

DEPARTMENT OF MECHANICAL ENGINEERING



EDITORIAL BOARD

CHIEF PATRONS

Dr.M.Manickam Chairman, MCET Mr.M.Harihara Sudhan Correspondent, MCET Dr.C.Ramaswamy Secretary, NIA Dr.S.V.Subramanian Joint Secretary, NIA

PATRONS

Dr.P.Govindasamy Principal Dr.A.Senthil Kumar Vice Principal

ADVISORY COMMITTEE

Dr.Rama Thirumurugan Head of the Department Dr.D.Nathan Program Coordinator

FACULTY COORDINATORS

Mr.Vijayakkannan, AP(SS)/Mech,MCET Mr.Sreejith S Nair,AP(SS)/Mech,MCET

EDITORS

Prabin.P (22BME018) Thiruvarangan.M (23BME020)

Department of Mechanical Engineering



Vision

To transform students from rural background into professional leaders of tomorrow in the field of Mechanical Engineering with a strong sense of social commitment.

Mission

• To impart quality – engineering education leading to specialization in

he emerging areas of CAD/CAM/CAE, Energy Engineering and Materials Technology.

• To provide continually updated and intellectually stimulating environment to pursue research and consultancy activities.

Programme Educational Objectives (PEOs)

PEO1.Technical Expertise: Actively apply technical and professional skills in engineering practices towards the progress of the organization or the entrepreneurial venture in competitive and dynamic environment.

PEO2.Lifelong Learning: Own their professional and personal development by continuous learning and apply the learning at work to create new knowledge.

PEO3.Ethical Knowledge: Conduct themselves in a responsible, professional and ethical manner supporting sustainable economic development which enhances the quality of life.

Program Outcomes (POs)

PO1. Apply knowledge of basic sciences and engineering concepts to solve complex mechanical engineering problems.

PO2. Identify, formulate, and analyze engineering problems using scientific principles and concepts.

PO3. Design products, manufacturing processes and facilities that deliver the requirements of the target customers and desired quality functions.

PO4. Conduct experiments, analyze and interpret data to provide solutions for engineering problems.



News Letter MECHANICA PO5. Use appropriate tools and techniques to solve engineering problems.

PO6. Apply contextual knowledge to make informed decisions in societal, health, safety, legal, entrepreneurial and cultural issues

PO7. Demonstrate the knowledge of need for sustainable development in providing engineering solutions in global, environmental and societal contexts

PO8. Practice Ethical responsibility.

PO9. Work effectively in teams and build/manage interpersonal relationships.

PO10. Communicate effectively through oral, non-verbal and written means.

PO11. Apply management principles to manage individual and team work for executing projects in a multidisciplinary environment.

PO12. Articulate and engage in pursuit of career and life goals through continuous Learning.

Program Specific Outcomes (PSOs)

PSO 1: Demonstrate functional competencies for roles in design, manufacturing and service by learning through centers of excellence and industrial exposure.

PSO 2: Demonstrate behavioral competencies required for roles in design, manufacturing and service by learning through structured professional skills training.

News Letter MECHANICA



28.01.2025

The event titled "Enabling Optimization Technologies in New Product Development" was conducted online on 28.01.2025, organized by Mechanica, Department of Mechanical Engineering.

Expert speaker Mr. Sujith S Pillai shared insights on using AI, ML, and computational tools to enhance product development.

topics included Key design efficiency, material optimization, digital twins, and predictive simulations. session featured The real-world case studies highlighted and challenges and future trends in optimization technologies. A total of 191 students from II and III years attended, making the event a successful

knowledge-sharing platform.

News Letter MECHANICA





Date: 28.01.2025 Time : 11.00 A.M. Platform: MS - Teams

21.02.2025

The guest lecture on "Ergonomics in Construction Machinery Development Process" was held on 21.02.2025 at Dr. MCET, organized by the Department of Mechanical Engineering in collaboration with the Institution's Innovation Council. The session featured Mr. A. Gomathinayagam from PAI Machines, who discussed the importance of ergonomic principles in enhancing machinery safety, usability, and operator comfort.

Key topics included human-centered industry design, case studies, and future trends involving AI and automation. An interactive O&A 14 session followed, enriching participant engagement. A total of 82 students (54 Mechanical from 28 from and Automobile) attended the session.



Faculty Coordinator Mr. Vijayakkannan K (Association - Incharge) Assistant Professor (SS) - Mech

Convener Dr. Rama Thirumurugan, HOD-Mech

News Letter

MECHANICA



BotSmith

The event was held on 13.03.2025 at Dr. MCET, organized by the Departments of Mechanical and Automobile Engineering. It focused on testing students' prompt engineering skills through real-time AI-based tasks using ChatGPT. Participants were challenged to craft precise prompts to obtain accurate AI responses, judged on prompt clarity, answer quality, and time efficiency. The session included a live demonstration and a Q&A on AI applications and careers. With 37 participants and 3 winners, the event successfully highlighted the role of prompt engineering in modern AI use and sparked plans for future AI-focused events.





The SCULPT & SHAPE event, held on March 13, 2025 as part of TECHNOBYTE'25 at Dr. MCET, was Mechanical organized by the Engineering Department in with collaboration the Student **Research Council and MECHANICA.**

culpt & Shape

It featured a two-round competition combining puzzle-solving and clay modeling, where students applied analytical thinking and creativity. Round 1 involved a mechanical jigsaw puzzle challenge, while Round 2 tasked finalists with sculpting models based on Sustainable Development Goals (SDGs). The event successfully blended engineering and art, with 24 teams participating and 6 advancing to the final round. Plans are in place to conduct more such innovative events in the future.

News Letter MECHANICA

13.03.2025



Mechanica's Squid Game

14.03.2025

Held on 14th March 2025 as part of Technofete'25 at Dr. MCET, Mechanica's Squid Game was a dynamic event blending technical tasks with physical challenges inspired by the popular web series.

Organized by the Department of Mechanical Engineering, the event tested students' teamwork, engineering skills, problem-solving, and agility through multiple elimination rounds. Activities included design-based puzzles and coordination tasks with an engineering twist. With strong student participation and engagement, the event concluded successfully, awarding the top 3 teams and receiving positive feedback for its innovative and interactive learning approach.

News Letter MECHANICA

Batch 21-25 Farewell

The farewell for the 2021–2025 batch was held on 21st April 2025 at Dr. MCET, celebrating the students' growth, achievements, and cherished memories over the past four years. The event featured emotional speeches, faculty appreciations—especially for Dr. S. Ayyappan and Dr. Ramathirumurugan—and heartfelt student performances.

21.04.2025

WIII

Nostalgia, gratitude, and joy filled the air as students reflected on their journey. Each student was honored with a memento, and faculty shared words of encouragement for their future. The farewell was a beautiful blend of reflection and celebration, marking both an ending and a hopeful new beginning.



DEPARTMENT ASSOCIATION OF MECHANICAL ENGINEERING

AECHANICA

Batch 21-25 Farewel

21.04.2025

Industry Conclave

"BRIDGING KNOWLEDGE AND INNOVATION FOR TOMORROW'S ENGINEERS"

The Department of Automobile Engineering and Mechanical Engineering successfully conducted Industry Conclave-2025 on April 26, 2025, at the New Seminar Hall. With the theme "Revolutionizing Engineering in the Digital Age," the event focused on the integration of AI, IoT, Data Analytics, Electric Vehicles, and Hydrogen Technology in driving innovation across the mechanical and automotive industries.

Prominent industry experts, including Mr. Kiran Sheelavant, Mr. S. B. Mallikarjun, Mr. Gurunath Hanche from Autoliv, Dr. Narayanan Ramanujam from Hexagon Manufacturing Intelligence, and Mr. S. Srinath from TAFE, shared their insights and experiences. The conclave witnessed active engagement from students and faculty, encouraging meaningful discussions on emerging technological trends and their impact on engineering practices.



News Letter MECHANICA



STUENT PARTICIPATION AND ACHIVEMENTS

07

2000

News Letter MECHANICA

EVENT : VARNAM -25 CAD MODELING INTER COLLEGE TECHNICAL SYMPOSIUM

Date : 06-02-2025



III

01 la 4

EVENT NAME: MEDICNIK-25 KARPAGAM ACADEMY OF HIGHER EDUCATION

Date : 14-02-2025



S.No	Roll No	Name of the Students	Yr	Sec	Title of the Program	Nature of the Program	Event Venue	Date	P/A
1	727623BME011	IBRAHIM DHANISH J	II	А					
2	727623BME024	NIKHIL PRASANNA P	II	А					
3	727623BME030	ARAVIND V	II	А		Karpagam Academy of	2025		
4	727623BME054	BALANAVEEN S	II	A	CAD Modeling	Inter college Technical	Higher Education,	1402.2025	
5	727623BME059	HARITH KUMAR A	II	A		Symposium	Coimbatore		
6	727624BME304	ASWATH KRISHNA A	II	A					

Congratulations!

EVENT NAME : DESIGN EVENT DJ ACADEMY OF DESIGN,COIMBATORE

Date : 17-02-2025



S.No	Roll No	Name of the Students	Yr	Sec	Title of the Program	Nature of the Program	Event Venue	Date	P/A
1	727622BME014	KISHORE S	III	В					Р
2	727622BME022	SRIDHAR RAJ S	III	В			DJ Academy of Design, Coimbatore	1702.2025 - 1702.2025	Р
3	727622BME024	MANJARIKA N	III	В					Р
4	727622BME033	SWETHA K	III	В					Р
5	727622BME038	VIGNESH M	III	В	D. J. E.				Р
6	727622BME042	GUNANIDHI P C	III	В	Design Event	workshop on design			Р
7	727622BME072	MOHAMED FAZIL K	III	В					Р
8	727623BME313	PRANESHKUMAR R	III	В				1	Р
9	727623BME336	VISHNU C	III	В					Р
10	727623BME345	MANIMADHAN KUMAR A	III	В					Р

BAJA SAEINDIA

Date : 20.02.25-23.02.25



0

1 m									
								-	
S. No.	Roll No.	Name of the Students	Yr	Sec	Title of the Program	Nature of the Program	Event Venue	Date	P/A
1	727621BME003	RAHUL JOY D	IV	А				23.02.2025	Р
2	727622BME020	KAVIN E	III	В					Р
3	727623BME306	KARTHICK KUMAR S	III	В	E - BAJA	Physical Round	BV Raju Institute of	1	Р
4	727623BME318	BAVITHRAN K	III	В		(Phase 3)	Technology, Narsapur.	2002.2025	Р
5	727623BME021	LAKSHNASRI D	II	А				200	Р
6	727623BME023	PRABHAKAR M	II	А					Р

EVENT NAME : YUGAM-25 KUMARAGURU COLLEGE OF ENGINERRING,COIMBATORE

Date : 07-03-2025



ø

S.No	Roll No	Name of the Students	Yr	Sec	Title of the Program	Nature of the Program	Event Venue	Date	P/A
1	727623BME010	VISHNU PRASANTH V	II	А		Robo Fest Speed Trail	Kumaraguru College of Technology,	03.202	$A - 2^{nd}$
2	727623BME011	IBRAHIM DHANISH J	II	А	YUGAM 2K25				A – 2 nd
3	727623BME059	HARITH KUMAR A	II	А		-	Coimbatore	07	A – 2 nd

EVENT NAME : ROBAFIESTA-25 SRI RAMAKRISHNA ENGINERRING COLLEGE

Date : 12-03-2025



S.No	Roll No	Name of the Students	Yr	Sec	Title of the Program	Nature of the Program	Event Venue	Date	P/A
1	727623BME011	IBRAHIM DHANISH J	II	А	Robafiesta -	National	Sri	025	Р
2	727623BME059	HARITH KUMAR A	II	A	2K25	Level	Ramakrishna Engineering College,	203.20	Р
3	727623BME062	ROWHITH R	II	А	Robo race Robo soccer	Symposium	Coimbatore	1	Р

EVENT NAME : RGF-25 RATHINAM GROUP OF INSTITUTION

Date : 26-03-2025



\wedge				, 19
1 ong	ga	Int	a	ions!
$\bigcup A$. 8 :

S.No	Roll No	Name of the Students	Yr	Sec	Title of the Program	Nature of the Program	Event Venue	Date	P/A
1	727623BME021	LAKSHNASRI D	II	А	RGF -2K25 Workshop	National Level Technical Symposium	Rathinam Group of Institution, Coimbatore	2603.2025	Р

EVENT NAME : CMTI-DESIGN AND INNOVATION CLINIC-25, BANGALORE

Date : 07.04.25 - 09.04.25







Organised By

Co-Sponsored

Promoting Self-Driven Innovations



S.No	Roll No	Name of the Students	Yr	Sec	Title of the Program	Nature of the Program	Event Venue	Date	P/A
1	727623BME010	VISHNU PRASANTH V	II	А	CMTI -			25 to 025	Р
2	727623BME011	IBRAHIM DHANISH J	II	А	Design and Innovation	Hackathon	Bangalore)4.20 .04.2	Р
3	727623BME059	HARITH KUMAR A	II	Α	Clinic -2025			07.C 09	Р

EVENT NAME : VIHAAN-2025 NEHRU INSTITUTION OF ENGINEERING AND TECHNOLOGY

Date : 17-04-2025



"YOU'VE ACHIVED SOMETHING REMARKABLE KEEP UP THE GREAT WORK!"

S.No.	Roll No	Name of theStudents	Yr	Sec	Title of the Program	Nature of the Program	Event Venue	Date	P/A
1	727623BME305	KABILESH M	III	A	Vihaan - 2K25 CAD Modelling	National Level Technical Symposium	Nehru Institute of Engineering and Technology, Coimbatore	1704.2025	1 st Prize



"CONGRATULATIONS ON YOUR ACHIVEMENT"

"AFTER ALL THE HEARDWORK YOU PUT IN,YOU SURE DESERVE WHAT YOU HAVE "







Congratulations to Mechanical Research Centre

"SUCCESS IS NOT THE KEY TO HAPPINESS. HAPPINESS IS THE KEY TO SUCCESS. IF YOU LOVE WHAT YOU ARE DOING, YOU WILL BE SUCCESSFUL."



"THE FUTURE BELONGS TO THOSE WHO BELIEVE IN THE BEAUTY OF THEIR DREAMS."





Office of Dean Research & Innovation

Congratulations

Published a Paper in Q1 Journal



Dr. Gurupranes SV Assistant Professor Mechanical Engineering





Polymer Composites WILEY Publication

Impact Factor - 4.80



"THE FUTURE BELONGS TO THOSE WHO BELIEVE IN THE BEAUTY OF THEIR DREAMS."

FACULTY ACHIEVEMENT

Sponsored projects submitted and sanctioned



Total no of project submitted: 12 Sanctioned:1 Amount:90,00,000

AICTE Selected our college to establish an IDEA LAB for the amount of 90 Lakhs





Chief Mentor Dr. P. Govindasamy Head of the Institution

Faculty coordinator Dr.Rama.Thirumurugan Professor and Head Mechanical Engineering Department





Faculty Co-Coordinator Dr.M.Jayaraj Assistant Professor(SG) Mechanical Engineering Department

Dr.Rama Thirumurugan, Professor and HoD(I/C) participated in AICTE IDEA LAB TECH FEST -2025 at AICTE HQ, NEW Delhi on 7.3.2025.









Dr. MAHALINGAM

COLLEGE OF ENGINEERING AND TECHNOLOGY



MCET Has Been Selected to Establish AICTE - IDEA LAB





<u>Our Síncere Thanks to</u> AICTE & MCET Management

Chief Mentor Dr. P. Govindasamy

Coordinator Dr. Rama Thirumurugan

HOD - Mechanical Engg.





Co-coordinator Dr. M. Javaraj AP (SG) - Mechanical Engg.

PATENT PUBLICATION







11 1 A.C.

DR.JAYARAJ.M AP(SG), MECH

JOURNAL PUBLICATION

Waste and Biomass Valorization https://doi.org/10.1007/s12649-024-02704-z

ORIGINAL PAPER

Investigations on the Mechanical, Morphological, and Thermal Degradation Properties of Alkali-Treated Polymer Composites Reinforced with an Areca Palm Leaf Stalk Fibers

N. Shanmuga Sundaram¹ · Jayaraj Mahalingam¹ · K. Vijayakkannan¹ · S. V. Gurupranes¹ · Rajendran Prabakaran² · Sung Chul Kim² · Saravanan Pandiaraj³ · Mostafizur Rahaman⁴

Received: 1 February 2024 / Accepted: 20 August 2024 © The Author(s), under exclusive licence to Springer Nature B.V. 2024

Abstract

The current research reported the mechanical characteristics of polyester composites that were strengthened with untreated and three distinct levels of alkali-treated continuous areca palm leaf stalk fibers (AF). The fabrication of the composites involved the utilization of a compression molding method, wherein both untreated AF (UTAF) and alkali-treated AF (ATAF) at varying concentrations of 5%, 10%, and 15% were incorporated into an epoxy resin matrix. The results revealed that the tensile, flexural, and impact properties of the composite material, which was strengthened with with a 10% alkali solution treated AF composite (ATAFC), exhibited a significant improvement in comparison to the UTAF-reinforced composite (UTAFC), as well as the ATAFC with 5% and 15% alkali treatment. Furthermore, a decline in the water absorption characteristic was observed in the 10% ATAFC with a reduction of 15%. The scanning electron microscopy technique also revealed that the 10% ATAFC exhibited improved loss and storage modulus when compared to the UTAFC, as well as the 5% and 15% ATAF composites.

Keywords Biomass · Areca palm leaf stalk fibers · Alkali treatment · Mechanical properties · Epoxy resin matrix

Introduction

- ☑ Jayaraj Mahalingam jayaraj.m21@gmail.com
- Rajendran Prabakaran praba.auto@gmail.com; prabakaran@yu.ac.kr
- Sung Chul Kim sungkim@ynu.ac.kr
- ¹ Department of Mechanical Engineering, Dr. Mahlaingam College of Engineering and Technology, Pollachi 642003, India
- ² School of Mechanical Engineering, Yeungnam University, 280 Daehak-Ro, Gyeongsan 712-749, Republic of Korea
- ³ Biological and Environmental Sensing Research Unit, King Abdullah Institute for Nanotechnology, King Saud University, P.O. Box 2455, Riyadh 11451, Saudi Arabia
- ⁴ Department of Chemistry, College of Science, King Saud University, Riyadh 11451, Saudi Arabia

Published online: 02 September 2024

The growing recognition of environmental concerns and the enforcement of environmental regulations have spurred a shift toward the use of eco-friendly materials in both industrial and domestic settings. This shift has led to increased interest in utilizing natural cellulose fibers as reinforcement materials in polymer matrix-based composites [1-4]. These cellulose fibers, primarily sourced from animals and plants, present unique challenges and advantages. The animal-derived fibers are scarce and difficult to extract, while plant-based fibers offer abundant availability and numerous benefits, including higher specific strength, biodegradability, renewability, affordability, lower energy consumption during processing, favorable mechanical properties, and carbon dioxide absorption capabilities [5, 6]. Additionally, plant-based fibers require significantly less energy-about 60% less-to produce compared to synthetic fibers such as glass fibers [7, 8].

🖉 Springer

ongrafulations!

Dr.N.Shanmuga Sundaram Dr.M.Jayaraj Mr.K.Vijayakkannan Dr.S.V.Gurupranes



1

JOURNAL PUBLICATION

Environmental Quality Management

WILEY

and the state

RESEARCH ARTICLE

Exploring the Potential of *Tamarindus indica* and *Caryota mitis* Leaf Stalk Fibers for Sustainable Biodegradable Composites

Gurupranes Sivaraj Vijaya 💿 | Bala Murali Nagarajan | Jayaraj Mahalingam | Nachimuthu Somasundaram | Ayyappan Subrananian | Shanmugasundram Natarajan | Vijayakkannan Kaliyappan

Department of Mechanical Engineering, Dr. Mahalingam College of Engineering and Technology, Pollachi, Tamilnadu, India

Correspondence: Gurupranes Sivaraj Vijaya (gurusivaraj94@gmail.com)

Received: 3 June 2024 | Revised: 19 November 2024 | Accepted: 13 December 2024

Keywords: Caryota mitis leaf stalk fiber | composites | natural fibers | Tamarindus indica seed powder | TGA/DTA | XRD

ABSTRACT

As a substitute for synthetic materials, it is difficult for researchers studying natural fiber materials to develop biodegradable composite materials. These natural fiber-infused polymer composites are environmentally friendly and exhibit excellent mechanical properties. The main objectives of this work were to create and analyze epoxy polymer composites reinforced with *Tamarindus indica* and *Caryota mitis* leaf stalk fiber. Five distinct compositions were used in the hand lay-up procedure to create composite specimens. An evaluation was conducted on the mechanical qualities, including hardness, tensile strength, and impact resistance. To evaluate the physical and chemical properties of the composites, their metallurgical features were investigated using wear, microstructure, and thermogravimetric analysis (TGA). Specimen C, composed of 20% *C. mitis*, 20% *T. indica* powder, and 60% epoxy, showed the best tensile strength (69.12 MPa) and the highest hardness (76.37 VHN) of all the compositions examined. The composite exhibited favorable bonding and temperature adaptability, as demonstrated by the microstructure and TGA studies. All things considered, research indicates that these hybrid composites have better particular qualities, which makes them suitable materials for use in automotive and aerospace applications.

1 | Introduction

The development of natural composites has been the focus of aircraft industry research in recent years, owing to the rise in environmental pollutants. Indian researchers are searching for novel applications of residual plant fibers to create ecofriendly products (Neto et al. 2022). Over the past few decades, many researchers have worked to increase awareness of natural fiber-reinforced composites. Accordingly, tests were conducted to determine the qualities of green composites reinforced with *Caryota mitis* leaf sheath fibers and tamarind seed powder mixed with an epoxy resin matrix (Karimah et al. 2021). *C. mitis* leaf sheaths are easily accessible and have high tensile strength, which is crucial for preserving the structural integrity of composite materials. Tamarind seed powder is also reasonably priced and is considered a waste product in the tamarind industry. Together with epoxy resins, these fillers can be used to prepare sustainable biodegradable composites (Ashok, Srinivasa, and Basavaraju 2018). Most places underutilize tamarind seeds, but there are plenty that can be improved. Bio fillers are utilized because of their exceptional mechanical and thermal properties, as well as their low density, according to numerous authors. A comprehensive analysis of the current developments in this sector is required to evaluate the effectiveness of renewable sources in composite materials, as several authors have documented. The mechanisms that lead to the degradation of polymeric components, from

© 2025 Wiley Periodicals LLC.

Environmental Quality Management, 2025; 34:e70029 https://doi.org/10.1002/tqem.70029 1 of 7

ongrafulations!

Dr.N.Shanmuga Sundaram Dr.M.Jayaraj Mr.K.Vijayakkannan

Dr.S.V.Gurupranes Dr.Balamurali .N Dr.S.Ayyappan

JOURNAL PUBLICATION

JOURNAL OF ENGINEERING SCIENCES

Volume 11, Issue 2 (2024)



in the

Jayaraj M., Ashok S. K., Thirumurugan R, Shanmugam D., Mahendran M. (2024). Mechanical properties and stress analysis of natural fiber reinforced polymer composite spur gear. Journal Engineering Sciences (Ukraine), Vol. 11(2),D1–D8. ofpp. //doi.org/10.21272/jes.2024.11(2).d1

Mechanical Properties and Stress Analysis of Natural Fiber Reinforced **Polymer Composite Spur Gear**

Jayaraj M.[0000-0003-2397-5014], Ashok S. K.*[0000-0002-7690-0094], Thirumurugan R.[0000-0003-1222-3845], Shanmugam D. [0000-0003-2331-0864], Mahendran M. [0000-0002 94-6114]

Dr. Mahalingam College of Engineering and Technology, Udumalai Rd., Annamalai Nagar, Pollachi, 642003, Coimbatore, Tamilnadu, India

April 17, 2024

August 15, 2024

July 30, 2024 August 9, 2024

Article info:

Submitted: Received in revised form: Accepted for publication: Available online:

*Corresponding email: ashokksamy@gmail.com

Abstract. This research study investigates the mechanical properties of polymer composites reinforced with natural fibers, specifically Palmyra palm leaf stalk fiber (PPLSF) and Palmyra palm primary leaf stalk fiber (PPFLSF). Tensile, flexural, and impact strength were among the composites' mechanical parameters generated by integrating these fibers into a polymer matrix and assessing them experimentally. Additionally, stress analysis of a spur gear was conducted using the finite element analysis software ABAQUS. The composite material properties obtained from the experimental investigation were used in the analysis to evaluate the gear's stress distribution and deformation behavior. The bending stress at the pitch point of the natural composite gears for PPLSF, PPFLSF, and nylon synthetic material is analyzed using analytical and experimental methods by ABAQUS software. Finally, the results are compared with each other. The results show that stress induced by nylon is comparatively higher than that of PPLSF and PPFLSF fiber. By analyzing these composites' strength, durability, and stress distribution under operating environments, the study aims to determine whether they are suitable substitutes for conventional materials.

Keywords: composite material, natural fiber, nylon, finite element analysis, von Mises equivalent stress.

1 Introduction

According to several studies, natural fibers, including banana, elephant grass, sisal, jute, vakka, bamboo, Roystonea regia, and coconut, are reinforced in composite materials. Various sectors, including the automotive, marine, sports goods, and structural ones, use other natural fibers such as kenaf, hemp, flax, ramie, bamboo, coir, bagasse, and sugarcane [1, 2].

Despite the growing interest in natural fiber composites, there is limited knowledge and research specifically addressing their use in spur gears. Critical areas for further exploration include material selection and characterization, development of manufacturing techniques, structural integrity and performance evaluation under varying conditions, understanding tribological properties, comparative studies with conventional metal gears, and application-specific metal gears, and application-specific research. Addressing these research gaps will contribute to a deeper understanding of the potential of natural fiber composites in spur gear applications, guiding their design optimization for improved performance and and reliability [3, 4].

2 Literature Review

Maurya et al. [5] examined the influence of alkali treatment on surface modification that enhanced adhesion between the fiber and polymeric resin, making Palmyra palm primary leaf stalk fiber (PPFLSF) a better natural fiber composite.

Mahalingam et al. [6] studied the properties of raw and alkali-treated Palmyra palm leaf stalk fiber (PPLSF) and concluded that alkali treatment removes impurities that help better bonding and improve physical and chemical strength.

Qu et al. [7] reviewed natural fiber-reinforced polymer composites and concluded that they exhibit beneficial

Journal of Engineering Sciences (Ukraine), Volume 11(2), pp. D1-D8

D1

ongrafifations! Dr. Jayaraj.M



FACULTY DEVELOPMENT PROGRAM

	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
Program attended 5days and above	43	116	104	23	42	15
Program attended (3 or 4 Days)	8	20	2	5	0	1
Days Program attended (1 or 2Days)	6	4	5	9	10	6
Online Course	7	2	23	25	16	9

Mr.J.Venkatesh, Assistant Professor/Mechanical attended the FDP titled "Advanced in Solar Collector Technologies" on 03-03-2025 to 07-03-2025 at Indian Institute of Technology, Guwahati.





FACULTY DEVELOPMENT PROGRAM

Mr.K.Sasikumar,Assistant Professor/Mechanical attended the National Workshop on the Development of Nano biomaterials for Advancing 3D Bioprinting Technology on 27th February – 01st March 2025 at Sathyabama Institute of Science and Technology, Chennai.



Mr.R.Gunasekaran, Assistant Professor/Mechanical presented a paper in 9th International and 30th All India Manufacturing Technology, Design, and Research Conference (AIMTDR) 2023 is being organized by the Department of Mechanical Engineering, IIT (BHU) Varanasi, from 8th - 10th December 2023.



COMMUNITY ENGAGEMENT

ATTENDED THE GRAMA SABHA MEETINGS AT MAKKINAICKENPATTI, THENCHITTUR AND CHINNAMPALAYAM VILLAGES ON 26.1.2025.

Name of the Coordinator: **Dr.S.Ayyappan** Name of the villages adopted:

- 1. Kanjampatti
- 2. ThenChittur
- 3. Chinnampalayam
- 4. Unjavelampatti
- 5. Makkinaickenpatti











BATCH 2021-2025



2025 VOLUME 2 NEWSLETTER