ISO 9001:2015 AICTE-CII: GOLD Category Institute NAAC-'A' Grade Institute (CGPA: 3.21)

KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE
Opp : Yerragattu Gutta, Hasanparthy (Mandal), WARANGAL - 506015, TELANGANA, INDIA
काकतीय प्रौद्योगिकी एवं विज्ञान संस्थान, वरंगल - ५०६०१५, तेलंगाना, भारत
కాకతీయ సాంకేతిక విజ్ఞాన శాస్త్ర విద్యాలయం, వరంగల్ - ౫౦౬౦౧౫, తెలంగాణ, భారతదేశము
(An Autonomous Institute under Kakatiya University, Warangal)
(Approved by AICTE, New Delhi; Recognised by UGC under 2(f) & 12(B); Sponsored by EKASILA EDUCATION SOCIETY)
Estd: 1980 KITSW

website: www.kitsw.ac.in E-mail: principal@kitsw.ac.in : +91 9392055211, +91 7382564888

Name of the Department: Mechanical Engineering

Name of Research and Education center: Composite Materials

Research & Education Center
COMPOSITE MATERIALS

About the Center:

The Composite Materials Lab, a pivotal addition to our Research Center, embodies our commitment to cutting-edge research and innovation. With the escalating demand for lightweight, durable materials, composites stand at the forefront of modern engineering. This introduction encapsulates our dedication to advancing knowledge, fostering interdisciplinary collaboration, and addressing contemporary challenges across industries. By providing state-of-the-art facilities and promoting industry partnerships, the lab aims to drive innovation, nurture talent, and facilitate the seamless translation of research into practical applications. Our endeavors in composite materials science and engineering herald a new era of technological advancement and transformative solutions for a dynamic world.

The primary functions of the center:

The laboratory fulfills the requirements for undergraduate, postgraduate, and doctoral research projects, as well as consultancy services related to material testing. The center serves as a dynamic hub for research, innovation, and collaboration, focusing on several key functions:

- Research Excellence: Conducting cutting-edge research across various disciplines, addressing critical challenges, and advancing knowledge in fields ranging from science and engineering to social sciences and humanities.
- Interdisciplinary Collaboration: Facilitating cross-disciplinary partnerships and collaboration among researchers, scholars, and industry professionals to tackle complex problems and explore innovative solutions.
- Talent Development: Nurturing the next generation of researchers, scholars, and leaders through mentorship, training programs, and experiential learning opportunities that foster critical thinking, creativity, and academic excellence.
- Knowledge Dissemination: Sharing research findings, insights, and discoveries through publications, conferences, seminars, and outreach activities to contribute to the global academic community and promote societal impact.
- Innovation and Entrepreneurship: Fostering a culture of innovation, entrepreneurship, and technology transfer by supporting startups, incubating new ideas, and commercializing research outcomes to address societal needs and drive economic growth.

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Major equipments: (along with description / Cost/ photographs)

S. No	Equipment	Description	Cost (Rs.)	Photograph
1	Universal testing machine (3TON load capacity, computerized operation)	The Micro Universal Testing Machine designed for polymer matrix materials features a 3-ton load capacity and computerized operation. This specialized apparatus offers precise testing for the mechanical properties of polymers, including tensile, compression, and flexural tests. It ensures accurate analysis and characterization of polymer materials in research and industrial applications.	6,49,000/-	
2	Pin on disc machine (Standards as per ASTM G99 With Data acquisition of wear; laptop) Laptop: - Processor (CPU): Intel Core i3, Memory: 4GB RAM Storage: 500 GB internal storage drive	The Pin-on-Disc machine designed in accordance with ASTM G99 standards offers wear testing capabilities with data acquisition functionalities. The laptop facilitates data acquisition during wear testing procedures conducted using the Pin-on-Disc machine. It enables researchers to capture, analyze, and store wear data efficiently, ensuring accurate assessment and characterization of materials under test conditions.	5,59,910/-	

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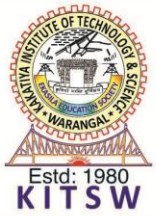
3	Izod/ Charpy impact tester (Load conditions 2.5Joule to 29 Joules, Digital output) HP 15q Core i5 8th Gen (8GB/ 1TBHDD/ Windows 10 Home) 15q-ds, 1001 TU Laptop (15.6-inch, Jet Black, 1.77kg with MS Office)	The Izod/Charpy impact tester is designed to evaluate the impact resistance of materials by subjecting them to controlled impact loads within the range of 2.5 Joules to 29 Joules. It provides digital output, allowing for precise measurement and recording of the impact energy absorbed by the specimen during testing. This tester is crucial for assessing the toughness and durability of materials used in various industries, including manufacturing, construction, and automotive.	1,81,290/-	

Minor equipment details:

S. No	Equipment	Description	Cost (Rs.)
1.	Motorized Notch Cutter – Digital	A Motorized Notch Cutter, Digital, is a specialized apparatus used in material testing laboratories, particularly in the field of metallurgy and mechanical engineering. Its primary function is to create precise notches or grooves on metal specimens, typically for standardized tests like Charpy or Izod impact tests.	48,380/-
2.	Vacuum bagging set up	A vacuum bagging setup is a specialized system used in composite manufacturing processes to remove air and compact composite materials during the curing process.	32,450/-
3.	Scroll saw (composite cutter)	A scroll saw designed for cutting composite materials is a specialized tool used in various industries, including woodworking, aerospace, automotive, and manufacturing.	13,400/-
4.	Mini Stirrer	a mini stirrer is a versatile and indispensable tool in laboratory settings, offering efficient and reliable mixing and stirring capabilities for small-scale applications.	15,340/-



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Types of projects / research carried out with description:

List of projects that utilized available equipment in the composite materials lab during 2021-25 academic years.

S. No	Project Guide Name	Project Title
1.	Smt. P. Anitha	Experimental Optimization of Dry Sliding Wear Behaviour of Metal Matrix Composites
2.	D. Sammaiah	Effects of Water And Kerosene on The Weight Gain And The Impact Strength of FRP Composites: Plant Based Jute
3.	Dr.K Rajanarender Reddy	Development And Characterization of Randomly Oriented Short Natural Fiber Composites
4.	P.Divya	Evaluation of Mechanical Properties of Basalt Fiber Reinforced Composites
5.	Sri Ch. Karunakar	Evaluation of Mechanical And Tribological Properties of Hybrid Cellulose Composites For Various Liquid Conditions
6.	M. Anil Kumar	Morphological And Tribological Properties of Sisal Cellulose Reinforced Composite Under Different Liquid Conditions
7.	Dr.S Chandramouli	Experimentation Investigation And Characteristics of Aluminium Metal Matrix Composite
8.	Sri S Sripathy	Fabrication And Testing of Fibre And Nanoparticles Reinforced Polymer Composite Materials
9.	Dr. M. Om Prakash	Tribological Behaviour of Biodegradable Composites
10.	Dr. G. Srinu	Evaluation of Machining Performance And Sustainability Characteristics In Vegetable Oil Based MQL Machining
11.	V. Rajesh	Material Characteristics of 3d Printed Reinforced Composite Material
12.	Dr. J. Laxman	Experimental Study on Mechanical Properties of Metal Matrix Composite Materials
13.	Dr. Md Sameer	Friction Stir Welding of Aluminium Alloy Reinforced With Al2O3 And And Graphite Nanoparticles
14.	Dr. G. Srinivasa Rao	Banana And Ladyfinger Fiber Tensile Behaviour
15.	V Pradeep	Microstructure And Wear Characteristics of Aluminium Metal Matrix Composites
16.	Dr. Md. Sameer	Optimization of 3D Printing Parameters
17.	Dr. J. Laxman	Experimental Investigation of Microstructure And Mechanical Properties of Metal Matrix Composites
18.	V. Srikanth	Mechanical Properties of Composite Materials
19.	Dr.K.Raja Narender Reddy	Study on Mechanical Properties of Composite Materials
20.	V. Srikanth	Mechanical Properties of Composites
21.	Dr K Raja Narender Reddy	Study on Mechanical Property And Characterization of Randomly Oriented Water Hyacinth (Eichhornia Crassipes) Fiber As Reinforcement With Guar Gum Matrix Material
22.	Dr.P.Prabhakar Rao	Cold Spray Coating On Polymer Composites

23.	K. Kishor Kumar	Investigation of The Mechanical Properties of A Kenaf-Banana Fiber Reinforced Composite
24.	Dr. Md Sameer	Tribological Properties of Aluminium Matrix Composite Reinforced With Al2o3
25.	Dr. K. Raja Narender Reddy	Development And Characterization of Water Hyacinth Fiber Reinforced GG Composites To Catalyse Sustainability.
26.	Dr. A. Devaraju	Fabrication And Characterization of Basalt Fiber Reinforced Composites
27.	Dr. Md. Sameer	Parametric Analysis And Optimization of FDM Processed Parts Using Filaments
28.	Sri K. Kishor Kumar & Sri S. Sripathy	Preparation & testing of particle reinforced polymer composites materials for different composite materials
29.	Dr. J. Laxman	Experimental Investigation of Mechanical Properties of Fiber Composite Material
30.	Dr. G. Sai Kumar	Preparation, characterization and investigation of mechanical properties of Epoxy-based composites
31.	Dr. K. Raja Narender & Sri V. Srikanth	Dynamic Mechanical Analysis of Natural Fibre Reinforced Composites
32.	Dr. K. Raja Narender	Fatigue properties of chemically treated natural fiber - reinforced with guar gum composites
33.	Dr. A. Devaraju	Evaluation of dielectric properties of basalt fiber reinforced composite
34.	Sri A. Hari Kumar & Smt. P. Anitha	Studies on mechanical tribological properties and the behavior of developed nano composites
35.	Dr. P. Prabhakara Rao	Fabrication and Analysis of Hybrid Composite using Natural Fibers

Experimental Optimization: Projects like "Experimental Optimization of Dry Sliding Wear Behavior of Metal Matrix Composites" (Smt. P. Anitha) and "Morphological And Tribological Properties of Sisal Cellulose Reinforced Composite Under Different Liquid Conditions" (M. Anil Kumar) involve experimental optimization to understand the behavior and performance of composite materials under various conditions.

Characterization Studies: Projects such as "Development And Characterization of Randomly Oriented Short Natural Fiber Composites" (Dr. K Rajanarender Reddy) and "Microstructure And Wear Characteristics of Aluminium Metal Matrix Composites" (V Pradeep) focus on characterizing the properties and microstructure of composite materials through experimental analysis and testing.

Tribological Analysis: Several projects like "Tribological Behavior of Biodegradable Composites" (Dr. M.Om Prakash) and "Tribological Properties of Aluminium Matrix Composite Reinforced With Al2O3" (Dr Md Sameer) involve studying the friction, wear, and lubrication properties of composite materials to enhance their performance and durability.

Mechanical Properties Evaluation: Projects such as "Evaluation of Mechanical Properties of Basalt Fiber Reinforced Composites" (P. Divya) and "Mechanical Properties of Composite Materials" (V. Srikanth) focus on evaluating the mechanical strength, stiffness, and toughness of composite materials under different loading and environmental conditions.

Material Development and Fabrication: Projects like "Fabrication And Testing of Fiber And Nanoparticles Reinforced Polymer Composite Materials" (Sri S Sripathy) and "Fabrication And Characterization of Basalt Fiber Reinforced Composites" (Dr. A. Devaraju Sir) involve developing new composite materials and fabricating them using various techniques for specific applications.

Process Optimization: Projects such as "Optimization of 3D Printing Parameters" (Md. Sameer) and "Parametric Analysis And Optimization of FDM Processed Parts Using Filaments" (Dr. Md. Sameer) focus on optimizing manufacturing processes and parameters to achieve desired material properties and performance outcomes.

Environmental Sustainability: Projects like "Development and Characterization of Water Hyacinth Fiber Reinforced GG Composites to Catalyze Sustainability" (Dr K. Raja Narender Reddy) aim to explore eco-friendly alternatives and sustainable materials for composite manufacturing, contributing to environmental conservation efforts.

These projects demonstrate the breadth and depth of research within the field of composite materials, covering aspects ranging from material development and characterization to performance evaluation, process optimization, and sustainability considerations. Each project contributes to advancing knowledge and understanding in the field and addresses specific challenges and opportunities associated with composite materials and their applications.

Photographs of Samples tested in the Lab:

Tensile test Specimens tested in the lab

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Details of Faculty incharge for Research and Education Center: (Photo, Contact details)

Sri Ch. Karunakar
Assistant Professor
Mobile: 9347706262
Email: chkr.me@kitsw.ac.in