

FABRICATION AND MECHANICAL PROPERTIES EVALUATION OF HYBRID COMPOSITE OF COCONUT SHELL AND GLASS FIBER

AKSHAY AWSTHI¹, AVINASH SHARMA², DHARANJY SHIGH³

¹P.G Student, Department of Mechanical Engineering KIT, Kanpur, AKTU U.P India

²Assistant Professor Department of Mechanical Engineering, Allen House Institute of Technology

³Assistant Prof. Dep. Of Mechanical Engineering, KIT, Kanpur AKTU, U.P India

ABSTRACT: – In this Research paper we evaluate the Mechanical Properties of hybrid composite testing, including: prepared the mixture of Coconut shell powder and epoxy material Bond tite; reinforced material glass fiber by using hand lay-up method. The three variation of weight of coconut shell powder is taken; according to ASTM standards samples are made. In this we are testing the mechanical properties compressive strength, tensile testing and flexural properties of hybrid composite material. It is Application of composite material Aerospace Industries, Military Industries, furniture industry, railways, building constructions, ceilings and panels, automobiles, medical industry etc. due there surprising property of light weight, cost effective, easy manufacturing, bio-degradable and environment eco- friendly materials.

Key words: Impact Energy, Tensile strength, Compressive Strength, Bending Strength, Strain, Elongation, Load Variations.

INTRODUCTION: In today's industrialization composite materials are used in various applications like interiors of vehicles, machine parts, aero- space industry, furniture industry, railways, building constructions, ceilings and panels, automobiles, medical industry etc. due there surprising property of light weight, cost effective, easy manufacturing, bio-degradable and environment eco- friendly materials. Composites are of basically two types Metal Matrices composite (MMC) and Polymer Matrices composite (PMC). In MMC the base material is metal where in PMC the base material is other than metal. In this research we use the PMC of coconut shell powder binds with epoxy resin and reinforced material is glass fiber, it's a hybrid composite material.

Coconut shell is the by-product of coconut fruit which is waste after using coconut water and meat. Coconut shell is available abundantly in tropical areas like south states of India. It is natural fiber used in making various composite materials. Coconut shell used as small particles made by pulverizing mills. Main properties of coconut shell are light weight, cheap, hardness, high compressive property, bio-degradable, easily available in nature.

Reinforce material is glass fiber; this is synthetic fiber materials easily available in market in different forms like thread, wool and woven form. Reinforcing is done for binding the two materials tightly. Our first material is coconut shell powder and other is epoxy resin, the glass fiber is placed between these two in woven form.

The final hybrid composite material is based on coconut shell powder reinforced with glass fiber in woven form. It has mechanical properties like high compressive strength, tenacity, high hardness, non-corrosive and better flexural properties and physical properties if this hybrid composite is light – weight, low density, manufacturing cost is low and eco- friendly.

Application of this hybrid composite is in plastic industry, plastic furniture making, interiors of automobiles and engine covers, aero-space industry like panels and ceilings, laminations, building constructions etc.

MATERIALS:

1.1 MATERIALS USED

S.No.	Coconut shell powder(wt.)	Reinforced Glass Fiber	Epoxy resin
1	20 gm.	Woven form	100 gm.
2	35 gm.	Woven form	100 gm



Fig. 1.1 Glass fiber woven form and coconut shell powder

1.2 FABRICATION METHOD

In this we use the coconut shell as in powder form which is made by hand grinding and mixture machine. Coconut shell powder is air dried under presence of sun light for removing its moisture content. In a beaker Epoxy resin mix well by hand stirring and mixes it with coconut shell powder and mix well with spoon hand stirring for the all three samples. After that in wooden mould the mixture of epoxy and coconut shell powder is pour and layer of mixture is formed above this layer reinforced material glass fiber in woven form is placed and cover with epoxy and coconut shell powder mixture and rest it for 24 hours for setting it. Specimen is cut from sample according to the ASTM standards.

1.2 Table for Specimen size

S. No.	Size in mm
1	165 × 19
2	76 × 25
3	63.5 × 12.5

We have main three samples therefore 9 specimens' standard testing According to ASTM Standard Parameters and Indian Standard and ISO According to Machining of specimens' dependent on different- different testing specimens required different – different Parameter and shape of the Specimens to find Out the Standard Mechanical physical Properties of the Composites material.

3. Manufacturing Experimental Set-up

In this Research paper in Manufacturing and Experiment set-up Lab in Allen House Institute of Technology Maharajpur Kanpur Uttar Pradesh India first of use in Hand mixture both raw materials in powder form after use Hand lay-up method and solidification of solvents in room temperature in 24 hours.



Figure. 3.1 Melting in low Temperature



Figure 3.2 Raw composite Mixture Machine

Manufacturing and Experimental after solidification of the composite material in at room temperature the after making of Specimens of the solidify composite material by the help of general types of lathe machine. Perform of operations in composite material cutting, facing and requirement of operation jus perform of the composite specimens. American Standard Test Method using Standard Parameters of specimens and Indian Standard test Orgnization. Machining of specimens' dependent on different- different testing specimens required different – different Parameter and shape of the Specimens to find Out the Standard Mechanical physical Properties of the Composites material.

4. Machining of Specimens and Testing Specimen set-up



Figure 4.1 specimens making

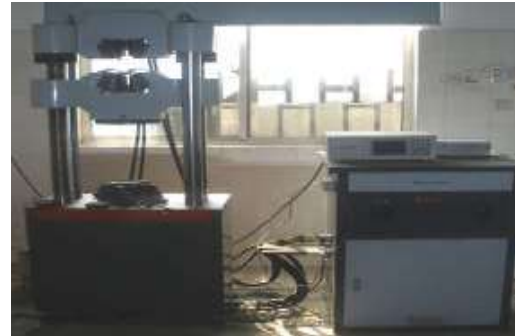


Figure 4.2 tensile strength teste set-up



Figure 4.3 Strain testing

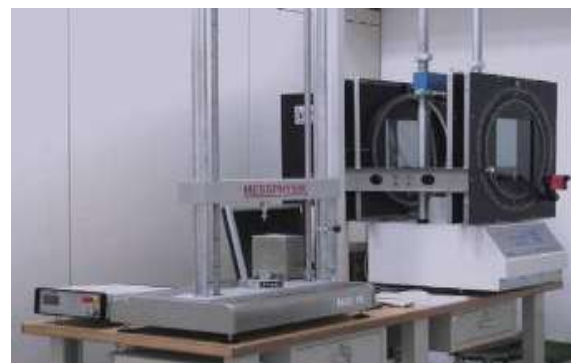


Figure 4.4 compressive testing set-up

5. RESULT AND DISCUSSIONS

In this the Research Papers main prepuce of in growth an Indian composites fields increasing the composite material and reduces the cast of the composite materials products. This is the composite material Coconut shell powder and epoxy material in strong Bond; reinforced material glass fiber. All the Result in found Standard of the composite materials

5. 1 PROPERTIES OF HYBRID COMPOSITE TABLE

MECHANICAL PROPERTIES	EXPERIMENTAL VALUES
Tensile Strength (MPa)	21.3606
Compressive Strength (MPa)	1.428
Bending Strength (MPa)	28.1006
Strain	0.114
Elongation (mm)	11.3726
Impact Energy (kg.cm/cm)	20.2653
Hardness	74.54

6. CONCLUSION

The comparisons of compressive Strength of three FML samples are compared the systems Exhibited excellent interfacial fracture properties, they could be consider for automotive and Aerospace industries, applications where good structure applications. It is the required under dynamic loading conditions. The coconut shell powder this is the composite material Coconut shell powder and epoxy material in strong Bond; reinforced material glass fiber. Main properties of coconut shell are

light weight, cheap, hardness, and high compressive property, bio-degradable, easily available in nature. This is hybrid composite is main Properties is light weight material and very chipset material manufacturing cast is low Environment Ecofriendly of the composite materials.

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BIOGRAPHIES



AKSHAY AWSTHI P.G Student,
Department of Mechanical
Engineering KIT, Kanpur, AKTU
U.P India

AVINASH SHARMA: Assistant
Professor Department of
Mechanical Engineering, Allen
House Institute of Technology

DHARANJY SHIGH Assistant
Prof. Dep. Of Mechanical
Engineering, KIT, Kanpur AKTU,
U.P India