Newsletter for April 2026
Department of Mechanical Engineering
Dayananda Sagar University
Bengaluru-562112

Dr. Ravitej Y P

Dr. Ravitej Y P, Mechanical Engineering Department, Dayananda Sagar University published a research paper entitled "Experimental and data-driven investigation of dry sliding wear behaviour in Al 6061–graphite composites" in "Canadian Metallurgical Quarterly" 13th April 2026. This paper investigates dry sliding wear in Al 6061–graphite composites using experiments and data-driven methods, revealing wear mechanisms, performance trends, and insights for optimizing composite design and tribological applications.

Taylor & Francis

Canadian Metallurgical Quarterly
The Canadian Journal of Metallurgy and Materials Science

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Experimental and data-driven investigation of dry sliding wear behaviour in Al 6061–graphite composites

Vinayak V. Kulkarni, Akhil Deshpande, Roopa D N, Chethan S, Shivakumar K. Malladad, Batluri Tilak Chandra, Vrushali Yogesh Bhalerao, A. Srinivas, Bindhu Shree B S, Ravitej Y P, Sharanabasappa Tadkal & Shashidhar L C

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Prof. Jerrin Joy Varughese

Research and Academic Contributions - April 2026

Prof. Jerrin Joy Varughese, Department of Mechanical Engineering, has made notable academic contributions during April 2026 through high-impact research publication and scholarly peer-review activities.

A research article titled "Molybdenum Disulfide-Functionalized Multiwalled Carbon Nanotubes Based Epoxy Coating on Epoxy/Carbon Fibre Laminates for Improved Erosion Resistance" has been published in the **Polymer Composites (Q1 Journal - Impact Factor: 4.7).** The study presents an advanced hybrid nanocomposite coating system integrating MoS_2-functionalized MWCNTs, demonstrating significant enhancement in erosion resistance of epoxy/carbon fibre laminates. The work establishes a shift from brittle to semi-ductile erosion behaviour, with optimised performance at varying impact angles, offering strong potential for applications in aerospace, energy, and structural systems exposed to severe erosive environments.

In addition to research publication, Prof. Varughese contributed to the academic community by serving as a reviewer for the reputed journal Materials Letters (Elsevier), further strengthening scholarly engagement and peer-review excellence.

These achievements reflect active involvement in cutting-edge research and academic service, reinforcing the department's commitment to high-quality research and global academic collaboration.

DAYANANDA SAGAR UNIVERSITY

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RESEARCH ARTICLE

Molybdenum Disulfide-Functionalized Multiwalled Carbon Nanotubes Based Epoxy Coating on Epoxy/Carbon Fiber Laminates for Improved Erosion Resistance

Arun Sam Varghese[1,2] | Lince Mathew Thomas[2] | Jerrin Joy Varughese[2,3] | S. Abhishek[1] | Daniel Biju Thomas[1] | T. B. Jacob Michael[1] | Adith Murali[1] | M. S. Sreekanth[2]

[1]Department of Mechanical Engineering, Carmel College of Engineering & Technology, Alappuzha, Kerala, India | [2]Department of Manufacturing Engineering, School of Mechanical Engineering, Vellore Institute of Technology, Vellore, Tamil Nadu, India | [3]Department of Mechanical Engineering, School of Engineering, Dayananda Sagar University, Bengaluru, Karnataka, India

Correspondence: Arun Sam Varghese (arun90sam@gmail.com) | M. S. Sreekanth (sreekanth.ms@vit.ac.in)

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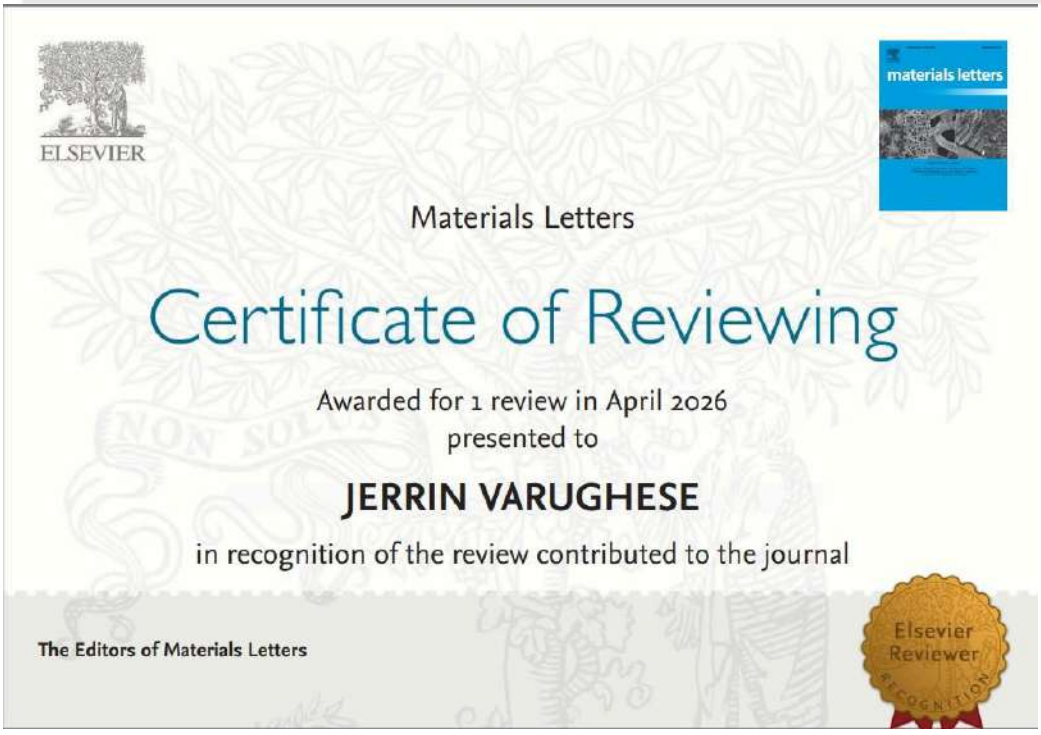
Keywords: abrasive particle erosion | molybdenum disulfide | morphology | multiwalled carbon nanotubes | nanocomposite coatings

ABSTRACT

The investigation evaluates the erosion behavior of carbon fiber (CF) reinforced epoxy laminates, protected with an epoxy-based coating system incorporating synthesized molybdenum disulfide (MoS_2) functionalized multiwalled carbon nanotubes (MWCNTs) hybrid nanoparticles. The nanocomposite coating with 0.5 wt% MoS_2-MWCNTs hybrid demonstrated a superior resistance to severe erosive wear conditions and exhibited clear deviation in erosion response as compared to conventional epoxy/CF composites. The epoxy hybrid nanocomposite coated epoxy/CF laminates displayed a semi-ductile erosion characteristic, with a maximum erosion rate of 1132 mg/kg, occurring at a 30° impact angle, and the minimum erosion rate of 600 mg/kg occurring at a 90° impact angle. Morphological analysis of the eroded surface by FESEM revealed that micro-plowing and micro-cutting mechanisms were predominant at the hybrid nanocomposite coated regions, whereas fiber cutting mechanisms were primarily observed in the epoxy/CF laminates.



Dr. Naseem Khayum

Dr. Naseem Khayum, Assistant Professor, Department of Mechanical Engineering has published a review article titled *"AI Driven Approaches in Battery Thermal Management Systems for Prediction and Multi-Objective Optimization: A Comprehensive Literature Review"* in the journal ***Discover Mechanical Engineering*** (Springer), a **Q2-indexed international journal**. The work highlights advanced AI-based methodologies for improving thermal performance and optimization in battery systems.

Home › Discover Mechanical Engineering › Article

AI driven approaches in battery thermal management systems for prediction and multi objective optimization: a comprehensive literature review

Review | Open access | Published: 09 April 2026

Volume 5, article number 53, (2026) Cite this article

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Yerumbu Nandakishora, Naseem Khayum, Chandan Patra, Prashant Kumar, Abhishek Sharma & Alok Kumar Ansu

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Abstract

Battery Thermal Management Systems (BTMS) play a critical role in ensuring the safety, performance, and lifespan of lithium-ion batteries in electric vehicles; however, conventional empirical, numerical, and physics-based approaches often struggle to handle complex thermal behaviors, nonlinear interactions, and real-time operational demands. This limitation highlights the need for intelligent, adaptable, and computationally efficient prediction and optimization frameworks. The objective of this study is to critically review and analyze recent artificial intelligence (AI)-driven approaches for BTMS, with particular

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Abstract
Introduction
EV battery thermal management
Application of AI (ML) for prediction
Application of AI (ML) for optimization (multi-o...
Future research directions for AI-based battery t...
Conclusions
Data availability
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Acknowledgements



Dr. Saravana Bavan **Dr. Vinayak Hemadri** **Dr. Naseem Khayum**

On 22 April 2026, the Department of Mechanical Engineering organized an industrial visit to **Triveni Turbines Limited** for students to gain practical exposure to turbine manufacturing and energy systems. The visit was guided by **Dr. Saravana Bavan**, **Dr. Vinayak Hemadri**, and **Dr. Naseem Khayum,** enhancing students' understanding of real-world engineering applications.


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Prof. Karthik SB, Mechanical Engineering Department, Dayananda Sagar University published a research paper entitled "**Finite element analysis of stress concentration and buckling behaviour in composite panels with cutouts**" in " **J Mater. Sci: Mater Eng.**" 14th April 2026. This paper presents finite element analysis of stress concentration and buckling behavior in composite panels with cutouts. It evaluates structural performance under loading, identifies critical stress regions, and examines stability characteristics, offering insights to improve design efficiency and structural integrity of advanced composite structures**.**

J Mater. Sci: Mater Eng.
https://doi.org/10.1186/s40712-026-00458-1
Article in Press

Finite element analysis of stress concentration and buckling behaviour in composite panels with cutouts

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Cite this article as: SB K., N A., Abhinav *et al.* Finite element analysis of stress concentration and buckling behaviour in composite panels with cutouts. *J Mater. Sci: Mater Eng.* (2026). https://doi.org/10.1186/s40712-026-00458-1

Karthik SB, Abhijith N, Abhinav, Santhosh N, Manjula K, Prem Chand R, Channa Keshava Naik N, Addisu Frinjo Emma, Mustafa M. Aljumaily & Mukhtar Hamid Abed

Dr. Rahul Kumar

Dr. Rahul Kumar, Associate Professor, Department of Mechanical Engineering has published a research article in the **Journal of Materials Engineering and Performance**, a **Q2-ranked, SCIE Indexed International Journa**l **(IF-2.3)**. The published research addresses contemporary challenges in mechanical and sustainable engineering and presented innovative methodologies/analytical insights in WFRP composites aligned with UN's Sustainable Development Goals. This achievement reflects the faculty member's commitment to high-quality research and continuous contribution to the university research ecosystem.

JMEPEG
https://doi.org/10.1007/s11665-026-13924-w

1059-9495/$19.00

ORIGINAL RESEARCH ARTICLE

Tensile Properties Prediction of WFRP Composite Based on Machine Learning and ANN Models: An Experimental and Statistical Approach

Rahul Kumar, Jagadish, Divya Zindani, and Sumit Bhowmik

Submitted: 5 February 2026 / Revised: 16 March 2026 / Accepted: 20 March 2026

Due to increasing sustainability concerns, wood filler-reinforced polymer (WFRP) composite materials have gained prominence as a potential material in various industries such as construction, automotive and consumer products. This real-world application of wood filler-reinforced polymer composites requires well understanding and prediction of important mechanical properties. The conventional experimental methods of material characterization are often resource intensive and time-consuming. Recently, the machine learning (ML) presented a novel and viable avenues for augmenting prediction models, enabling the accurate estimation of mechanical properties with fewer experiments and improved generalization. The current work presents the application of ML techniques for the prediction of tensile properties of WFRP composite. Various models like support vector machine, polynomial regression, and decision trees (DT) are explored for their potential to predict tensile properties based on input variables like filler content, and crosshead speed. These models are very effective and accurate in representing highly intricate and non-linear interdependencies between material input parameters and its performance. Additionally, the artificial neural network model, in particular, exhibits an excellent capability of predicting tensile strength of composites with the lowest MSE value. The study highlights the efficiency of ML models, demonstrating their potential to enhance material property prediction.

Keywords ANN, epoxy, machine learning, predictive modeling, regression, wood filler, wood filler-reinforced polymer (WFRP) composites

1. Introduction

The natural plant-based fiber/filler-reinforced polymer composites have attracted considerable attention for their sustainability, light weight, and biodegradability [1, 2]. These fibers such as wood, bamboo, coir, sugarcane bagasse, and jute are reinforced/mixed with a polymer matrix for covering various applications like automotive components, structural/construction materials and household items [3-8]. These aforementioned applications require good mechanical properties for their usefulness. Therefore, the accurate prediction of mechanical properties is essential for optimizing material design and tailoring specific properties for targeted applications [9, 10].

Rahul Kumar, Department of Mechanical Engineering, School of Engineering (SoE), Dayananda Sagar University, Devarakaggalahalli, Harohalli, Kanakapura Road, Ramanagara Dt., Bengaluru 562 112, India; **Jagadish**, SQC & OR Unit, Indian Statistical Institute, Bangalore Centre, Bangalore, India; **Divya Zindani**, Department of Mechanical Engineering, Sri Sivasubramaniya Nadar College of Engineering, Chennai 603110, India; and **Sumit Bhowmik**, Department of Mechanical Engineering, National Institute of Technology, Silchar, Assam 788010, India. Contact e-mails: rahul.oec@gmail.com, jagadish@isibang.ac.in, zindamidivya@gmail.com, and bhwowmiksumit04@yahoo.co.in.

However, traditionally material scientists and engineers have deeply focused on extensive experimental testing which in turn is very time-consuming, costlier and limited by the complexity of the materials' behavior [11]. As a result of this, researchers working in this domain are strongly exploring the computational methods, particularly machine learning (ML), that learn data pattern and make accurate predictions with minimal experimental input [12, 13].

Machine learning is found to be an efficient computational model that can be utilized to discover data patterns and predict new output values from a given set of input variables [14-24]. Different kinds of machine learning algorithms are supervised, unsupervised and reinforcement learning. There are two major approaches in the supervised kind of machine learning algorithm namely classification and regression. Support vector machines (SVM), decision tree, random forest, k-nearest neighbor are some of the examples of classification-based algorithms [25-27]. The regression and classification-based algorithm have shown immense potential and increasingly utilized in the prediction of mechanical properties of natural fiber composites [28]. The regression-based machine learning algorithmic tools predict various types of mechanical properties based on input features such as fiber type, volume fraction, and processing parameters [29, 30]. These algorithms can assess the patterns and relationships in the experimentally derived dataset, thus precisely predicting the desired properties. In this way it will reduce the dependency on sample fabrication and experimental testing thus offer a cost-effective and quick solution for novel material design and optimization, which in turn lead to tailoring the material for specific set of applications [31-33]. In the last few years, various researchers have carried out/utilized

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Dr. Shashidhar L C Mr. Abhishek M

Industrial Visit to Kamath Plastics Pvt. Ltd. Bengaluru (6 March 2026)

The Department of Mechanical Engineering, School of Engineering, DSU, on 6 March 2026 conducted an industrial visit to M/s. Kamath Plastics Private Limited, a well-established company engaged in injection molding and mold manufacturing.

Dr. Shashidhar L C, and Mr. Abhishek M (PhD), Assistant Professor, Department of Mechanical Engineering, led the program along with VI semester mechanical engineering students. The program was carefully selected to provide the students with hands-on exposure to plastic production processes and deepen their understanding of the technologies employed in the industry.

The faculty delivered concept-driven instruction complemented by the industry's problem-solving approach, enabling participants to gain practical exposure to real-world plastic molding processes and industrial workflows. This interactive approach helped VI semester Mechanical Engineering students enhance their technical competence and industry readiness, while also strengthening collaborative engagement.


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