

# International Journal of Innovative Research in Science, Engineering and Technology

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## Evaluation of Mechanical behavior of Discarded Seashell Incorporate hybrid Composite for Marine Crafts

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**ABSTRACT:** Sea shell is available in nature. In general, sea shell has more strong which incorporated with orthophthalic resin. Sea shell practical size is varying in polymer matrix composite. In the composite, various sizes of particles. Composites have been found to be the most promising and discerning material available in this century. Presently, composites reinforced with fibers of synthetic or natural materials are gaining more importance as demands for lightweight materials with high strength for specific applications are growing in the market. Here mechanical properties (impact strength, hardness, flexural strength, tensile strength) as per standard and optimise the results.

**KEYWORDS:** Natural fibers, Thermosets, Thermoplastics, Composites, Mechanical properties

### I. INTRODUCTION

Natural materials can exhibit remarkable combinations of stiffness, low weight, strength, and toughness which are in some cases unmatched by manmade materials. Natural fiber reinforced composite became more attractive due to their high specific strength, light weight, biodegradability, and environment friendliness natural fiber mixed with synthetic fiber reinforced polymer composites are finding increased application.

### II. EXPERIMENTAL

Manufacturing of a composite material is to combine the polymeric resin system with the fiber reinforcement. Since the orientation of the fibers is critical to the end properties of the composite, manufacturing process is utmost important to align the fibers in desired direction.

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## III. PROJECT LAYOUT

### Hand Lay-Up

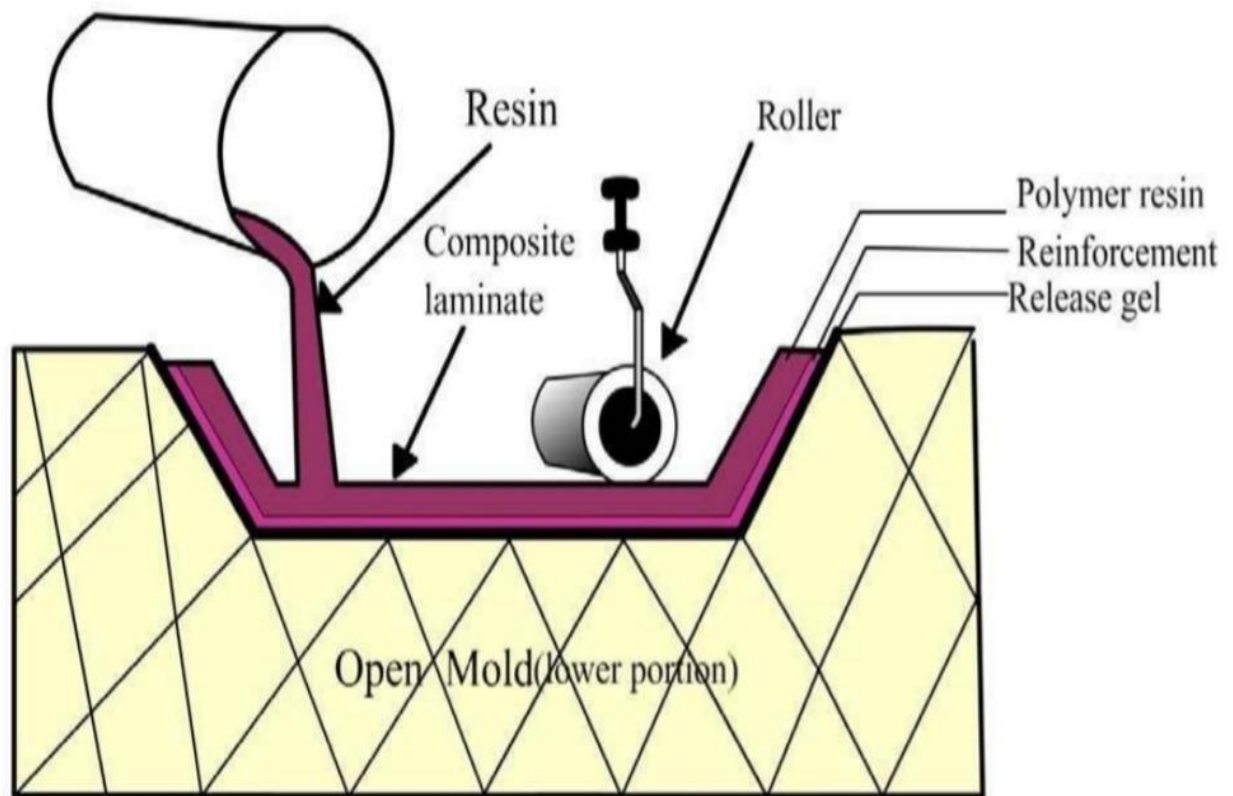


Fig 9.1 Hand layup process

## IV. REINFORCED COMPOSITE

The manufacture, use and removal of traditional fiber usually made of glass, carbon or aramid fiber-reinforced plastic, reinforced thermoplastic and thermoset resins are considered critically because of environmental problems.

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## Natural Fibers



Luffa



Palm



Jute



Banana



Rice Husk



Kenaf



Chicken feather



Cotton



Coir



Sisal



Flax



Abaca



Hemp



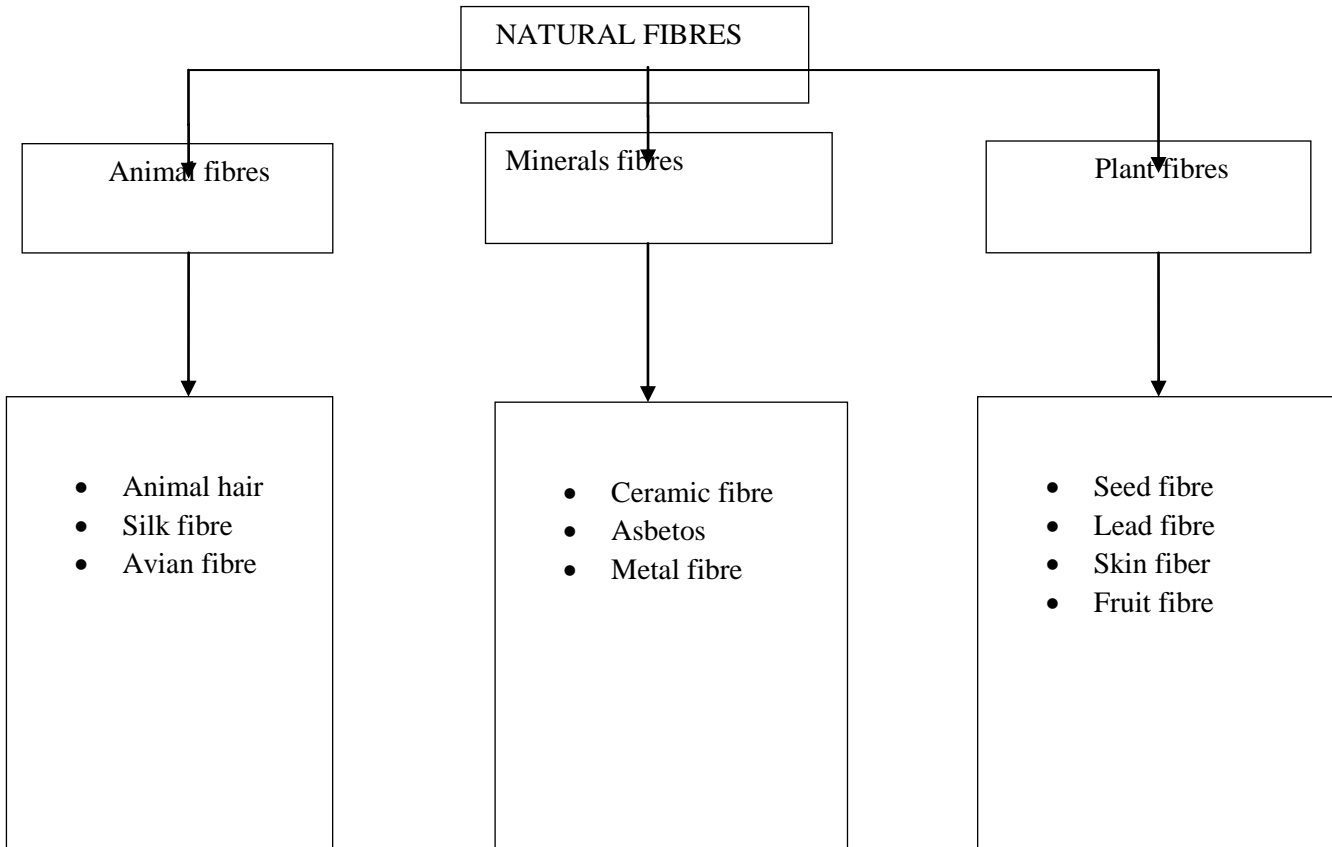
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## V. CLASSIFICATION

Sea shell particles reinforced polymer matrix composite is used in the following applications laminating casting and casting with metal and stone fillers, compounded with large number resinous, motor housing, telephones and electrical fixtures etc.

## OTHER APPLICATIONS

1. AUTO MOBILE
2. BUILDINGS AND CONSTRUCTION INDUSTRY
3. ELECTRONIC APPLICATIONS
4. SPORTS
5. AUTOMOBILE BODY FRAMES
6. WATER STORAGE TANK
7. TRANSPORTATION INDUSTRY

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## JOURNAL PAPER

A journal is a publication that is printed periodically. It is a collection of reviewed papers. Also journal papers are usually more elaborative than the conference paper

### **MR.D.PUGILA en tl (2004):**

Natural fibre polymer composite have recently had a great renewed interest for a variety of reasons. Among these, are the quest for increased fuel efficiency in cars, cheaper and better building materials and a growing interest in environmental preservation. Fillers are one of the most inexpensive materials used in the fabrication of composites, but they frequently help in improving the performance of composite which might not be achieved with the use of the reinforcement and resin ingredients alone. These fillers are also referred to as extenders.

### **MR.ROBERTS JOFFE en tl (2018):**

The effect of the fibre/matrix weight content change on mechanical behaviour (elastic modulus and strength) of composites has been investigated and possible explanations of some times peculiar behaviour are suggested. It is speculated that in wood mechanism that together with fibre/matrix interaction and high porosity defines the stiffness and strength of these composites.

### **MR.K.GUPTA en tl (2015):**

These composites are prepared by various manufacturing technique using various weight or volume fraction using various weight or volume fraction of fibres. Hand lay up and compression molding technique are very popular among those manufacturing techniques. Natural fibres have many advantages such as low cost, low density, eco-friendly, recyclable and availability in abundance. Natural fibres can be used in place of synthetic fibre due to its acceptable mechanical properties.

### **MR.Babatunde Bolasodunen tl (2006):**

Polymer composites play an important reinforcement of polyester matrix composites, role in polymer industries and engineers always incorporation of the wastes in the composites keep on searching for the best material which will enhanced considerably the mechanical properties. Properties at 10wt% fibre loading were greatly be cost effective that will suit certain design and such as tensile modulus and impact strength. In product requirement. One of the key factors which the study of the tensile behaviour and hardness of make plastics attractive for engineering coconut fibre-ortho unsaturated polyester applications is the possibility of property composites, the results showed that the tensile.

### **MR.Vijay Kumar Thakur en tl:**

The polymer in composite materials, plays an imperative role in determining the overall properties of a composite. Among various polymer composites, there has been keen interest in the synthesis, processing, and applications of natural fiber-reinforced composites during the past few years. Composites materials were often employed by the people of earlier civilizations for a number of household applications. The use of natural fibers as one component in composite materials was reported as far back as nearly 3000 years ago in ancient Egypt. For those composite materials, Egyptians mixed straw and clay in the fabrication of building walls. The use of natural fibers as reinforcement in polymers has recently seen a resurgence due to rising environmental awareness. Different kinds of natural fibers having different origins have been reported to be potential alternatives to traditional synthetic fibers in composite materials for a number of applications, including structural applications. Different types of polymer matrices, from synthetic to natural, have been reported to be frequently used in a number of automotive applications.

### **MR.Yashas Gowda.T.G en tl (2018):**

In concern with global environmental awareness, most of the engineering synthetic materials are replaced by natural fiber composites. Bamboo is attracted towards the researchers because of its bio-degradability, high tensile strength, low density and antibacterial properties. Many research studies have shown underutilization of these bamboo

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fibers as a reinforcing material in composite research and its relevant application in product development. Hence there are more possibilities of developing a economical engineering products by utilizing bamboo fibers in composite manufacturing. In the present work experimental investigation has been carried out to study the effect of Silicon carbide on bamboo/carbon fibers. The woven hybrid composite laminates were fabricated by using hand lay-up method using L-5 Epoxy resin and K-6 hardener. Bamboo fibers at different wt % are filled in epoxy resin and the effects of Silicon carbide with bamboo/carbon fibers on mechanical and physical properties are studied.

### MR.Suhas Sridhar en tl (2019):

Natural fiber polymer composites (NFPC) are a composite material consisting of a polymer matrix embedded with high-strength natural fibers, like jute, oil palm, sisal, kenaf, and flax. Most of the time, Natural fibers compared to synthetic fibers are inferior in properties such as tensile strength, Flexural strength etc. One possible solution to this is to use the synthetic fiber with the natural fibers resulting in a polymer. that the rise in fiber content causes improving in the tensile properties of the composites. Another vital factor that considerably impacts the properties and surface characteristics of the composites is the process parameters utilized.

### MR.K.Ganesan en tl (2018):

The polymer can be categorized into two types, thermoplastics and thermosetting. Thermoplastic materials currently take over as matrices for biofibers; the most frequently used thermoplastics are polypropylene, polyethylene, and poly vinyl chloride even as phenolic, epoxy, and polyester resins are the most commonly used thermosetting matrices (Yashas Gowda. et al. 2018). Quite a lot of the latest types of nano and micro reinforcing materials are used in polymer composite applications. As reinforcements in composite matrices, natural fibers are available in many ways to produce numerous hybrid composites. The development of polymer-based composites from natural fiber and fillers can reduce the voids and enhance the physical properties compared to the neat composite which means pure fabric mat with matrix combination. Natural fibers are today widely used in many industrial fields, such as automotive, marine, and civil industry. It has numerous benefits, which comprises of good bio-degradability, absolute renewability, recyclability, low production cost, low density, low carbon hoof marks, high specific mechanical properties.

### MR.Anish Khan en tl (2019):

This study presents the extraction and characterization of Eleusine indica grass to evaluate their potential use as reinforcement in composite materials. The results indicated that Eleusine indica grass possesses high cellulose content (61.3 wt. %) and the lower density (1143 kg/m<sup>3</sup>). The Crystallinity Index of Eleusine indica grass was found to be 45%. The tensile strength of Eleusine indica grass was promoted to semi-structural applications. The characterization results confirmed that the Eleusine indica grass is a better alternative material for hazardous synthetic fibers because of its significant physical, chemical mechanical and thermal properties.

### MR.S.S.Saravanakumar en tl (2014):

Increased environmental awareness of the general public about reducing carbon footprints and the use of nonnaturally decomposed solid wastes has resulted in increasing use of biodegradable natural materials and recyclable polymers and their composites for a wide range of engineering applications.<sup>[1]</sup> In recent years, fiber-reinforced polymer composites have become important in industries and fundamental research.<sup>[2]</sup> Natural fibers such as hemp, flax, sisal, kenaf, and jute are highly hydrophilic due to the presence of hydroxyl (OH) groups of anhydroglucose repeating unit in the cellulose structure. However, these fibers are covered with pectin and waxy materials, thus hindering the OH groups from reacting with polymer matrices.

### MR.Niraj Choudhary en tl (2018):

Hybrid composites were successfully prepared and their mechanical and dynamic mechanical properties were investigated. From the results of performed tests, following conclusions can be obtained. Positive effect of hybridization was obtained in resulting improved mechanical and dynamic mechanical properties. Each hybrid composite had better mechanical and dynamic mechanical properties than those of pure jute and sisal composites.

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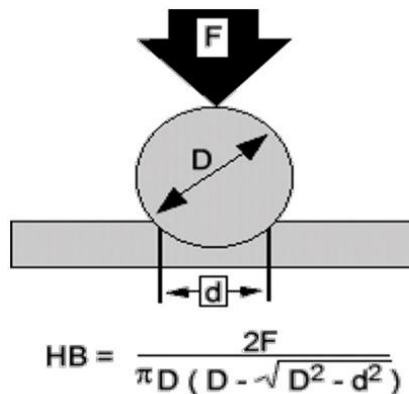
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## VI. TESTING PROCEDURE

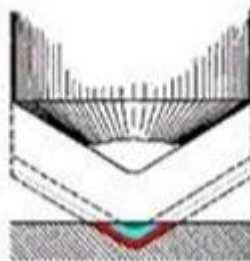
### 1. BRINELL HARDNESS:

All Brinell tests use a carbide ball indenter. The indenter is pressed into the sample by an accurately controlled test force. The force is maintained for a specific dwell time, normally 10 seconds. After the dwell time is complete, the indenter is removed leaving a round indent in the sample. The size of the indent is determined optically by measuring two diagonals of the round indent using either a portable microscope or one that is integrated with the load application device. The Brinell hardness number is a function of the test force divided by the curved surface area of the indent. The indentation is considered to be spherical with a radius equal to half the diameter of the ball. The average of the two diagonals is used in the following formula to calculate the Brinell hardness.



### 2. ROCKWELL HARDNESS TEST:

The indenter moves down into position on the part surface. A minor load is applied and a zero reference position is established. The major load is applied for a specified time period (dwell time) beyond zero. The major load is released leaving the minor load applied. Fig 12.2 Schematic of the Rockwell hardness. The resulting Rockwell number represents the difference in depth from the zero reference position as a result of the application of the major load. The Rockwell test can be used on almost any metal sample as well as some hard



plastics. The test can normally be performed in less than 10 seconds and the indent is usually small enough to allow the part to be used. Some parts with a critical hardness specification are tested 100%.

### 3. CHARPY IMPACT TEST:

Impact tests are designed to measure the resistance to failure of a material to a suddenly applied force. The test measures the impact energy, or the energy absorbed prior to fracture. The Charpy impact test, also known as the Charpy V standardized high strain-rate notch test, is a rate test which determines the amount of energy absorbed by a material during fracture. The Charpy test involves striking a suitable test piece with a striker,

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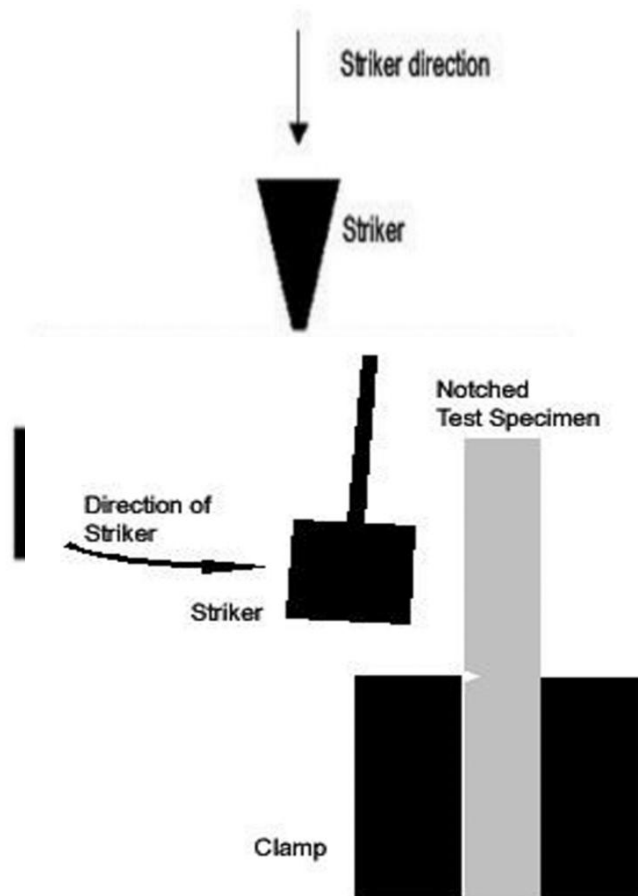
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mounted at the end of a pendulum. The test piece is fixed in place at both ends and the striker impacts the test piece immediately behind a machined notch.

## 4. IZOD IMPACT TEST:



Izod test specimens vary depending on what material is being tested. Metallic samples tend to be square in cross section, while polymeric test specimens are often rectangular, being struck parallel to the long axis of the rectangle. Izod test sample usually have a although specimens with no notch V-notch cut into them, as also used on occasion . The Izod test involves striking a suitable test piece with a striker, mounted at the end of a pendulum. The test piece is clamped vertically with the notch facing the striker. The striker swings downwards impacting the test piece at the bottom of its swing.

## VII. RESULT

Sea shell particles reinforced polymer matrix composite is prepared and tested the samples from the results. The fractured surfaces are analyzed with the help of scanning electron microscopic pictures.



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## VIII. CONCLUSION

Sea shell particle reinforced polymer matrix composite is prepared and tested the samples. From the results, the following conclusions are made. In general particle have more strength, which is act as a reinforced in polymer matrix composites. In these laminations, sized composite is gives better results when compared to other size of particles content composites. Due to the particle size is very tiny. It avoids the voids. So it gives more strength to the material.

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