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Investigation on Mechanical Properties of CET Composite Materials

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ABSTRACT
The invention and subsequent growth of composite materials has bought a revolution in the world over the last three decades. The composite materials were available in the olden days in many forms has been a tremendous research in the area because of its high strength to weight ratio especially in structural applications. The main theme of composite material is to reduce the weight and improve mechanical properties .To obtain this we prepared a new composite material that consists of coconut shell powder, egg shell powder, and teak wood flour .we named it as CET COMPOSITE MATERIAL. The mechanical behavior and the properties are explained by using experimental results

Key words: *Coconut shell powder1, Egg shell powder2, Teak wood powder3, and Hardener & Epoxy resin*.

Abbreviations: *MMC-Metal Matrix Composite, PMC-Plastics Metal Composite, CMC-Ceramics Matrix Composite R1,R2,R3,R4 are different Ratios.*

1. INTRODUCTION

Highlight a section that you want to designate with a certain style, then select the appropriate name on the style menu. The style will adjust your fonts and line spacing. **Do not change the font sizes or line spacing to squeeze more text into a limited number of pages.** A composite material is may combining two or more dissimilar materials. They are combined in such a way that the resulting composite material or composite possesses superior properties .which are not obtainable with a single constituent material. So, in technical terms, we can define a composite as 'a multiphase material from a combination of materials, differing in composition or form, which remain bonded together, but retain their identities and properties, without going into any chemical reactions. The components do not dissolve or completely merge. They maintain an interface between each other and ad in concert to provide improved, specific or synergistic characteristics not obtainable by any of the original components acting singly. Bone is a simple example of a natural composite material having the best properties of its constituents. Bone must be strong and rigid. Yet flexible enough to resist breaking under normal use. These requisite properties are contributed by its components. A mature bone is made up of two basic kinds of materials--organic and inorganic. The organic component, consisting mostly of proteins, carbohydrates and fats, makes it pliable and gives the required softness. The inorganic component, made up of calcium phosphate, gives it the required strength and rigidity

1.1 CLASSIFICATIONS

Composite materials may be broadly classified into natural and synthetic composite materials. Schematically shows the classification of composite materials. Synthetic composite materials are generally prepared by taking the ingredients/constituents separately and physically combining them by different techniques and random/oriented arrangement of fibers. Two ingredients may be composed together as

(i) Layered composition in which layers of ingredient materials are bonded to one another, and

(ii) Phase composition in which one ingredient is inserted into the other ingredient.

The phase that receives the insert in the phase composition is the continuous phase and is called matrix. The purpose of adding the insert is generally to improve the mechanical properties of the matrix or to make it cost-effective. If the insert is added to improve the mechanical Properties, it is called reinforcement but if added to make it cost-effective or to change a property other than mechanical properties, it is called filler.

1.1.1 CMC Composites

Ceramic, carbon and glass are widely used for this purpose. The introduction of fibers into ceramics improves tensile strength and toughness. Similarly, carbodglass reinforced with carbon fibers have better toughness.

1.1.2 PMC Composites

Plastics matrix based composite materials constitute more than 95 per cent of composite materials in use today. Both thermosets as well as thermoplastics are used as matrix materials. As thermosets mostly exist in liquid state before cross-linking, it is very convenient tocoqbine reinforcements in the required proportion, shape the product and cure it into solid. Thermoplastics, on the other hand, have to be heated and liquefied for adding inserts.

1.1.3 MMC Composites

Metals can also be reinforced with high strength fibers in order to improve the strength and stiffness (Young's modulus). However, it reduces elongation and toughness. Boron reinforced aluminum is very popular for aircraft applications

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2. PREPARATION OF MATERIALS IN POWDER FORM

2.1 Preparation of egg shell powder

We collected large amount of egg shells from a local seller. These collected egg shells are exposed to sunlight for drying process. After drying these egg shells were dipped into the sodium carbonate solution for cleaning purpose .After cleaning the inner layer which is present inside these shells was removed by us. In this we cleaned nearly 100-150 egg shells. These are ready to prepare egg shell powder. These collected shells were converted in to powder form in MIXY but we don't know the grain size of these particles. We required exact uniform grain structure so we divided the egg shell powder in to different groups based on grain size..so we collected 150 microns grain size

Fig -1: Egg shell powder

2.2 Preparation of teak wood flour

To prepare teak wood floor in to fine grain size we used machining process .In this way first we had collected teak wood from wood sellers. The upper layer which is present on the top of the wood is removed and this is send to the machining operation for teak powder .After machining process we collected teak wood floor of unknown grain size .To test the CET composite material we required all raw materials should be in same size .So we have to divide these obtained powder in to known size. In this way we collected 50, 100, 150, 200 microns grain size of teak wood flour.
These collected teak wood were converted in to powder form in MIXY but we don't know the grain size of these particles. we required exact uniform grain structure so we divided the teak wood powder in to different groups based on grain size so we collected 150 microns grain size

Fig -2: Teak wood powder

2.3 Preparation of coconut shell powder

Coconut shell powder is also called as Endocarp powder. To prepare Endocarp powder .we collected the coconuts .these coconut contain two layers one is Exocarp and another one is called Mesocarp. The green layer which is present on the top of the composite is called Exocarp and the fiber type layer which is present inside the green layer is called mesocarp. Inside the coconut some meet is there. That coconut meet is called Endo sperm.

In the preparation of coconut shell powder first we removed the Endosperm and then we removed Exocarp and Mesocarp. Now these coconut shells are hammered in to small pieces. These pieces are sending to the machining process and we had collected coconut shell powder of unknown grain size. These powders divided into different grain size i.e. 50,100,150,200 microns

Fig-3: Coconut shell powder

3. MANUFACTURING OF SPECIMEN

3.1Components for compression test

The test sample was in the form of a cube 40mm × 40mm × 40mm. It was sawed from the composite samples so as to have smoothed edges free from cracks. The mould is made up of mild steel and assemble of cube is with the help of bolts and nuts**.** For quick and easy removal of the composite rod apply oil to the mould. The weight presents of coconut shell powder, egg shell powder, teak wood powder in the different ratios, was mixed with the matrix material consisting of epoxy resin and hardener these mixture mixed thoroughly then poured into the mould. Care was taken to avoid formation of air bubbles during pouring and mixture was allowed to cure at room temperature for 24

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hours. After the curing the laminate was cut into required size of various mechanical tests. By using same procedure we prepare different composite rods by using different ratios.

Fig-4: CompressionTest Specimen

3.2 Components for Impact Test

The test sample which is used to find the impact strength is in the form of bar type with dimensions 75mm × 13mm × 13mm. It was sawed from the composite samples so as to have smoothed edges free from cracks. First of all we take the two 'L' angle rods and cut these rods until to form a required shape and assemble of these bar shaped rods with the help of welding in order to form a bar shaped mould. For quick and easy removal of the composite bar apply oil to the mould. The weight presents of coconut shell powder, egg shell powder, teak wood powder in the different ratio, was mixed with the matrix material consisting of epoxy resin and hardener these mixture mixed thoroughly then poured into the mould. Care was taken to avoid formation of air bubbles during pouring and mixture was allowed to cure at room temperature for 24 hours. After the curing the laminate was cut into required size of various mechanical tests. By using same procedure we prepare different composite rods by using different ratios. The specimens are prepared as per as ASTM

Fig-5: Impact Test Specimen

3. TESTING OF THE SPECIMEN

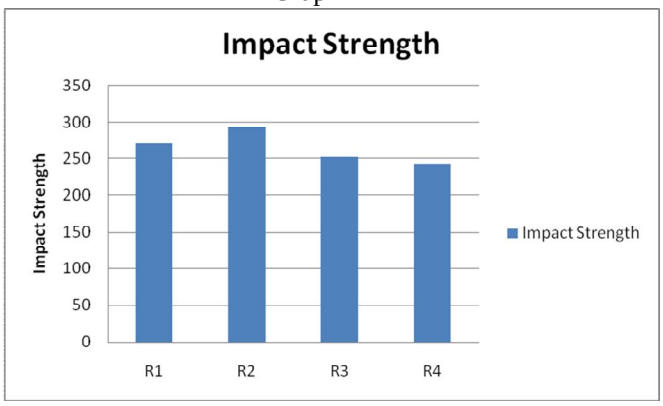
Table -1: Compression Test

S.No	Ratios	Specimen	Comp Force (kN)	Aveg Comp Force(kN)
1	R1	S1	83.3	86.3
2		S2	86.2	
3		S3	89.4	
4	R2	S1	103	103
5		S2	102	
6		S3	104	
7	R3	S1	104	105
8		S2	106	
9		S3	105	
10	R4	S1	77	78
11		S2	79	
12		S3	78	

Table-2 Impact Test

S.No	Ratios	Specimen	Impact Strength (Joules)	Aveg Impact Strength (Joules)
1	R1	S1	262	271
2		S2	274	
3		S3	277	
4	R2	S1	302	294
5		S2	296	
6		S3	284	
7	R3	S1	252	252
8		S2	248	
9		S3	256	
10	R4	S1	243	243
11		S2	239	
12		S3	247	

Graph-1



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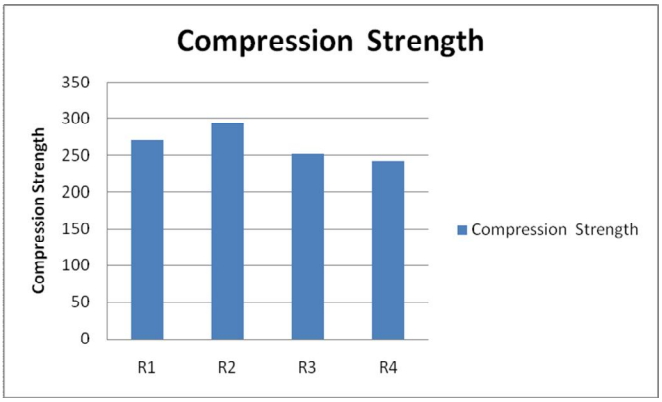
Graph-2



4. CONCLUSION

- The obtained experimental calculation the mechanical properties of CET composite materials in different ratios are R1, R2, R3 & R4.
- By observing experimental work R3, R4 are decreases of both the Compression & Impact Strength.
- Concluded that when the CET Composite materials of ratio (R2) are the best Compression & Impact Strength.
- CET composite materials are good water resistance.
- When it is placed in Muff furnace and it is heated to 353^0C temperature it behaves like rubber & dropped from some height it bounces like a rubber ball.

APPENDIX

Appendixes, if needed, appear before the acknowledgment.

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REFERENCES

1. Toro, Patricio, Quijad, Toro, Patricio, Quijad, Yazdani-pedram, Mehrdad,Arias, Jose Luis.**Egshell anew bio filler for polypropylene composite materials**. Letters 61(22),4347-4350
2. Shuhadad,S.Supri,M.Kamaruddin.**Thermal analysis,water absorption and morphology properties of eggshell powder filled low density polyethylene composites.** *In. Proceedinds of MUCET 2008*, UniMAP, Kangar, perlis pp.15-16.
3. Siva Prasad, D.Rama Krishna. **Productio and Mechanical properties of A356.2/RHA composites**. *International Journal of Advanced Science and Technology 33, 51-58*.
4. J.Gautron and Y Nys. ***Eggshell matrix proteinsand naturals defenses of the egg***, 2006. Symposium Nov 7-10
5. S.B.Hassan,V.SAigbodion. ***Effect on the microstructure and properties Al-CU-Mg/ Egg shell particulate composite***,v.s 2007.
6. Alok Singh, Savita, Aditya Kumar. ***Study of mechanical properties and absorption behavior of coconut shell –epoxy composites.***
7. J.Olumuyiwa Agunsoye,Talabi S.Isaac, Sanni O. Samuel. **Study of mechanical behavior of coconut shell reinforced polymer matrix.** Samuel 2012,2011,774-779.
8. Kamini Sewda,S.N. Maiti. **Mechanical properties of teak wood flour reinforced HDPE composite**.