EFFECT OF MATRIX AND COMPOSITE CURING TIME ON MECHANICAL BEHAVIOUR OF ARECA COMPOSITES – AN EXPERIMENTAL STUDY

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Introduction

Presently the world population is 6.8 billion people and it is increasing at a fast pace every day. With this increase in population a lot of emphasis is made in order to produce better products and to sustain this growing population.

New products have been introduced in order to replace material such as metals, cement etc that are very heavy, and corrosive and less environment friendly. One such material is natural fiber composites.There are several reasons which make us to apply natural fibers instead of any other artificial fibers for various products of life. They are Lightweight, strong, and low-cost, natural fibers are poised to replace glass and mineral fillers in numerous interior parts.

The use of natural fibers for technical composite applications has recently been the subject of intensive research in world. Many automotive components are already produced by using natural composites

The present work focuses on investigating the Effect of Matrix and Composite Curing Time on Mechanical Behaviour of Areca Composites.

Objectives

The primary goal of this research project is to develop a mechanics-based experimental approach to estimate the elastic properties of random orientated areca composites. The specific objectives within this project are to:

- Understand the effects of chemical treatment on mechanical behavior of areca fibers composites.
- To study the physical and chemical composition of areca fibers.
- To study the behavior of Areca –Urea formaldehyde, Areca- Melamine Urea formaldehyde and Areca-Epoxy-*LY556* composites under different mechanical loads by using experimental methods.
- Quantify key variables to contribute for optimum mechanical behavior of areca composites under different loading conditions.
- To develop a product(furniture, table, desk ete) from areca fibers composite

Methodology

1. The mesocarp (fibrous husk) were kept in water for a period of 7 days, then the fibers were separated from husk manually and dried at room temperature for a period of 15 days to remove the moisture content.
2. Finally the areca fibers were chemically treated to improve the mechanical properties using sodium hydroxide (NaOH).
3. Finally the fibers are washed with few drop of acetic acid and distilled water. The washed fibers were dried for a period of 7 days at room temperature.
4. The composites were prepared with three different types of matrix systems namely urea formaldehyde, melamine urea formaldehyde and Epoxy-LY556.
5. Comparative study of mechanical properties like tensile strength, compression strength; static bending strength, impact strength, and hardness has made.
6. Moisture absorption test was also carried out as natural fibers have more affinity towards moisture and results were reported.

Results and Discussions

1. The mechanical properties for areca-epoxy composite observed in this study are higher compared to areca fibers reinforced with urea formaldehyde and melamine urea formaldehyde resin.
2. Areca epoxy composites are good substitute for wood based composites when strength factor is the main criteria. When cost of the composites are considered, areca-melamine urea formaldehyde composites are best suited for the replacement of other natural fibers composites
3. Impact strength of the areca composite is that; as the composite curing time increases the composite becomes more brittle, this in turn increases the impact strength of the composite.
4. Replacement of glass fibers by natural fibers as the reinforcing component in thermoplastic composites is the distinctive improvement in crash behavior.
5. Reinforcement of natural fibers are safer than glass fiber parts, as no sharp-edged fracture surfaces occur in case of crash.
6. The results suggest that areca composite is a good substitute for natural fibers like banana, cotton, coir, sisal, jute etc and even for wood composites, motivated by potential advantages of weight saving, lower raw material price
7. Areca fiber has a very promising future in the composite industry.

Scope for the Future Work

1. The current work can be continued by using high quality resin systems to arrive at optimum mechanical properties.

2. The present work limits fiber loading in matrix systems to about 60% by weight of fiber.
3. This work can be further proceeded by increasing the fiber volume fraction by the use of new composite processing technique.
4. The present work can be continued by blending the Areca fibers with other natural fibers.