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ANALYSIS OF DEFORMATION CHARACTERISTIC OF EPOXY COTTON PLASTIC LAYER BASED SYNTACTIC FOAM

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Abstract - *The current research focus is on the study and synthesis of the deformation characteristic of epoxy plastic syntactic foams. In the current investigation, important to achieve good reinforcement properties as we know polymer vary in their chemical structure and offer different properties there selection of polymer matrix made based on application and property requirement. thermoplastics can used to make composites The resin- plastic mixture (putty like consistency) which have high viscosities beyond 4 layer stops filtering and depends on the reinforcement used in the layer it is found that if polymer matrix is filled with fibrous materials the resulting material that is process very high and excellent mechanical properties these materials can be used for load bearing and other high end application such as material are composite materials there are two component the main component of the composite is the matrix and second is component is reinforcement which is more often called as filler. The overpriced of artificial thermoplastic fibers like glass and carbon, etc. results ineffective and products obtained from these stuff which has demanded substitute resources of stuff advancement. This is also include the usage of nearby obtainable waste thermoplastics for materials stuff advancement. In this research, the main motive is to develop, investigate and determine the mechanical properties of the reinforcement material using waste thermoplastics. The fabrication of the composite was carried out using epoxy resin as the matrix and the waste thermoplastics as reinforcement. Tests were carried out to determine the mechanical properties such as tensile, hardness, impact and compressive strengths. The results were studied and compared with the conventional materials and it process that the material developed can be used in structural applications with strong dependence on its mechanical properties.*

Key Words: Epoxy resin, Hardener, Syntactic Foam

1. INTRODUCTION

Syntactic foam is a composite material **[1].** It is closed cell composite material mixed in an epoxy and hardener matrix.**[2]** It has good mechanical properties, very strong and insulation properties, low expansion and low moisture absorption capacity, etc.**[3]** It is developed for new material and strength is high. Application because it is light weights also its application in ship structure and spacecraft. Syntactic foam is used as core material as any new product structure in composite.**[4]** first is matrix phase and reinforcement matrix of material is by weight is composite one fiber epoxy composites are used as structural materials for the fuselage wings tail doors and much of the interior lightweight composites enhance an aircraft's efficiency in load carrying capacity and huge advantage in fuel saving in fact the very first large –scale se of carbon fiber epoxy composite is used the matrix energy sector is also utilizing composite and there are turbines with blades and application it is the storage tank is very light not a steel cylinder this is solved by having FRP as the material for hydrogen storage tank or cylinders when a polymer matrix material is mixed with a non-polymer material such as a metal , non- metal ,a metal, an oil , a ceramic ,etc. to form a new material the quality of all the other material that we get is in the material alone , which we call polymer composite material**[5][6][7].** There are two types of composite material .first is the main constitute forming the body of composite material is the matrix phase and second is the material which provide the strength to the matrix material is the reinforcement matrix. Composite material are an what are constitute and what their properties are who have learn that composite are light , stiff, and strong material**[8][9][10]**. There are combination of two are more than two phases the very important fiber material is glass , carbon, boron ,silica, and synthetic fiber conventional engineering material are not able to serve the specific need there is a requirement to develop formed material the need of material with better properties are increase the combination of better properties can only be achieved with introduction of new material the project is an study of natural fibres and particular glass fibre and wood and find the mechanical strength and stiffness is selected as a reinforcement because of good properties and also used 79:7.9 as the Wight ratio four epoxy and hardener and placed the one by one and applied the mixed epoxy and hardener in between the fibres layer and used silicon spread and dry for 48 hours.**[11][18]** Epoxy resin is important classes of thermosetting polymers that are used in advanced composites, because it has chemical resistance and high tensile also high compressive strength.**[12][19]** It has low shrinkage properties during cure process, and has good adhesion, and along with good structural strength**[13][18].**

2. LITERATURE RIVIEW

•J.R.M ALMEDA et.al (2012)[14]Work on the effect of diameter of glass, wood on the mechanical behaviour of microsphere composite he find that mechanical behaviour of glass microsphere is achieve by varying diameter of microsphere. Wall thickness of microsphere is independent of mean size, so it is important to achieve optimum diameter to wall thickness ratio and it is most important processing parameter.

•AARE ARUNIIT et.al (2014)[15] Research on the topic of effect of wood microsphere on a mechanical and physical characteristic the focused study is to find minimum cost with of composition of composite which is light in weight but having desirable mechanical property.

•K.C. YUNG et.al (2014)[16] Research on different property of hollow glass microsphere, they filled hollow glass microsphere in the epoxy matrix with varying volume% from 0-50 of hollow glass microsphere. In this process they got improved property like coefficient of expansion and glass transition temperature.

3. MATERIAL

Raw material choose for this experimental work are as follows-

I. Epoxy Resin LY556
II. Hardener- HY951
III. Silicone Spray
IV. Plywood
V. Polythene
VI. Cello Tape

Fig-1 Epoxy Resin (LY556) and Hardener (HY951) **[17]**

4. SAMPLE PREPARATION

There are three types of sample has been prepared using Epoxy resin (LY556), hardener (HY951)**[17],** polythene and Plywood.

I. By using only epoxy and Hardener

Fig -2 This image showing the sample of epoxy and hardener

II. By adding a layer of Polythene in the above sample(Reinforcement of polythene)

Fig-3 This image showing the reinforcement of polythene.

III. By Adding Reinforcement of polythene and Plywood with epoxy and hardener

Fig-4 This image showing the reinforcement of polythene and Plywood

5. PREPARATION OF TESTING SPECIMEN

After preparation of sample to analysis of deformation characteristic of epoxy cotton plastic layer based syntactic foam is to make a different type of sample

a. For impact test specimen

b. For Tensile Test specimen

c. For compressive test sample

Fig-5 Impact test specimen

Fig-6 Tensile Test specimen

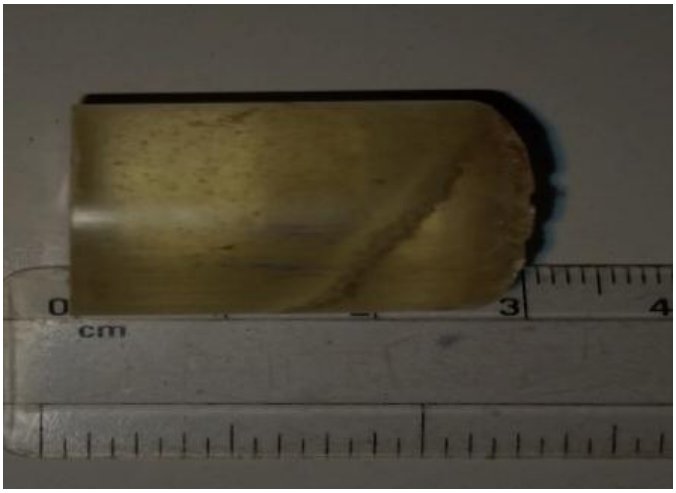

Fig-7 Compressive test sample

6. METHODOLOGY

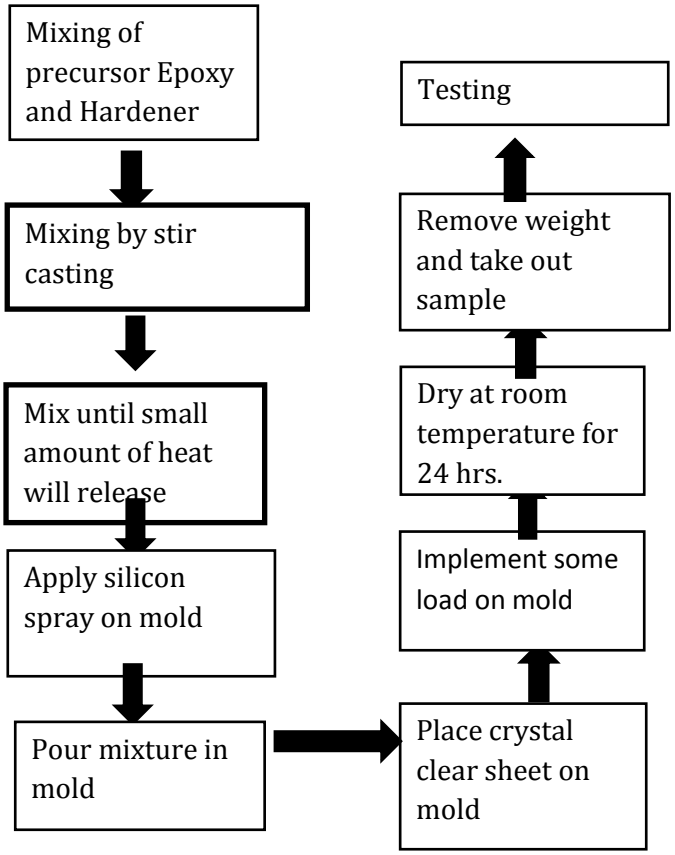

Fig-7 This block diagram shows the Methodology that is used.

7. APPLICATION

The epoxy reinforcement is use in different areas

I. In transport industries

II .Used in racing boats

IV. In rocket component

V. In military aircraft

VI. In engine component

VII. In Sport industries

8. RESULT

After performing compressive Test, The following results are obtains

For without Reinforcement

Fracture Load =46.2 kN
Cross-section Area of rectangular Specimen
A = 30*15 =450 mm^2
So,
Compressive stress =Fracture load / Area
Compressive stress = $(46.2 \times 10^3)/450 = 102.66$ MPa

For Reinforcement uses

Fracture Load =56 kN
Cross-section Area of rectangular Specimen
A = 30*15 =450 mm^2
So,
Compressive stress = Fracture load / Area
Compressive stress = $(56 \times 10^3)/450 = 124.44$ MPa

Compressive Strength curve with different layer of reinforcement are shown below

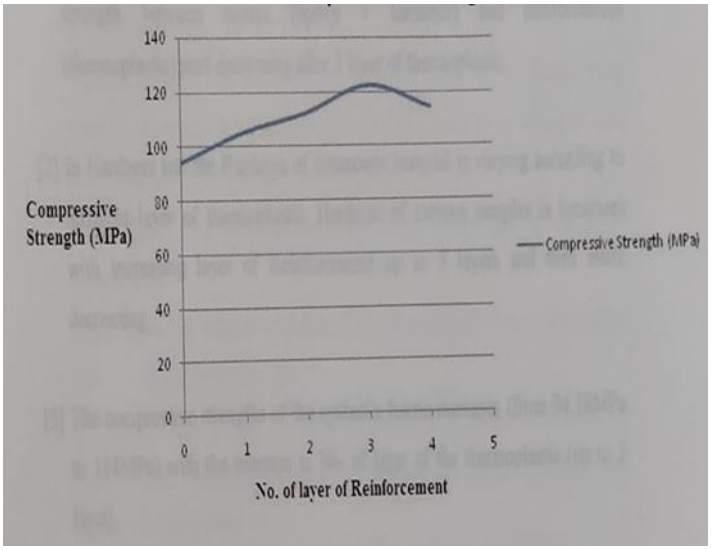

Fig-4: This Figure showing Compressive strength varies with respect to the layer of reinforcement.

9. CONCLUSION

•The strength of impact and composite material is depends according to different layer of thermoplastic in impact test. Impact strength of different sample is grew with growing layer of Reinforcement up to 3 layer and then begin reducing.

•The Hardness of composite material is differing in accordance with different layer of thermoplastic in the hardness test. Hardness of different sample is increased with increasing layer of Reinforcement up to 3 layer and then start reducing.

•In Tensile trial the tensile strength of composite material is differing in accordance with different layer of thermoplastic. Tensile strength of 1 layer sample is increased then further decrease at 2 and 3 layers of reinforcement & at 4 layer of reinforcement the tensile strength is increased. It means that the characteristics of tensile strength of composites material are not poor.

•The compressive strength of composite material is differing in accordance with different layer of thermoplastic in compressive test. of composites compressive strength of the increases and strong with increasing layer of Reinforcement up to 3 layer and then start decreasing. It means the properties of compressive strength material are very good as compare to tensile strength.

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