 2011, followed by IOC-2 in December 2013 after expanding its flight envelope and weapon capabilities. Final Operational Clearance (FOC) in February 2019 came after successful testing of air-to-air refuelling, Beyond Visual Range missile integration (including the indigenous Astra Mk1), and gun firing trials with the Russian GSh-23 cannon. HAL's production faced challenges with initial rates of just 4-6 aircraft annually due to supply chain issues, particularly with imported components like ejection seats and radars. The manufacturing process incorporated robotic drilling for composite structures and advanced jigging systems, gradually increasing to 16 aircraft per year. The weapons management system, developed by Defence Avionics Research Establishment (DARE), enabled integration of diverse armaments including Python-5 and Derby missiles (Israel), Kh-59ME (Russia), and DRDO's Smart Anti-Airfield Weapon (SAAW).

Advanced Variants and Future Roadmap

The current focus is on the Tejas Mk1A variant featuring the ELTA EL/M-2052 AESA radar (to be replaced by DRDO's Uttam AESA in later batches), improved electronic warfare suite, and reduced maintenance requirements. The 2021 contract for 83 Mk1A aircraft (₹48,000 crore) represents India's largest indigenous defence deal. HAL has established new production lines targeting 16 aircraft annually, incorporating lessons from initial manufacturing challenges. Development of the Tejas Mk2 (Medium Weight Fighter) is underway, featuring the more powerful GE F414-INS6 engine (98 kN thrust), increased fuel capacity, and target of 75% indigenous content. The program's legacy continues in the Advanced Medium Combat Aircraft (AMCA) project, which builds on Tejas-developed technologies in composites, FBW systems, and avionics architecture. While the naval variant was shelved due to performance limitations, the program has generated export interest from Malaysia, Argentina and Egypt, showcasing India's growing aerospace capabilities.

The Tejas program's three-decade journey has transformed India's aerospace ecosystem, creating indigenous capabilities in advanced aerodynamics, composite manufacturing, flight control systems, and avionics integration. Despite early challenges with engines and radar systems, the program has established a foundation for future combat aircraft development while delivering a capable 4.5-generation fighter to the IAF. The evolution from Mk1 to Mk1A and upcoming Mk2 variants demonstrates India's commitment to progressively increasing indigenous content and technological sophistication in defence aviation.

– Gali Karthikeyan
4th Year
Department of Mechanical Engineering

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