ISSUE: 2 | VOLUME: 5 | YEAR: 2024-25

St. XAVIER'S CATHOLIC COLLEGE OF ENGINEERING (Autonomous)

Chunkankadai, Nagercoil - 629003
Kanyakumari District, Tamil Nadu

Approved by AICTE & Affiliated to Anna University, Chennai
Accredited with 'A' Grade by NAAC
UG Programs(ECE, EEE, Mech, Civil, CSE & IT) Accredited by NBA
Anna University Recognized Research Institute
Recognized under section 2(f) & 12(B) of UGC Act, 1956
UG Programs(ECE, EEE, Mech, Civil, CSE & IT),
MBA & MCA Programs Permanently Affiliated

News Letter

Department of Mechanical Engineering

""Education is the key that unlocks the golden door to freedom."

Department Vision

Developing technically sound mechanical engineering professionals to serve the global community with academic excellence and innovative research

Department Mission

M 1 To transform the students into mechanical technocrats with clear conceptual understanding and hands-on experience

M 2 To integrate the fundamentals with recent concepts through technical gatherings, research and industry interactions

M 3 To impart managerial quality and develop soft skills through leadership and personality development programs

M 4 To inculcate core human values through ethical practices and inspire them to serve the society

HoD's Message

It gives me immense pleasure to present the Department of Mechanical Engineering newsletter for the period of January to June 2025. This edition showcases a vibrant tapestry of academic excellence, innovative research, impactful workshops, and spirited student participation.

Our faculty members continue to set high standards in research and development, with numerous publications in reputed journals, participation in faculty development programs, and contributions as resource persons in various technical domains. I am particularly proud of the significant strides our department has made in patent filings and interdisciplinary research activities that align with emerging industrial trends.

The Mechanical Engineering association (MEGX) has been instrumental in organizing a plethora of value-added programs from seminars and industrial visits to national-level symposiums cultivating both technical acumen and leadership qualities in our students.

Our students have brought laurels to the department by excelling in various intercollegiate events, further affirming our commitment to holistic development and academic rigor.

I extend my heartfelt gratitude to all faculty members, supporting staff, and students whose passion and perseverance have driven these accomplishments.

Dr. G. Antony Miraculas

ABOUT THE DEPARTMENT

Established in 2003, the Department of Mechanical Engineering offers both undergraduate and postgraduate programs with a strong focus on research, innovation, and industry collaboration. The department fosters professional growth through active student associations such as MEGX, SAE, and ISHRAE, which regularly organize workshops, seminars, and industry-engagement activities. Accredited by the NBA and granted autonomous status, the department remains committed to academic excellence by continuously updating its curriculum in line with industry needs, equipping students with hands-on skills and exposure to cutting-edge technologies.

Editors

Dr. G. Antony Miraculas
Dr. Y. Balto
Mr. Vaishnav S S (III Mech.)
Mr. Shane Lensar B (III Mech.)

Programs Organized

MEGX (Mechanical Engineering Extension Cell)

1. METEOR'25 – National Level Technical Symposium

Date: 25th April 2025

Goal: Ignite innovation and technical brilliance

Resource Person: Mr. A. Joseph Selvaraj, Petrafons

Participants: 187 (Staff: 14, Students: 173)

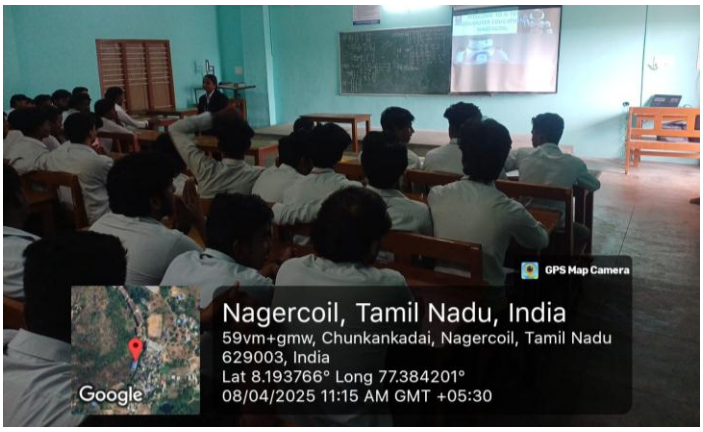
2. Awareness on Revit MEP for Mechanical Engineers

Date: 8th April 2025

Goal: Improve proficiency in BIM tools for mechanical engineers

Resource Person: Mrs. V. Sumitha, G-TEC, Nagercoil

Participants: 68 (Staff: 2, Students: 66)



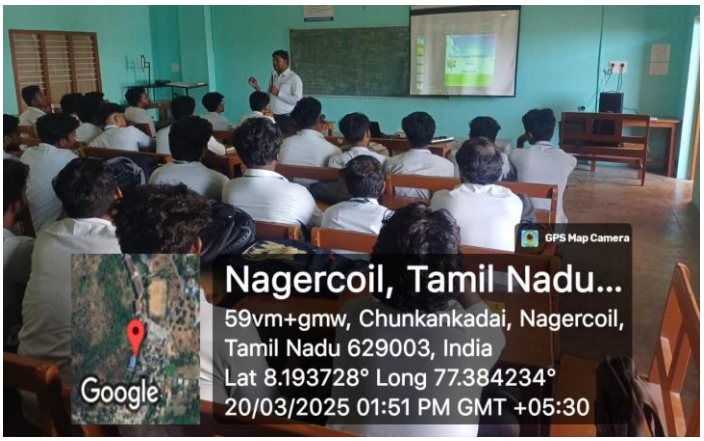
3. Trends and Innovations in the Automotive Industry

Date: 20th March 2025

Goal: Explore modern automotive developments

Resource Person: Mr. Selvaraj, Chief Trainer, Tri-O Technologies

Participants: 145 (Staff: 4, Students: 141)



4. Career Prospects in Mechanical Design Engineering

Date: 18th March 2025

Goal: Explore job opportunities in design engineering

Resource Person: Mr. S. Vishnu, EduCAD Tech, Nagercoil

Participants: 67 (Staff: 2, Students: 65)

5. Skill Wizard Program for Mechanical Engineers

Date: 13th February 2025

Goal: Train students in industry-relevant CAD/CAM skills

Resource Persons: Mr. R. Selvaraj & Mr. Aswin, CAD DESK

Participants: 128 (Staff: 2, Students: 126)

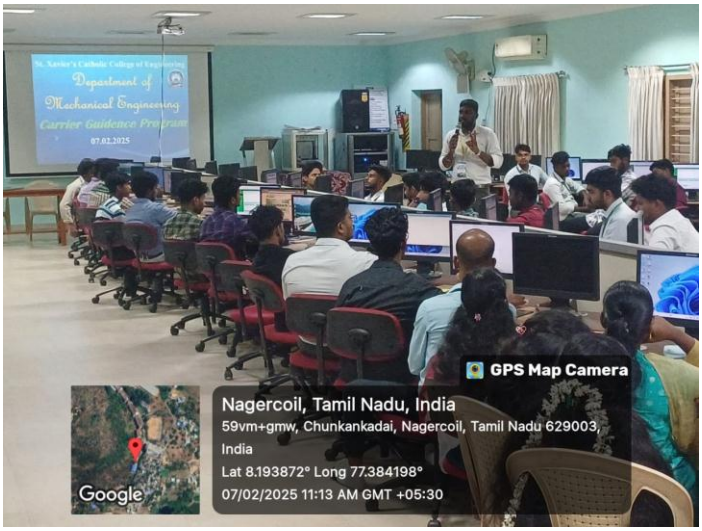
6. Career Guidance Program for Mechanical Engineers

Date: 7th February 2025

Goal: Highlight software design career paths

Resource Persons: Mr. K. Augustin Raj & Ms. Sowmi, Cadpoint Engineering

Participants: 65 (Staff: 3, Students: 62)



SAE (Society of Automotive Engineers)

1. Field Visit to Matrics

Date: 24th April 2025

Goal: Connect academic learning with industry practices in materials research

Resource Persons: Dr. M. Felix Xavier Muthu, Dr. J. Jebeen Moses, Mr. T. Michel Raj (SXCCE)

Participants: 35 (Staff: 32, Students: 3)

2. Guest Lecture: Recent Trends in Marine Engineering

Date: 8th March 2025

Goal: Educate students on current marine technologies and mechanical roles

Resource Person: Mr. Franklin Antony Libin Vincent, Assistant Professor, NI University

Participants: 49 (Staff: 1, Students: 48)

ISHRAE (Indian Society of Heating, Refrigerating and Air Conditioning Engineers)

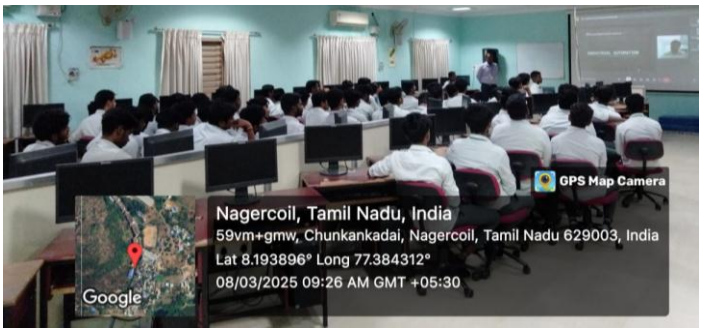
1. Guest Lecture: Industrial Automation

Date: 8th March 2025

Goal: Introduce industrial automation tools and real-life examples

Resource Person: Mr. Arasan Veron Francis

Participants: 64 (Staff: 1, Students: 64)



MoU with Darrels AM Research and Reverse Engineering Labs Pvt. Ltd.

On 9th April 2025, the Department of Mechanical Engineering at St. Xavier's Catholic College of Engineering signed a Memorandum of Understanding (MoU) with Darrels AM Research and Reverse Engineering Labs Pvt. Ltd., a leading player in additive manufacturing and reverse engineering. This collaboration aims to provide students with hands-on training opportunities through internships and participation in incubation centre activities. The MoU facilitates student access to advanced 3D modeling and printing technologies, fostering innovation and product development skills. This strategic partnership bridges the gap between academic knowledge and industrial practices, enhancing student employability and research capabilities. The MoU is valid until 8th April 2030, marking a long-term commitment to academic-industry synergy.

Research Publications Report

Academic Year: ***2024–2025***

The Department of Mechanical Engineering takes pride in the remarkable research contributions made by its faculty and students. A total of 13 peer-reviewed international journal publications were published in reputed journals including Elsevier, Wiley, ASCE, Taylor & Francis, Emerald, and de Gruyter. These high-impact articles reflect the department's consistent efforts toward cutting-edge research in sustainable technologies, material science, bio-composites, renewable energy, and digital innovation.

1. ***Parametric Optimization of Tyre Waste Co-Gasification***

Authors: Manikandan Parathesi, **Christus Jeya Singh V**, Beno Wincy W

Journal: Energy (Elsevier, WoS Indexed, Impact Factor: 9)

DOI: 10.1016/j.energy.2025.134786

This research focuses on sustainable waste-to-energy conversion using RSM-CCD techniques for co-gasification in downdraft gasifiers.

2. Char Reduction and Gas Quality Enrichment from Tyre Waste

Authors: Manikandan P, Beno Wincy W, **Christus Jeya Singh V**

Journal: Fuel (Elsevier, SCI Indexed, Impact: 6.7)

DOI: 10.1016/j.fuel.2025.134744

A significant contribution toward improving energy efficiency in gasifiers through waste co-processing.

3. Hydroxyapatite Synthesis for Biomedical Use

Authors: D. Ajith Kumar, **Ajith J. Kings**, L.R. Monisha Miriam, **Shambu S. Krishna**

Journal: Biomass & Bioenergy (Elsevier, Impact: 5.7)

DOI: 10.1016/j.biombioe.2025.107618

Highlights the biological synthesis of hydroxyapatite from natural sources for orthopedic and dental applications.

4. Characterization of Pistia-Derived Microcrystalline Cellulose

Authors: **Ajith J. Kings et al.**

Journal: International Journal of Biological Macromolecules (Elsevier, Impact: 7.7)

DOI: 10.1016/j.ijbiomac.2025.140217

A cross-disciplinary work involving Mechanical, ECE, and Biotech departments.

5. Biodiesel Optimization using Nano-Biocatalyst

Authors: **S. Santhosh Kumar et al.**

Journal: Bioresource Technology Reports (Elsevier)

DOI: 10.1016/j.biteb.2025.102066

This paper analyzes seasonal seed oil biodiesel production using nano-biocatalysts.

6. Nanoparticle Effects on Friction Stir Welded Joints

Authors: Sanu Kailordson K., **Felix Xavier Muthu M.**

Journal: Industrial Lubrication and Tribology (Emerald, Impact: 1.5)

DOI: 10.1108/ILT-10-2024-0360

A study on wear resistance and mechanical behavior in dissimilar joints.

7. Thermal Modeling of Roofs Using Recycled Insulation

Authors: **Y. Balto,** R. Edwin Raj, M. Carolin Mabel, J.S. Binoj

Journal: Journal of Architectural Engineering (ASCE)

DOI: 10.1061/JAEIED.AEENG-1794

Interdisciplinary work modeling energy-efficient building structures.

8. Gasification of Rubber and Palm Kernel Shells

Authors: P. Marshal Raj, **M. Gerald Arul Selvan**

Journal: International Journal of Chemical Reactor Engineering (de Gruyter, Impact: 1.2)

DOI: 10.1515/ijcre-2024-0121

9. Growth and Optical Study of Doped Crystals

Authors: N. Sheen Kumar, **M. Gerald Arul Selvan**

Journal: Journal of Molecular Structure (Elsevier, Impact: 4.7)

DOI: 10.1016/j.molstruc.2025.142820

Focused on nonlinear optical properties of doped semi-organic crystals.

10. Machine Learning in Composite Characterization

Authors: M. Gerald Arul Selvan et al.

Journal: Advances in Materials Science and Engineering (Wiley, Scopus Indexed)

Presents a model for characterizing screw pine fiber composites using AI.

11. Cyber Security in Cloud through Encryption Algorithms

Author: **M. M. Anwar Rajesh**

Journal: AIP Conference Proceedings (Scopus Indexed)

A computational study evaluating encryption for cloud data security.

12. Biocomposite from Ficus benjamina L. Root Fiber

Authors: **M. Sergius Joe** et al.

Journal: Journal of Natural Fibers (Taylor & Francis, SCI, Impact: 2.8)

DOI: 10.1080/15440478.2025.2475158

Investigates eco-friendly composites with natural fiber reinforcement.

Publication Summary

Total Publications: 13

Indexing: WoS, SCI, Scopus

Impact Factor Range: 1.2 – 9.0

These publications underline the department's commitment to interdisciplinary research, innovation, and societal relevance. The collaborative efforts have not only expanded the boundaries of mechanical engineering research but also established the department as a contributor to globally recognized academic excellence.

Faculty Excellence through NPTEL & SWAYAM Certifications

The Department of Mechanical Engineering at St. Xavier's Catholic College of Engineering continues to encourage its

faculty to engage in lifelong learning through premier online platforms such as NPTEL and SWAYAM. Several faculty members successfully completed certification courses offered by IITs and national institutes, focusing on both technical advancements and pedagogical enrichment.

Dr. G. Antony Miraculas distinguished himself by completing two significant courses through NPTEL. The first, Soft Skill Development, offered by IIT Kharagpur, focused on enhancing interpersonal and professional skills essential for effective communication and leadership. His second course, Inspection and Quality Control in Manufacturing, offered by IIT Roorkee, provided valuable insights into modern quality assurance practices in engineering industries. He earned Elite certificates in both courses, reflecting high academic performance.

Dr. M. Gerald Arul Selvan completed a course on Outcome-Based Pedagogic Principles for Effective Teaching through NPTEL. This program emphasized the importance of aligning teaching methodologies with clearly defined learning outcomes, a cornerstone of modern engineering education.

Similarly, Dr. J. Jebeen Moses successfully completed an extended 8-week version of the same course offered by IIT Kharagpur, earning an Elite certificate. Her commitment to pedagogical refinement demonstrates the department's focus on continuous improvement in academic delivery.

Dr. D.X. Tittu George expanded his expertise in educational tools by completing the Educational Media course offered by NITTTR Bhopal via the SWAYAM platform. This course provided a comprehensive understanding of integrating multimedia and digital resources in the teaching-learning process, for which he also earned an Elite certificate.

Mr. Jude Vinoth V earned an Elite certificate upon completing the Inspection and Quality Control in Manufacturing course from IIT Roorkee, underscoring the department's emphasis on quality-centric education and practical knowledge.

These certifications reflect the faculty's proactive efforts to stay updated with current academic and industry trends, ultimately enriching the learning experience for students. Their achievements are a testament to the department's culture of academic excellence and professional growth.

Student Awards and Achievements

The students of the Department of Mechanical Engineering showcased commendable technical expertise and creativity by excelling in numerous national and state-level events during the academic year 2024–2025. Their participation in competitions, symposiums, and conferences across institutions such as Annai Vailankanni College of Engineering, Nooral Islam University, Stella Mary's College of Engineering, DMI Engineering College, and Rohini College of Engineering brought significant laurels to the institution. Notable achievements include Adhi Krishnan's First Place in the Off-Road Race, Jeffrin Diaz Savio's victories in CAD Modelling and Lathe Master events, and Arun J.'s outstanding performances in multiple technical contests. Students like Shane Lensar, Vaishnav S.S., Laxman, Mithul Sharon, and Sahaya Jebath demonstrated academic strength in technical quizzes, while Nevin Joe J. earned accolades in photography and poster presentations, alongside active participation in academic conferences.

These achievements reflect the department's emphasis on holistic development, blending technical knowledge with creativity, problem-solving, and communication skills. From winning top honors in engineering design and manufacturing-based competitions to engaging in academic forums and state-level conferences, the students have displayed a well-rounded approach to engineering education. Their success not only reinforces the department's academic vision but also exemplifies the drive, innovation, and excellence that define the student community at St. Xavier's Catholic College of Engineering.

Faculty Development Programme (FDP)

Emerging Trends in Sustainable and Smart Manufacturing Systems

24^{th} – 30^{th} June 2025

The Department of Mechanical Engineering successfully organized a Faculty Development Programme (FDP) on

"Emerging Trends in Sustainable and Smart Manufacturing Systems" from 24th to 30th June 2025. The program aimed to enrich faculty members and researchers with the latest developments in smart manufacturing, sustainable practices, and interdisciplinary innovations. A series of expert lectures delivered by distinguished academicians and researchers provided deep insights into Industry 4.0 and 5.0 technologies, additive manufacturing, energy-efficient construction, and computer vision applications in modern production systems.

The FDP commenced on 24th June 2025 with a keynote session on "The Synergy of Industry 4.0 and 5.0: Pathways to Smart Manufacturing" by Dr. R. Edwin Raj, Professor at Gati Shakti Vishwavidyalaya, Vadodara, Gujarat. He elaborated on the convergence of automation, human-centric design, and intelligent systems, highlighting how industries are transitioning from digitalization to hyper-personalized smart factories.

On 25th June 2025, Dr. S. C. Vettivel, Professor, Department of Mechanical Engineering, Chandigarh College of Engineering and Technology, discussed "Additive Manufacturing: Trends, Technologies, and Applications". His session covered recent breakthroughs in 3D printing processes and materials, and their transformative role in decentralized and customized production systems.

The session on 26th June 2025 focused on "Numerical Modeling and Simulation of Additive Manufactured Components". Delivered by Dr. M. S. Starvin, Assistant Professor (Selection Grade), University College of Engineering, Nagercoil, the talk emphasized the importance of simulation tools in predicting mechanical behavior and optimizing design parameters for additively manufactured parts.

On 27th June 2025, Dr. J. Jerlin Rejin, Professor, Department of Civil Engineering, St. Xavier's Catholic College of Engineering, presented on "Eco-Conscious Material Choices for Sustainable Construction Practices". She highlighted the use of recycled, renewable, and low-carbon materials in building projects, aligning engineering practices with environmental stewardship.

The session on 28th June 2025 was led by Dr. M. Antony Forster Raj, Associate Professor, Department of Mechanical Engineering, St. Xavier's Catholic College of Engineering. His topic, "Innovative Strategies for Low-Energy Building Design and Implementation", explored passive design techniques, energy simulation tools, and practical approaches to achieving net-zero energy buildings.

The FDP concluded on 30th June 2025 with an insightful session on "Computer Vision in Smart Manufacturing" by Prof. C. Seldev Christopher, Professor, Department of Computer Science and Engineering, St. Xavier's Catholic College of Engineering. He demonstrated the integration of AI-powered vision systems in automated inspection, defect detection, and quality control across smart production lines.

This week-long FDP empowered participants with a multi-dimensional understanding of the evolving manufacturing landscape. It promoted cross-disciplinary collaboration and emphasized the role of sustainable practices and digital intelligence in future-ready industries. The Department extends its gratitude to all the speakers and participants for making the program a grand success.

Patent Filing

Dr. G. Antony Miraculas, Associate Professor, Department of Mechanical Engineering, has co-invented a novel "Vibration Mount for Engine", which was officially published in The Patent Office Journal (No. 09/2025, dated 28/02/2025) under Application No. 202541012544 A. This innovative patent proposes the use of fluorocarbon as a superior alternative to traditional rubber in engine mounts.

Faculty Recognitions and Academic Contributions

The Department of Mechanical Engineering proudly celebrates the prestigious recognitions and contributions received by its faculty members in national and international platforms during the academic year 2024–2025. Dr. G. Antony Miraculas was recognized as a reviewer for a book chapter by BP International, highlighting his subject expertise at the international level. Dr. M. Gerald Arul Selvan received accolades as a

reviewer for reputed journals such as Polymer Composites and Wiley–Bio Polymer. Dr. J. Jebeen Moses was honored for her reviewing services with Springer Nature, and Dr. Sergius Joe M contributed as a reviewer for Wiley journals. Dr. Y. Balto was invited as a guest lecturer multiple times by Universal College of Engineering and Technology, while Dr. D.X. Tittu George delivered a guest lecture on Advanced Energy Storage Systems at Stella Mary's College of Engineering. These recognitions stand as a testament to the department's academic leadership, research excellence, and knowledge dissemination beyond institutional boundaries.