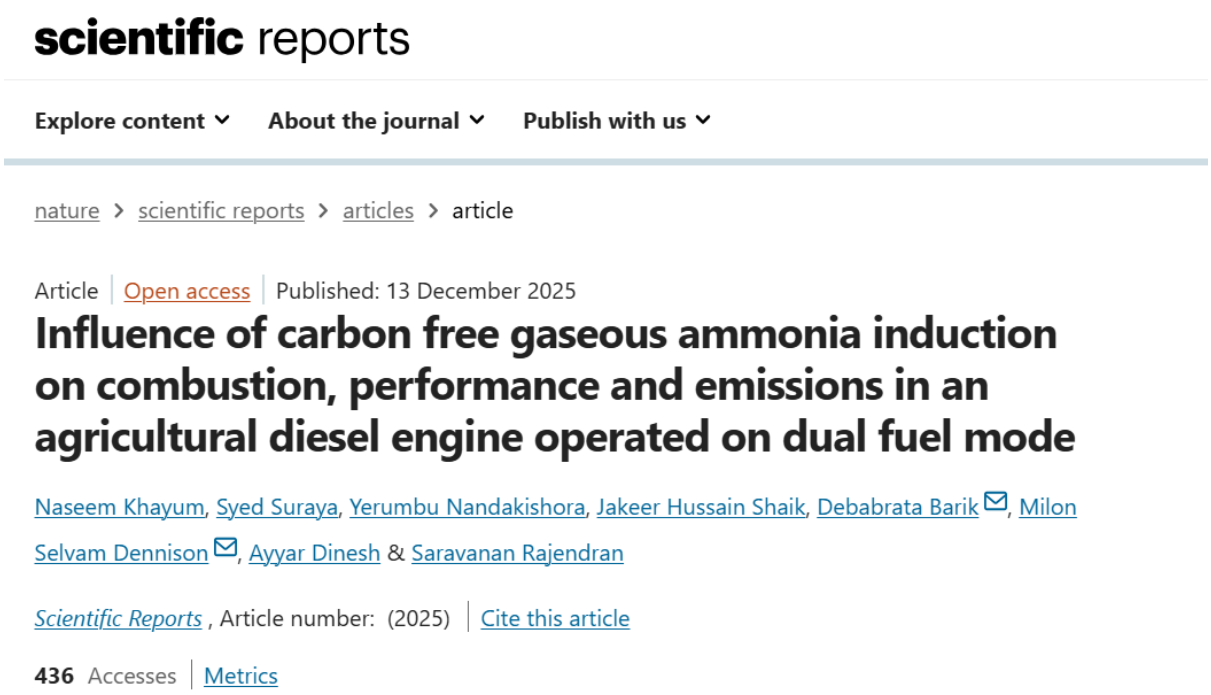
Newsletter for December 2025
Department of Mechanical Engineering
Dayananda Sagar University
Bengaluru-562112

Dr. Saravana bavan, Associate Professor, Dept. of Mechanical Engineering was selected as speaker at International Conference on Surface Engineering of Sustainable & Bio-Materials (ICSESBM 2025), IIT Madras, 9-11 December 2025.

ICSESBM 2025, jointly organized by the Indian Institute of Technology Madras (IIT Madras), Indian Institute of Technology Delhi (IIT Delhi), and King Mongkut's University of Technology North Bangkok (KMUTNB), Thailand. The conference aligned with the United Nations' Sustainable Development Goals, fostered discussions that paved the way for a sustainable world. Academicians from India and around the world, scientists from research laboratories, and industry professionals attended the conference and exhibited their research ideas.

Dr. **Naseem Khayum**, Assistant Professor in the **Department of Mechanical Engineering, Dayananda Sagar University**, **Bangalore**, has published a paper in the **Q1 journal, *Scientific Reports*** (Impact Factor: **3.9**). The paper, titled *"Influence of carbon free gaseous ammonia induction on combustion, performance and emissions in an agricultural diesel engine operated on dual fuel mode,"* advances in sustainable combustion research. This achievement highlights Dr. Khayum's continued contributions to **clean energy and intelligent engine technologies**.



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Article | Open access | Published: 13 December 2025

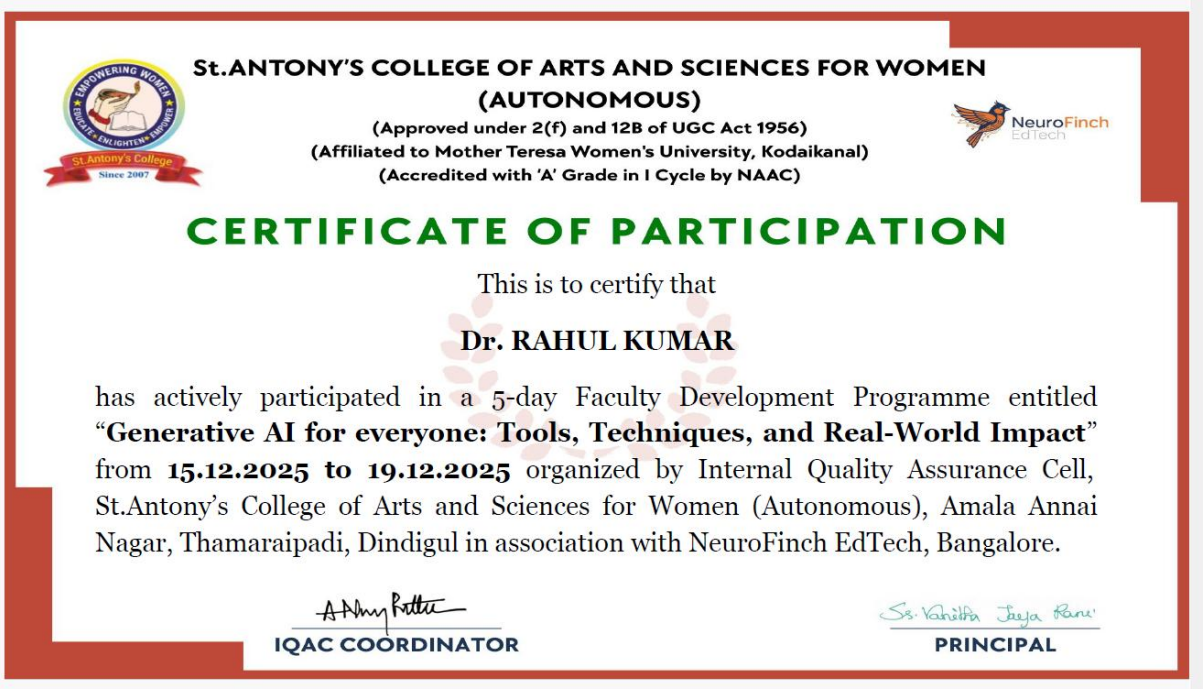
Influence of carbon free gaseous ammonia induction on combustion, performance and emissions in an agricultural diesel engine operated on dual fuel mode

Naseem Khayum, Syed Suraya, Yerumbu Nandakishora, Jakeer Hussain Shaik, Debabrata Barik ✉, Milon Selvam Dennison ✉, Ayyar Dinesh & Saravanan Rajendran

Scientific Reports , Article number: (2025) | Cite this article

436 Accesses | Metrics

Dr Rahul Kumar, Associate Professor, Department of Mechanical Engineering, has successfully completed 5-day Faculty Development Programme (FDP) on "Generative AI for everyone: Tools, Techniques, and Real-World Impact" from 15.12.2025 to 19.12.2025.



St.ANTONY'S COLLEGE OF ARTS AND SCIENCES FOR WOMEN
(AUTONOMOUS)
(Approved under 2(f) and 12B of UGC Act 1956)
(Affiliated to Mother Teresa Women's University, Kodaikanal)
(Accredited with 'A' Grade in I Cycle by NAAC)

NeuroFinch EdTech

CERTIFICATE OF PARTICIPATION

This is to certify that

Dr. RAHUL KUMAR

has actively participated in a 5-day Faculty Development Programme entitled "**Generative AI for everyone: Tools, Techniques, and Real-World Impact**" from **15.12.2025 to 19.12.2025** organized by Internal Quality Assurance Cell, St.Antony's College of Arts and Sciences for Women (Autonomous), Amala Annai Nagar, Thamaraipadi, Dindigul in association with NeuroFinch EdTech, Bangalore.

IQAC COORDINATOR

PRINCIPAL

Dr. Ravitej Y P, Assistant Professor, Mechanical Engineering Department published 3 Scopus Indexed (Q2) papers as corresponding author in December 2025

J. Inst. Eng. India Ser. D
https://doi.org/10.1007/s40033-025-00963-1

ORIGINAL CONTRIBUTION

Effect of Tungsten Carbide Composites on Al6061 Using Powder Metallurgy Technique: Experimental and Machine Learning Approach

Y. P. Ravitej[1] · Rajeev Gupta[1] · S. B. Karthik[1] · Krantikumar Kshaurad[2] · Rayappa S. Mahale[1,2,3,4] · B. V. N. Ramakumar[3] · Balachandra Halemani[4] · N Abhijith[1]

Received: 4 July 2025 / Accepted: 20 November 2025

Abstract This paper investigates the mechanical and microstructural behaviour of Al6061-tungsten carbide (WC) metal matrix composites (MMCs) fabricated via powder metallurgy. Seven composite samples were prepared with varying WC content (0–12 wt%) using compression molding and sintering. Mechanical characterization, including Brinell hardness and compressive strength testing, showed significant improvement in both properties with increasing WC content, reaching up to 33% and 56% enhancement, respectively, at 12 wt% WC. Optical and SEM analyses confirmed a relatively uniform dispersion of WC particles in the matrix. Statistical validation using one-way ANOVA revealed a significant influence of WC content on hardness, supported by post-hoc Tukey's HSD test. Additionally, machine learning models linear, polynomial, and random forest regression, were developed to predict hardness, with polynomial regression (degree 3) yielding the highest accuracy (R^2=0.9372). A 3D surface model further highlighted the coupled effect of WC content and indentation diameter on hardness. The results affirm the suitability of WC reinforcement in enhancing Al6061 properties for load-bearing and wear-resistant applications, with 4–10 wt% identified as an optimal range.

Keywords Powder Metallurgy · Al6061-WC Composites · Brinell Hardness · Compressive Strength · Reinforcement Percentage

Introduction

Composites are materials made by combining two or more distinct substances to achieve enhanced properties that individual components cannot provide alone [1, 2]. Typically, they consist of a matrix material, such as a polymer, metal [3], or ceramic, reinforced with fibers or particles like carbon, glass, or aramid [4]. This combination results in materials that exhibit superior strength [5], stiffness, lightweight characteristics [6], and resistance to corrosion and wear [7]. Composites are widely used in aerospace, automotive, construction, and sports industries due to their high performance [8] and durability [9]. Advances in composite technology [10] continue to drive innovation in engineering and material science [11]. Reinforcements play a crucial role in determining composite materials' mechanical, thermal [12], and chemical properties [13]. The type, shape, size, and orientation [14] of reinforcements significantly affect the composite's strength,

Journal of Bio- and Tribo-Corrosion (2026) 12:22
https://doi.org/10.1007/s40735-025-01089-3

Machine Learning-Enabled Analysis of Surface Texture Orientation Effects on Wear Debris Morphology and Tribological Performance of High-Density Polyethene (HDPE)

Rajeev Kumar Gupta[1,2] · M. Rajanish[3] · R. PremChand[4] · Mahadeva Prasad[5] · Rayappa S. Mahale[6] · Ravitej Yellampalli Prakash[2] · M. Madhusudan[7] · Jayatirtha M. Patil[8] · B. Nityanand[9] · Balachandra Halemani[10] · O. Abhilash[2] · Joy Mondal[2]

Received: 10 November 2025 / Revised: 24 November 2025 / Accepted: 30 November 2025

Abstract
High-density polyethylene (HDPE) is widely used in tribological components, yet the influence of surface texture orientation on its frictional and wear behaviour remains underexplored. This study examines the effect of grinding angles (0°, 30°, 45°, 60°, 90°) on the coefficient of friction (COF), wear depth, and debris morphology of HDPE under dry and lubricated sliding at a 30 N load. Under dry conditions, the COF increases from 0.30 at 0° to 0.42–0.45 at 45°, while wear depth rises from ~25 µm to over 100 µm. Lubrication significantly reduces friction, with COF dropping to 0.18–0.20 at 0° and 0.28–0.32 at 45°, accompanied by more than a 50% reduction in wear depth. Debris analysis shows finer, spherical particles under lubrication (ECD 8–30 µm) and elongated particles in dry sliding (AR 4–7), indicating distinct wear mechanisms. The novelty of this work lies in integrating experimental tribology with supervised machine learning models (Decision Tree, Random Forest) to predict COF and wear depth with high accuracy ($R^2 > 0.90$), and in using image-based ML classification to correlate debris morphology with grinding orientation. This combined framework offers a predictive pathway for optimizing HDPE-based tribo-component design.

Keywords HDPE · Surface texture orientation · Grinding angle · Coefficient of friction (COF) · Random forest · Decision tree

Jurnal Tribologi 47 (2025) 1-23

MYTRIBOS Malaysian Tribology Society
Jurnal Tribologi
Website : jurnaltribologi.mytribos.org e-issn: 2289-7232

Wear rate prediction of hybrid composites: A comparative study using experimental analysis, finite element simulation and machine learning prediction

Ravitej Y P [1*], Keshavamurthy R [2], Rahul Kumar [1], Krantikumar Kshaurad [3], Balachandra Halemani [4], Ramakumar B V N [5], Sripad Kulkarni S [5], Ramesh Shankaranarayana [6]

[1] Department of Mechanical Engineering, Dayananda Sagar University, INDIA.
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[3] Department of Mechanical Engineering, Dayananda Sagar College of Engineering, INDIA.
[4] Department of Mechanical Engineering, KLE Technological University, INDIA.
[5] Department of Aerospace Engineering, Dayananda Sagar University, INDIA.
[6] College of Engineering and technology, University of technology and applied sciences - Nizwa, Sultanate of Oman.
[*]Corresponding author: ravitejyp@gmail.com

Dr. Rajeev Kumar Gupta, Assistant Professor at Mechanical Engineering Department published 1 SCI journal (Q2) as first author and 1 Scopus Indexed (Q2) papers as co-author in December 2025. He has also successfully completed NPTEL-AICTE5, Faculty Development Programme (FDP) on "Artificial Intelligent and Machine Learning in Material Engineering" from July-October 2025.

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DAYANANDA SAGAR UNIVERSITY

SCHOOL OF ENGINEERING

NPTEL-AICTE
Faculty Development Programme

(Funded by the MoE, Govt. of India)

This certificate is awarded to

RAJEEV KUMAR GUPTA

for successfully completing the course

Artificial Intelligence and Machine Learning in Materials Engineering

with a consolidated score of 54 %

Prof. Andrew Thangaraj
NPTEL Coordinator
IIT Madras

(Jul-Oct 2025)

Roll No: NPTEL25MM37S552601232

Duration of NPTEL course : 12 Weeks

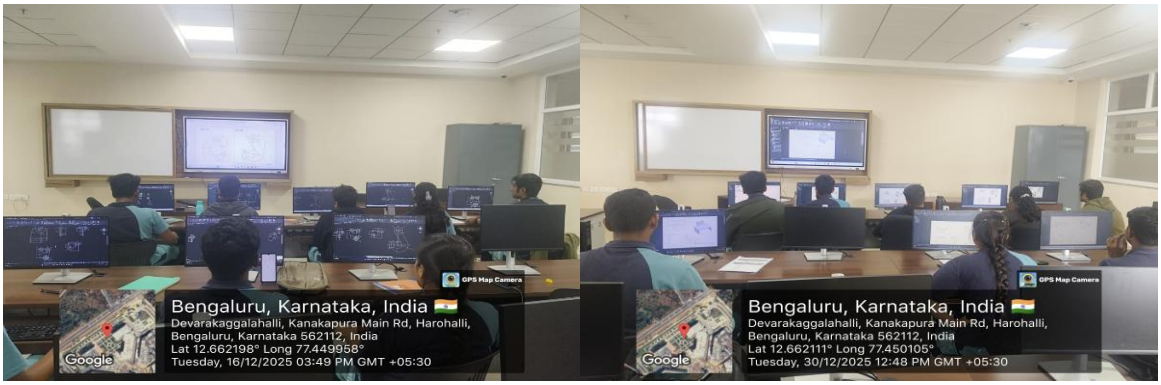
The candidate has studied the above course through MOOCs mode, has submitted online assignments and passed proctored exams.
This certificate is therefore acceptable for promotions under CAS as per AICTE notifications dated 16th Nov, 2023, similar to other refresher / orientation courses.
F.No. AICTE / RIFD / FDP through MOOCs / 2023

Dr. Shashidhara L C, Assistant Professor at Mechanical Engineering Department successfully conducted **A Two-week Corporate Training Program on "Autodesk Inventor and AutoCAD" for the Graduate Engineer Trainees (GETs) of Bühler India**

A two-week corporate training program on Autodesk Inventor and AutoCAD for the Graduate Engineer Trainees (GETs) of Bühler India was successfully conducted from 15th to 27th December 2025. This initiative marked the 12th batch under the ongoing collaboration between Bühler India and the institution, reflecting a strong and sustained industry–academia partnership. The program was expertly conducted by Dr. Shashidhar L C, Manager – Autodesk Design & Innovation Lab, who delivered structured sessions with extensive hands-on practice and guided learning, significantly enhancing participants' technical competence and professional readiness.

The training was supported with excellent institutional facilities and a well-equipped learning environment, ensuring a highly productive experience. Participants shared very positive feedback, appreciating the comprehensive curriculum, practical exposure, and effective delivery of concepts. With yet another successful batch completed, this initiative continues to strengthen

collaborative engagement and contribute meaningfully to industry-oriented skill development.



Dr. Vinay M S, Assistant Professor, Department of Mechanical Engineering, participated in the First International Conference on Advances in Computational and Experimental Approaches in Aerostructures (ICACEAA 2025) organised by JAIN (Deemed-to-be University), Bengaluru, held on 20th December 2025.

A research paper titled "Fabrication & Design Analysis of Toroidal Propeller Drone" (Paper ID: 71) was presented at the conference. The paper was authored by Dr. Saravana Bavan and co-authored by Dr. Vinay M S, Ravitej, Vishwas V S, and Yathish M, all from the Department of Mechanical Engineering, Dayananda Sagar University, Bengaluru.

The research focused on the design, analysis, and fabrication of toroidal propellers for unmanned aerial vehicles (UAVs) with the objective of reducing noise and improving propulsion efficiency. The study involved CAD modelling, structural stress and strain analysis, and fabrication of the toroidal propeller using 3D printing with ABS material. The toroidal propeller's closed-loop geometry was shown to reduce tip vortices, resulting in lower noise levels and improved thrust efficiency when compared to conventional propellers.

The work also highlighted applications in surveillance, wildlife monitoring, and aerial cinematography, where low-noise UAV operation is critical. Participation in this international conference facilitated interaction with researchers and experts, provided insights into recent advances in aerostructural engineering, and contributed to academic and professional development.

Overall, the conference participation and paper presentation were academically enriching and supported further research dissemination and collaboration.

First International Conference on Advances in Computational and Experimental Approaches in Aerostructures (ICACEAA 2025)

JAIN (Deemed-to-be University), Bengaluru

Paper ID-71

Fabrication & Design Analysis Of Toroidal Propeller Drone

Saravana Bavan, Vinay MS, Ravitej, Vishwas VS and Yathish M

Department of Mechanical Engineering
Dayananda Sagar University
Harohalli, Bengaluru

20th December, 2025

Dr. Viswanathan R, Associate Professor, Dept. of Mechanical Engineering successfully organised organized a two-day workshop titled "Gen-AI for Manufacturing Leaders: From Vision to Implementation" on 16 and 17 December 2025.

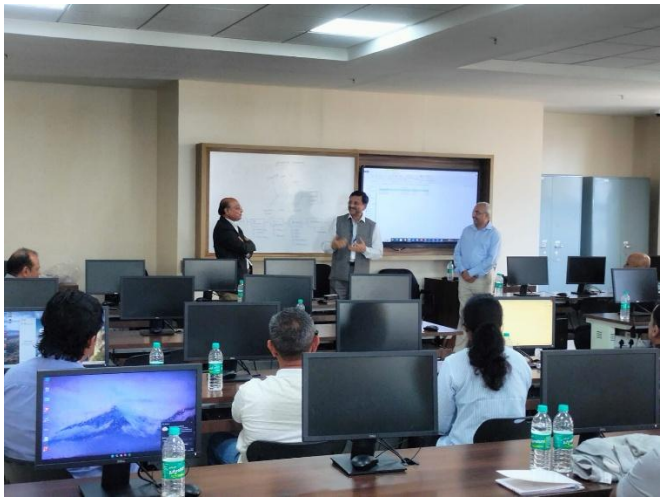
The sessions were conducted by Dr. J. B. Simha, a leading AI and data analytics expert. Participants included representatives from various industries along with DSU faculty.

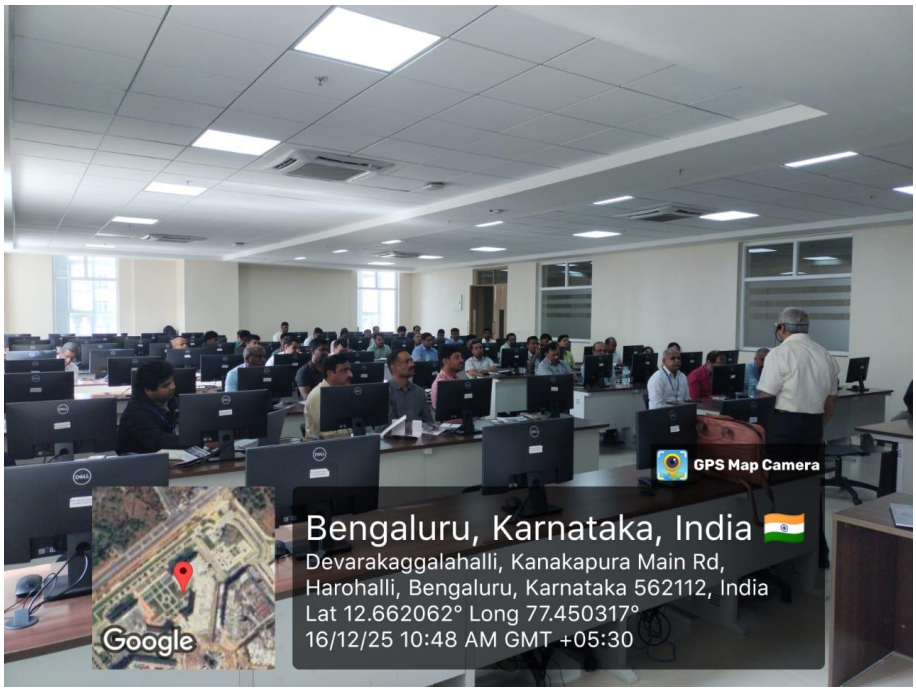
The workshop focused on:

- Practical understanding of AI and Generative AI in manufacturing
- Real-world industrial applications and case discussions
- Identification of organization-specific industrial problems
- Shortlisting of feasible problems for AI-based Proof-of-Concept (PoC) development

The sessions were interactive and well-received, with active participation and meaningful discussions. Participants expressed that the program helped them clearly understand how AI can be applied to solve real manufacturing challenges.

The event concluded with the identification of key problem statements and a roadmap towards PoC development and consultancy collaboration with industries. Support from the organizing team and university administration contributed to the smooth conduct of the program.




GPS Map Camera
Bengaluru, Karnataka, India
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Harohalli, Bengaluru, Karnataka 562112, India
Lat 12.662062° Long 77.450317°
16/12/25 10:48 AM GMT +05:30
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Dr. Vinay M S, Assistant Professor and **Mr. Sridhar S. Jetty**, PhD student at Mechanical Engineering Department, Dayananda Sagar University, Bengaluru have successfully participated in National Conference on Condensed Matter Physics (CMPA 2025) was organized at Manipal Institute of Technology, Manipal. The conference served as a distinguished platform bringing together academicians, researchers, scientists, and professionals working in the field of condensed matter physics and allied areas.

MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

13TH NATIONAL CONFERENCE ON

CONDENSED MATTER PHYSICS AND APPLICATIONS

Cmpa2025

December 08th - 09th, 2025, Manipal

POSTER PRESENTATION

Certificate of Appreciation

CMPA25- 137

This is to certify that

Mr. SRIDHAR S JETTY, Research Scholar
Dayananda Sagar University

Congratulations

has presented a paper (poster) entitled

Comparative Evaluation of Wear Behaviour of Mild Steel, Hadfield Steel, and Mn-Alloy Plough Blades under Varying Soil Conditions in Field Operation

in the 13TH NATIONAL CONFERENCE ON CONDENSED MATTER PHYSICS AND APPLICATIONS (CMPA-2025) held at Manipal Institute of Technology, MAHE, Manipal.

Dr. Nagaraja K K	Dr. Raghavendra K G	Dr. Sudha D Kamath	Commander.(Dr). Anil Rana
Convenor, CMPA 2025	Co-Convenor	HOD & Chairman, CMPA 2025	Director, MIT, Manipal