

MEXPRESS

MAY 2024

Mechanical Engineering Department's Official Newsletter
Volume No. 07 Issue No. 09
For Internal Circulation Only



REACH US AT



Mechanical Engineering Association
Department of Mechanical Engineering
KUMARAGURU COLLEGE OF TECHNOLOGY



EDITORS



Dr. C. Velmurugan
Professor & Head



Dr. B. N. Sreeharan
Assistant Professor - II

ASSOCIATE EDITORS



Mr. S. V. Nithesh



Ms. P. Kirubashini



Mr. K. V. Vijay Adithya



Ms. S. Santhiya

CONTENTS

Details	Page No.
Editors' Portfolio	4
Programmes Organized	5
Paper Presentations	7
Paper Publications	7
Manuscripts Reviewed	8
Book Chapter Publication	8
Industry Linkage	8
Consultancy	9
Patents	9
Programmes Participated	9
Snap Shots	11
Student Publications	12
Student Participations	12
Student Patent	12
Student Articles	13
Vision, Mission, POs, PSOs and PEOs	15

From the Editors...

Dear Readers,

In this month's newsletter, we celebrate the ongoing achievements of our faculty, staff, and students. Here's a look at some key accomplishments:

Faculty Focus: Knowledge Dissemination: Our faculty continue to actively share their expertise at conferences through **paper presentations**. Their dedication to scholarly exchange promotes advancement in their respective fields. **Peer Recognition:** We applaud faculty members who recently had their work published in prestigious journals, as evidenced by the number of **paper publications**. This recognition reflects the high quality of their research. **Industry Engagement:** Expanding their impact beyond academia, some faculty members have established valuable **industry linkages** and provided **consultancy** services. This collaboration ensures our curriculum remains current and relevant to real-world applications.

Innovation Spotlight: This month, we celebrate the filing of new **patent applications** by our faculty. These applications translate their research findings into potentially groundbreaking technological advancements, demonstrating our commitment to innovation.

Lifelong Learning: Our faculty actively invest in their own growth by participating in **programmes** to enhance their skills and stay updated in their areas of expertise. This dedication to continuous learning benefits our students directly.

Student Achievements: A vibrant learning environment fosters student success. Here are some notable student accomplishments:

- **Scholarly Pursuit:** We recognize students who have published their research or written insightful **articles**. Their efforts showcase their dedication and growing expertise.
- **Active Participation:** Student involvement in **programmes** outside the classroom complements their academic studies and enriches their overall learning experience.
- **Innovation Spirit:** Students who have filed **student patents** demonstrate the department's commitment to nurturing the spirit of innovation in the next generation.

This monthly snapshot highlights just a few of the remarkable achievements within our department. We are inspired by the dedication and talent of our faculty, staff, and students. Stay tuned for the next edition, where we'll showcase additional achievements and upcoming events!

Warm regards,

Editors....



PROGRAMMES ORGANIZED:



A training programme on “Next-gen Industry solutions for Product Design using 3D Experience” was organized on 27-04-2024. **Mr. G. Vergin Vino**, Design Engineer, TANCAM, was the resource person. **Mr. R. S. Mohankumar**, Assistant Professor – II and **Dr. S. Thirumurugaveerakumar**, Associate Professor were the coordinators.



Department Activities



A guest lecture on “Synthesis of Nanomaterials” was organized on 26-03-2024. **Dr. Geethakarthis**, Professor, Department of Civil Engineering, KCT delivered the guest lecture. **Dr. P. S. Samuel Ratna Kumar**, Assistant Professor – III, coordinated the guest lecture.



A Field visit to TNAU ABIS was organized on 10-04-2024 for 60 students of the department. The visit was coordinated by **Dr. S. Thirumurugaveerakumar**, Associate Professor.

PAPER PRESENTATIONS:



Mr. P. D. Devan, Assistant Professor II, presented his paper entitled "Investigation on mechanical characterises of skill fiber reinforced poly propelene composites" in the International Conference on 'Sustainable in Materials, Manufacturing and Automation (ICSIMMA2024)' organized by Kalasalingam Academy of Research and Education from 17-04-2024 to 18-04-2024.

PAPER PUBLICATIONS:

Dr. V. Manivel Muralidaran, Assistant Professor – III, published his paper entitled "Assessing the impact of electric vehicle charging on power procurement costs: Implications for India's energy utilities" in the Scopus indexed Tuijin Jishu/Journal of Propulsion Technology.



Dr. K. K. Arun, Assistant Professor – III, published his paper entitled "Study on Design and Analysis of Single Envelope Worm Gear for Solar Tracking System" in the International Journal of Novel Research and Development.

Dr. S. Thirumurugaveerakumar, Associate Professor, published his paper entitled "Study on the Mechanical Properties of the Camshaft by Varying Al-7075 and Silicon Carbide Composition" in the International Journal of Research and Analytical Reviews.



Mr. S. Sivakumar, Assistant Professor – II, published his paper entitled "Thermohydraulic performance of Curved Trapezoidal Winglet Vortex Generator using Sudden Expansion Channel" in the International Research Journal of Engineering and Technology (IRJET).

Dr. M. Balaji, Associate Professor, published his paper entitled "Barrier Analysis of Industrial Solid Waste Management Using Interpretive Structural Modeling", in the International Journal of Industrial Engineering Research and Development (IJIIRD).



MANUSCRIPTS REVIEWED:



Dr. B. N. Sreeharan, Assistant Professor – III, reviewed following manuscripts. Details are given below.

“Enhancing Microstructure and Mechanical Properties of Dissimilar TIG Welded Duplex 2205 and Ni-based Inconel718 Superalloy Through Post Weld Heat Treatment” for Engineering Research Express Journal.

“Comparisons of microstructure and mechanical properties of MAG joints welded in 2G and 3G conditions” for Materials Research Express Journal.

“Optimization study of single point incremental forming process of low carbon steel/CP-Titanium bimetallic sheets using grey relational analysis and response surface methodology” for Brazilian Society of Mechanical Sciences and Engineering Journal.



Dr. P. S. Samuel Ratna Kumar, reviewed a manuscript titled “Assessing Hidden Corrosion In Az91 Magnesium Alloy Via Infrared Thermography In Simulated Atmospheric Acid Rain Conditions” Engineering Research Express Journal.

BOOK CHAPTER PUBLICATIONS:

Dr. P. S. Samuel Ratna Kumar, Assistant Professor – III, published a book chapter titled “Sustainable Development of Redundant Articulated Robot Components Using Simscape Multibody” in the book Sustainable Machining and Green Manufacturing, published by Wiley, pp. 193–220, ISBN: 9781032356358.



INDUSTRY LINKAGE:



Dr. M. Balaji, Associate Professor on 03-04-2024 had Industry Interaction with Emerald Jewel Industry, Rakkipalayam, Coimbatore as a part of guiding PG project and Industrial Consultancy and processes of waste segregation and management.

On 12-04-2024, **Dr. P. S. Samuel Ratna Kumar**, Assistant Professor – III, visited CIRCOR Flow Technologies (P) Ltd for a consultancy work titled TUV Gates Surface Unevenness Process. He also visited Bonded Textile Pvt Ltd – Madurai for a project discussion on Rubber bladder on 08-04-2024.



CONSULTANCY:

Dr. P. S. Samuel Ratna Kumar, Assistant Professor – III, provided consultancy to Adavanced Naval Systems Programme - ANSP, Hyderabad on "Design of Rubber Bladder for NC Dome" for Rs. 16,91,000/-



PATENTS:



Dr. K. K. Arun, Assistant Professor – III, published a patent bearing no. 202441031116 A on "A Novel Approach to Electro-Optical Tracking: Improved Particle Swarm Optimization Fractional-System Identification Algorithm on 26-04-2024.

Dr. V. Manivel Muralidaran, Assistant Professor – III, published a patent bearing no. 6342734 titled "Machine for Analysis of the resistance of welded parts by the electrical system".



PROGRAMMES PARTICIPATED:



Dr. M. Balaji, Associate Professor, completed a NPTEL Course on "Teaching And Learning in Engineering (TALE)" from 08-01-2024 to 13-01-2024, organized by NPTEL. Further he participated in a FDP on "Precision Manufacturing" from 08-01-2024 to 13-01-2024, organized by PSG College of Technology, Coimbatore. He also participated in a FDP on "The Smart and Sustainable Manufacturing - The new Era of Manufacturing" from 08-01-2024 to 13-01-2024, organized by Government Polytechnic College, Chekkanurani

Dr. N. Sangeetha, Senior Asso Professor, completed a NPTEL Course on "Nature and Properties of Materials" from 08-01-2024 to 13-01-2024, organized by NPTEL. He also participated in a FDP on "The Smart and Sustainable Manufacturing - The new Era of Manufacturing" from 08-01-2024 to 13-01-2024, organized by Government Polytechnic College, Chekkanurani.



Dr. P. R. Ayyappan, Assistant Professor (SRG), participated in a FDP on "Pioneering the Future of BlockchainTechnology" from 08-01-2024 to 13-01-2024, organized by National Institute of Technology Tiruchirappalli.

Dr. B. N. Sreeharan, Assistant Professor II, participated in a FDP on "Application of Internet on things in mechanical Engineering and Agricultural Engineering Systems" from 08-01-2024 to 13-01-2024, organized by Sri Ramakrishna College of Engineering, Perambalur.



Department Activities



Dr. M. A. Vinayaga Moorthi, Assistant Professor III, completed a NPTEL course on "Product Engineering and Design Thinking" from 08-01-2024 to 13-01-2024, organized by NPTEL

Dr. M. Thirumalai Muthukumaran, Assistant Professor III, completed a NPTEL course on "Product Engineering and Design Thinking" from 08-01-2024 to 13-01-2024, organized by NPTEL.



Dr. S. Rajesh, Assistant Professor II, participated in a FDP on "Nanotechnology for sustainable growth and development" from 08-01-2024 to 13-01-2024, organized by KCT, Coimbatore.

Dr. S. Thirumurugaveerakumar, Associate Professor, participated in a FDP on "Nanotechnology for sustainable growth and development" from 08-01-2024 to 13-01-2024, organized by KCT, Coimbatore. He also participated in a STTP on "Computational Fluid Dynamics and Heat Transfer" from 08-01-2024 to 13-01-2024, organized by KCT.



Mr. S. Sivakumar, Assistant Professor II, participated in a FDP on "CMG 339 - Creativity and Innovation in Entrepreneurship" from 08-01-2024 to 13-01-2024, organized by Anna University Regional Office, Coimbatore. He also completed a NPTEL Course on "Introduction on Intellectual Property to Engineers and Technologists" from 08-01-2024 to 13-01-2024, organized by NPTEL.

Mr. B. Jeeva, Assistant Professor II, participated in a Training on "Technology Based Entrepreneurship Development Programme (TEDP)" from 08-01-2024 to 13-01-2024, organized by Indraprastha Engineering College- (IPEC-TBI), Ghaziabad.



Mr. K. Manikanda Prasath, Assistant Professor II, participated in a Refresher Course on "Supply Chain Management Professional" from 08-01-2024 to 13-01-2024, organized by VSkills.

Mr. P. Pradeep, Assistant Professor II, participated in a FDP on "Nanotechnology for sustainable growth and development" from 08-01-2024 to 13-01-2024, organized by KCT, Coimbatore



Department Activities



Mr. P. D. Devan, Assistant Professor II, completed a NPTEL Course on "Nature and Properties of Materials" from 08-01-2024 to 13-01-2024, organized by NPTEL. He also participated in a FDP on "The Smart and Sustainable Manufacturing - The new Era of Manufacturing" from 08-01-2024 to 13-01-2024, organized by Government Polytechnic College, Chekkanurani. Further, he participated in a Training on "ANSYS Skill Development Course for Mechanical and CFD" from 08-01-2024 to 13-01-2024, organized by KCT. Also, he completed another course on "Nature and Properties of Materials" from 08-01-2024 to 13-01-2024, organized by NPTEL.

SNAPSHOTS:



Dr. Samuel @ CIRCOR



Dr. M. Balaji @ Emerald Jewel Tech for Waster Management Project



Dr. Samuel @ Technical Textile Industry - Madurai

STUDENT PUBLICATIONS:

Mr. P. Abiram (20BME202) and **Mr. S. Aravind** (22BME206) along with **Dr. K. K. Arun**, Assistant Professor – III, published their paper titled “Study on Design and Analysis of Single Envelope Worm Gear for Solar Tracking System” in an international journal.

STUDENT PARTICIPATIONS:

Mr. T. Suresh, 23PME01R, participated in a Workshop on “Role of IPR and Patent Search for Innovation” on 26-02-2024 organized by IPR Cell, KCT.

Mr. K. Krisnan, 21BME211 and **Mr. T. N. Mithun**, 22BME059, participated in International Project Expo 2024 conducted by Department of Civil Engineer, Kumaraguru College of Technology and won 3rd prize with a prize money of 75GBP.

STUDENT PATENT:

A Design Patent titled "Battery Pack Prototype" by **Mr. U. Suriya Prakash**, **Mr. L Avinash Ramanathan** and along with the Institution bearing application number: 402660-001 was accepted and published in the journal. The journal number is 08/2024 and journal date is 23/02/2024.

STUDENT ARTICLES

Brennen Monorail



U. Suriya Prakash

Brennen Monorail is a kind of gyroscopic monorail invented by Louis Brennan in 1900's, patented in 1903, unveiled to the public in 1910 and seemed to defy the laws of physics and even the train can travel at higher speeds at turns and corners without being thrown out of the track. It is a gyroscopic monorail works on the gyroscopic action of spinning wheel to provide stability for balancing on top of single rail instead of two rails. The first demonstration was done by 30 by 11.8 inches box contained a balancing system.

Principle:

It runs on a single conventional rail with the help of gyroscopic balancing system. The spinning wheel mounted on a gimbal frame whose axis of rotation is perpendicular to spin axis. The assembly is mounted on the chassis. At equilibrium position, the spin axis, precession axis and vehicle roll axis are mutually perpendicular to each other. Forcing the gimbal to rotate causes the wheel to precess resulting in gyro torques about roll axis. The wheel allows to align the spin axis with gimbal or rotational axis, and it rotates the entire vehicle about its roll axis.

The system contains active sources like servos to control the transfer of centre of gravity and potential energy of system arises from the equilibrium position that is if the train is loaded mostly on only one of its sides. If constant forces were resisted by gyroscopic action alone, the gimbal would rotate quickly on to the stops and the vehicle would topple.



Brennan and other inventor Scherl were aware of this and implemented new balancing system with the pair of counter-rotating gyroscopes, precessing in opposite directions. With this all, the motion of the train or vehicle with respect to inertial force causes equal and opposite torque on two gyros and they are cancelled out. With double gyro system, instability on bends is eliminated and bank to correct angles, so that no net force is experienced on board.

Unfortunately, the investors of this project weren't confident in this design and hence this monorail is not in use.

Impact Strength Testing of Architectural Glass



S. Santhiya

In this article we will scout about the impact strength of an architectural glass through test rig method. We know that an architectural glass, essential for modern buildings, faces the significant challenge of breaking upon sudden impacts. To address this concern, there is a critical need to design glass with increased safety margins. However, achieving this goal requires careful consideration of material selection, cost factors, and time constraints.

Traditional testing methods, such as tensile and flexural assessments, measure the resilience of materials by observing how they absorb energy over time. While these methods are effective, they may not accurately replicate real-world situations where materials need to rapidly absorb energy from various sources like falling objects or collisions.

In response to this challenge, instrumental impact testing has emerged as the preferred approach. Following the guidelines of ASTM F3007-13, this method utilizes a custom-built test rig designed to simulate real impact conditions. By subjecting standardized glass samples to controlled impacts, the objective is to predict failure, determine impact resistance, and analyze rebound characteristics. However, accurately measuring rebound velocity presents an additional challenge, requiring precise measurement techniques. Various methods, including infrared sensors, videography combined with a steel ruler, and audio recordings using microphones, have been explored and compared for their effectiveness and accuracy.



The impact testing is to enhance the reliability and durability of architectural glass. By embracing advanced testing techniques and adhering to rigorous standards, researchers and engineers can develop glass products that can withstand real-world pressures while meeting demanding performance requirements.



KUMARAGURU
college of technology

COIMBATORE – 641 049

Department of Mechanical Engineering

INSTITUTE VISION:

The vision of the college is to become a technical university of International Standards through continuous improvement.

INSTITUTE MISSION:

Kumaraguru College of Technology (KCT) is committed to providing quality Education and Training in Engineering and Technology to prepare students for life and work equipping them to contribute to the technological, economic, and social development of India. The College pursues excellence in providing training to develop a sense of professional responsibility, social and cultural awareness and set students on the path to leadership.

DEPARTMENT VISION:

To emerge as a centre, that imparts quality higher education through the programme in the field of Mechanical Engineering and to meet the changing needs of the society.

DEPARTMENT MISSION:

The department involves in sustained curricular and co-curricular activities with competent faculty through teaching and research that generates technically capable Mechanical Engineering professionals to serve the society with delight and gratification.

B. E. MECHANICAL ENGINEERING

PROGRAM EDUCATIONAL OUTCOMES (PEO's):

- PEO 1 :** Graduates will take up career in manufacturing and design related disciplines.
- PEO 2 :** Graduates will be involved in the execution of Mechanical Engineering projects.
- PEO 3 :** Graduates will take up educational programme in mastering Mechanical sciences and management studies.

PROGRAM OUTCOMES (PO's):

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and teamwork:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSO's):

1. Apply the fundamentals of science and mathematics to solve complex problems in the field of design and thermal sciences.
2. Apply the concepts of production planning and industrial engineering techniques in the field of manufacturing engineering.

M. E. INDUSTRIAL ENGINEERING

PROGRAM EDUCATIONAL OBJECTIVES (PEO's):

- PEO 1 :** Graduates will be mid to higher level management / engineering professionals with responsibilities in engineering management, data analysis and business operations.
- PEO 2 :** Graduates will be engineering professionals, and technology leaders who would manage such functions as plant engineering, production, supply chain and quality management.
- PEO3 :** Graduates would function as educators or researchers in academic institutions.

PROGRAM OUTCOMES (PO's):

- P01 :** An ability to independently carry out research /investigation and development work to solve practical problems.
- P02 :** An ability to write and present a substantial technical report/document.
- P03 :** Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program.
- P04 :** Apply knowledge and competencies in manufacturing, analytics, supply chain, quality and engineering management.
- P05 :** Apply principles of industrial engineering to solve problems in industry.
- P06 :** An ability to work as part of interdisciplinary teams, communicate effectively, model and design engineering systems optimally.