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Review of Experimental Investigation on Mechanical Properties of Natural Composite Material

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A B S T R A C T

We had learned about composite material and its mechanical properties by reviewing journals. In this experimental and investigation is to analyze the mechanical properties of the natural fibers with epoxy resins. The different combinations of fiber and resin composites are prepared. The natural fibers are cheaper, biodegradable, Eco-friendly and easy available in any time. Natural fibers are the most popularly used fibers in natural composites. In this study epoxy resin is chosen as matrix and natural fiber is chosen as reinforcement. These composites are majorly used in automobile, aerospace, marine and domestic applications. Mechanical, physical, chemical and thermal properties are analyzed and used for various applications.

Keywords: Natural Fibers, Epoxy resin, Mechanical Properties.

1. LITERATURE REVIEW

C.Sivakandhan et al.[1] It is observed that the laminates laminated with natural fiber increases exponentially. Tensile strength was found improved in both ceramic and glass fiber laminated with ridge gourd/luffa fiber epoxy resin. It is noted that ridge gourd/luffa fiber content with glass and ceramic resulted in increase compressive strength. The impact test is performed with the impact values of both the composites made with natural fiber, it absolutely was found to be virtually similar. Also the results of this research indicate better mechanical properties by performing various mechanical tests in which natural fiber is used with different combination of fibers and resins.

M. Raju et al.[2] it is observed that the tensile strength of sample C5(Epoxy+ Luffa fiber (0%) +Carbon fiber (40%)) is higher and it may be due to more amount of carbon fiber increases density of lamina. It is clear that the compressive strength of sample C5 is higher and it could be the presence of a more volume of carbon fiber when compared to luffa fiber in sample C5. It is concluded that sample C5 is having higher flexural strength and the value is 124.01 MPa.

P.Chokkalingam et al.[3] investigated of the mechanical properties the results were found the mechanical properties of the combination of ridge gourd and coconut coir in three different weight percentages like 75% ridge gourd and 25% coconut coir, 25% ridge gourd and 75% coconut coir, 50% ridge gourd and 50% coconut coir. Comparison of these three plates the ultimate tensile strength of the plate B (Ridge gourd 25% and Coconut coir 75%) is better than another two plates. Comparison of these three plates the flexural strength of the plate B (Ridge gourd 25% and Coconut coir 75%) is better result compare to other two plates. In impact test, plate A (Ridge gourd 75% and Coconut coir 25%) is better output compare to other two plates.

J.S.Suresh et al.[4] The experimental investigation on mechanical characterization of glass fiber reinforced polyester based hybrid composites lead to the following conclusions such as Fabrication of polyester/epoxy based glass reinforced particulate filled composites has been done successfully by hand lay -up technique. Mechanical properties like tensile strength, tensile modulus, flexural strength, impact strength, ILSS and Hardness were determined as per ASTM standards.

Kanishka Jha,Y. K. Tyagi1 and Hari Om Maurya [5] The mechanical testing was performed on the neat PMMA (E) and ridge gourd reinforced composite (RE00, RE05, RE10, and RE15) and following conclusions are made. Tensile strength of epoxy was improved by the reinforcing of ridge gourd fibre and further decreases with increase in fiber content. Flexural properties and impact properties were found to be improved. Tensile properties of the composite RE15 were seen maximum compared to those of other specimens. Flexural strength was also found maximum at RE15. Impact properties of ridge gourd fiber composite were found maximum for the composite RE15.

Short Forms	Description
RE	Ridge gourd Eco-composite
RE00	Neat Epoxy
RE05	Fibers at 5% by weight
RE10	Fibers at 10% by weight
RE15	Fibers at 15% by weight

Table 1- Specimen Preparation

Felix Sahayaraj Arockiasamy, Muthukrishnan M [6] From the results, it is found that the 40% composite sample had improved mechanical characteristics; never the less, because of the smaller fiber volume percentage, the fiber orientation was poor, resulting in poor stress transmission. Poor wet ability of fiber resulted in inferior mechanical strength in composites at larger fiber volume fractions. The results show that 50% fibers reinforcements in composites are producing low strength due to the inadequate amount of resin present in the composite with high volume of fiber which leads to increase the amount of voids and inadequate stress transfer. The failure mechanisms that contribute to poor mechanical properties include large levels of fiber-to-fiber contact and matrix having broken at the surface of the fiber bunches. In comparison to the other, the highest onset temperature of 40 wt% reinforced composites is 390°C, with a residue mass of 17% at 499°C.

K.Vignesh et al.[7**]** In this study the influence of with and without alkali treatment (KOH) of fiber with polymer matrix composite for the study of tensile and flexural properties have been studied. It is clear that tensile and flexural strength of the KOH treated fiber with polyester composite is greater when comparing to normal fiber with polyester matrix and simple polyester alone. As it has light weight and resistant to light, heat and moister it can make use in air craft industries, automobile industries, in building spar parts of ships. More over to that because of its toughness, hardness and light in weight it can be used in maximum of mechanical parts. The study of the relationship between alkali treated and without treated materials and their tensile and flexural proprieties are confirmed by many researchers.

M.Sakthivel et al.[8] The feasibility of coir, luffa reinforcement in polypropylene was studied. Chemical modification of these fibers was studied to demonstrate the effect of modification on the mechanical properties of the composites. It was verified that effectively improved the mechanical properties in comparison with polymer pure. It can be used for automotive among the other natural fibre combinations.

And they noted some information as the variation of tensile, compressive and flexural properties of natural fiber particulate composite are studied. From experimental results, it is found that, compared with natural fiber particulate composite, the carbon particulate composite provides better mechanical properties.

2. CONCLUSIONS

From these journals, we learned some information regarding mechanical properties such as Tensile Strength, Compressive Strength, Flexural Strength, Impact test, Water absorption test of natural fiber with epoxy resin are analyzed and calculated. The 15% weight of natural fiber composites showed 74% Tensile strength, and showed more than 60% increment in impact strength. The water absorption capability of the 50 wt% fiber reinforced sample showed higher water-absorbing nature because of the fiber's hydrophilic nature. More over to that because of its toughness, hardness and light in weight it can be used in maximum of mechanical parts.

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