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# Mechanical Characterization of Kevlar Fiber Composite with Nano Particles

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**ABSTRACT:** In today's world, the focus is towards the materials based on Natural components because they are environmentally acceptable and biodegradable in nature. Among them, kevlar composite materials show a rapid growth in engineering applications, due to its low cost, light weight and biodegradable properties. The aim of this experimental study is to investigate the mechanical behaviour of kevlar fiber with nano particles. The performance of a fiber composite is judged by its length, shape, orientation and composition of the fiber on the mechanical properties of the matrix. kevlar fiber have been the leading material for agricultural twine because of its strength, durability and ability stretch

**KEYWORDS:** Obstacles detecting sensor, DC motor.

### I. INTRODUCTION

Composite materials produce a combination properties of two or more materials that cannot be achieved by either fiber or matrix when they are acting alone. Fiber-reinforced composites were successfully used for many decades for all engineering applications. The mechanical behaviour of a fiber-reinforced composite basically depends on the fiber strength and modulus, the chemical stability, matrix strength and the interface bonding between the fiber to enable stress transfer. The various GF reinforcements like long longitudinal, woven mat, chopped fiber (distinct) and chopped mat in the composites have been produced to enhance the mechanical and tri biological properties of the composites.

### II. LITERATURE REVIEW

#### Experimental Investigation and Analysis a Mechanical Properties of Hybrid Polymer Composite Plates

R.Sakthivel, D.Rajendran

This paper presents, about a new type of fiber reinforcement composite and chemical treatment like NaOH will increase the flexural strength of the fiber upto 20-30% and removes the moisture content of the fiber

The mechanical properties of banana and kevlar fiber reinforced epoxy hybrid composites have been investigated. The tensile strength and flexural strength increase with increase with increase fiber volume fraction. Among all the hybrid fiber composites tested, banana reinforced epoxy hybrid composites registered the highest mechanical properties whereas kevlar and banana fiber composites showed the highest. The mechanical properties of the natural fiber and synthetic fiber plates composites tested were found to compare favourably with the corresponding tensile and flexural properties increasing volume fraction of fiber percent.

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## 2.2 Mechanical Properties of Cnt

Yilun Liu, Bo Xie, Zhong Zhang, QuanshuiZheng, and ZhipingXu

This paper presents about the mechanics of cnt based papers where cnt sheets are assembled in layer-by-layer manner is studied here by first-principle calculations and the deformable tension-shear model. In comparison to the tension shear chain model, further include the elastic deformation of the cnt sheets that has key impacts to the overall mechanical properties of the cnt based composites. Simultaneously tuning the cnt sheet size and crosslink mechanisms, an optimal design of cnt based materials can be established with well-appreciated mechanical performance.

## 2.3 Kevlar Fiber-Reinforced Polymer Composites

TP Sathishkumar, S Satheeshkumar, and J Naveen

This paper is present about the mechanical, dynamics, tri biological, thermal and water absorption properties of kevlarfiber reinforced polymer composites have been discussed. They are the various preparation technologies were used for preparing the kevlarfiber reinforced polymer composites with various environmental conditions. The damping properties of kevlarfiber reinforced polymer composites were improved by increasing the kevlarfiber content in composite and the natural frequency was measured fir all conditions.

The water absorption was analyzed for various environmental conditions with different time period. The water absorption decreased the mechanical properties of the composites.

## 2.4 Experimental Analysis of Cnt Nano composite on Kevlar

S. Manigandan

This paper is focused on the Kevlar-cntnano composites are tested for the mechanical property. Four types of configuration id tested and compared with each other to find the optimized laminate. As the percentage of the cnt increase the strength of the fiber is increased. The result and plots clearly visualized that, the increase in ratio of nano composites will affect the interfacial property of the laminated due to which the strength of the fiber is dropped as the cnt ratio is exceed beyond 5%.

## 2.5 Mechanical characteristics of the Tensile properties of Kevlar fiber and its Reinforced polymer (GFRP) Composite under Varying strain rates and temperatures

YunfuOu, Liang Huang, BarzinMobasher

This experimental study focuses on the tensile characterization and failure pattern of kevlar yarn and GFRP samples under different loading conditions. The strain rate and temperature effects on the mechanical properties and fracture morphologies are investigated and discussed comparatively. The mechanical properties of kevlar yarn and GFRP are also dependent on the temperature. For kevlar yarn, tensile strength and toughness decrease nearly 25.3% and 31.1% when temperature increases from 25 to 75 °C.

## 2.6 Mechanical Properties of Kevlar Fiber Reinforced Polymer Based on Resin from Recycled Plastic

Ephraim M. E. and Adetiloye A.

The cardinal objective of this study was the determination of the mechanical properties of kevlar fibre reinforced plastic based on recycled resin and to ascertain its applicability for structural purposes. On the basis of the analysis of experimental results obtained in this study, it can be concluded that GFRP from recycled plastic wastes meets all the minimum requirements of the normative standards and therefore qualifies as a good material for different structural strengthening and retrofitting purposes. Specifically, GFRP has light weight and corrosion resistance. The decrease in dead weight will leads to substantial economy in the capacity of lifting and transportation equipment required for construction.

## 2.7 Research on the Mechanical Properties of a Kevlar Fiber Reinforced Polymer-Steel Combined Truss Structure

PengfeiLiu, JinchunLiu, and HaosenChen

In this study, a GFRP-steel combined truss is put forward to make a typical truss panel. Furthermore, load

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tests and analyses are conducted in a 12ms pan with a 20tequivalent wheel load. The ends of composite rods are fabricated with steel joints by way of pre tightened tooth connections. The mature weld technology is convenient for the design and manufacture of various nodes of the composite combined truss, and the experiment proves there liability of the transmission of a load.

Fig( 6.1 &): construction



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## III. MOTIVATION AND OBJECTIVE

- a) Fabrication of a new class of epoxy based hybrid composites reinforced with oriented kevlar fibers and cnt.
- b) Evaluation of mechanical properties such as tensile strength, flexural strength, compression strength and impact strength for these composites.
- c) To study the influence of fiber parameters such as fiber and fiber loading on the mechanical behavior of the composites.
- d) To increase the Ultimate tensile strength and flexural strength of the kevlar fiber composite with increase in the fiber/kevlar Volume ratio of fiber weight fractions.
- e) For improving the composites properties, the kevlar fiber were combined with epoxy resin and cnt. This may improve the mechanical properties of the GRP composites.
- f) The goal of the project is the made of composite material, with particular attention to aspects such as weight reduction and high volume production of the component.
- g) The first step of this work will be the choice of the material and process more suitable to have a lower weight component for high volume production.

## IV. CONCLUSION

The main motto of our project is about to reduce the time consuming of transportation. The simple construction work is enough to made this. The human physic work is to be reduce and the time is also saving.

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