

## Experimental Analysis of Coir Fibre and Epoxy Resin Composite

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**Abstract:** The main objective of our project is used waste natural materials as a composite and also replace for an automobile components. In this project, coir fibre composite material is fabricated in hand layup method. And also mechanical properties of coir fibre composite materials are experimentally analysed. Both treated and non-treated coir fibres are used in this project. Treated coir fibres are made by sodium hydroxide. After the fabrication flexural, hardness and impacts tests are taken.

**Key words:** Coir fibre, epoxy resin composite, natural waste and testing, automobile components, non-treated, fabrication

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### INTRODUCTION

Composites are commonly made by man. Composite material is combination of more than one chemically distinct material with a interface un combined the materials, fabricated to get properties that can't be full fill by any other components acting alone (Bongarde, 2014). Composite material is known as a material that consists of more than one combined constituents those are combined at a microscopically level and not soluble in each other (Mueller, 2004). One is known as the reinforced phase is in the shape of thin plate, particle and another one in which it is embedded is called matrix phase (Adams, 2012).

**Literature review:** The machining and mechanical properties of composites made by coir with epoxy resin and hardener are explained by Gunti Ranga Srinivas. Manual process is used for extracted the natural fibres (Raftoyiannis, 1984). The composites are fabricated using banana and pineapple fibre reinforcements is described in experimental and numerical simulation of magnetic pulses for joining of dissimilar materials with dissimilar geometry using electromagnetic welding process (Muthukumar *et al.*, 2017). Hybrid composites were prepared coir and glass of four different ratios of coir. In this research study structural and optical absorption studies of cobalt substituted strontium ferrites presents Composite materials mixing of more than one material to attain good mechanical characteristics (Mangai *et al.*, 2016). Composite materials are as mature as coir natural fibre as reinforcement material by hand layup method (Rajesh *et al.*, 2016). A specimen such a composite is developed during step by step layer method at a proper

pressure. The fabricated composite specimen is tested for its machining characteristics using digital testing machines and the results were recorded (Sagadevan *et al.*, 2016). In this study, described that the crystal growth, perfection, linear and nonlinear optical, photoconductivity, dielectric, thermal and laser damage threshold properties of 4-methylimidazolium picrate an interesting organic crystal for photonic and optoelectronic devices (Selvi *et al.*, 2016). The properties of metal matrix composites have been analysed (Sivaram *et al.*, 2015).

### MATERIALS AND METHODS

Composite material is known as combination of more than one materials. In this study, we selected the natural composite which was coir fiber. The combination materials are epoxy resin and hardner. In this study, we will select two various coir fiber. They are treated coir fiber and another one was untreated coir fiber. The LY956 type epoxy resin and HY456 type hardener were used in the composite material fabrication process.

**Fabrication method:** The moulds are cleaned by using cloth and brushes. The coir fibres applied uniformly over the mould before applying the resin and hardener mixture. After applying the coir properly, they were pressed by using roller. Then the pressed applying the epoxy and hardener over the coir fibre. Again epoxy combination is then poured over the coir properly and pressed by the roller. Coir composites are fabricated by various ratios of coir fibre. Finally, the coir fibre composite is covered by the OHP sheet. The coir composite fabrication picture was shown in the Fig. 1.



Fig. 1: Fabricated sample

Table 1: Flexural test

Sample No.	CS area (mm <sup>2</sup> )	Peak load (N)	Flex. strength (N/mm <sup>2</sup> )
S1	300.00	50	376.24
S2	300.00	75	242.56
S3	300.00	100	136.49

Table 2: Impact test

Sample No.	Energy reading in scale (J)
S1	8.9
S2	8.8
S3	9.1

### RESULTS AND DISCUSSION

The three various samples of coir composite materials are fabricated and it was mechanically tested. The tests are flexural testing, impact test and hardness test. The all testing results are noted in the Table 1-3. The three various samples are named as S1-S3. The fabricated coir composite materials cut in the dog bone shape for flexural test. In the flexural test, the S1 has more strength than the S2 and S3. The S1 flexural strength was 376.24 N/mm<sup>2</sup>. The impact test results are noted in the Table 2. By the result the S3 has more impact strength than the S1 and S2. The brinell hardness test was conducted in the samples and the values are noted in the Table 3. By the result the S1 has more hardness value than the S2 and S3. By the discussion the S1 has better mechanical properties than the S2 and S3.

Table 3: Hardness test

Trials	Load (kg)	Specimen size (mm)	Hardness values
S1	200	20×70×5	193.0
S2	200	20×70×5	192.0
S3	200	20×70×5	192.3

### CONCLUSION

The coir fibre reinforced composite material manufactured and then its mechanical characteristics like flexural, hardness and impact strength was determined for sample 1-3. The result thus obtained from the specimen compared with the other specimens. By using the coir composite material we can replace the plastics. By the experimental analysis the coir composite specimen is 3 treated is best than the other specimens.

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