

DESIGN AND TESTING OF CARBON FIBER COMPOSITE MATERIAL WITH COMPARATIVE ANALYSIS

Mr.Hemant Vijay Deore¹, Dr. K.G.Maniyar²

¹PG Scholar, Department of Mechanical Engineering, S.N.D. COE & RC, Babulgaon, Yeola, Maharashtra.

²PG Guide, Department of Mechanical Engineering, S.N.D. COE & RC, Babulgaon, Yeola, Maharashtra.

Abstract -This project has Analyze issues with using carbon fiber composite, with immersion on fatigue and design in composite materials. In the recent stages of the project, a literature is reviewed; where delamination, corrosion, fatigue and compound were find much critical problems. Fatigue is soften of the material due to cyclic loading and it is difficult to concluded and to validate due to the in-homogeneous structure of composite materials, because failure generally is sudden without preceding notice. If fatigue is critical is much more dependent on type of loading for design of the structure. So it is necessary to consider fatigue while designing composite materials, for minimizing its impact and risk, it occurs more factor affects the material performance and that will be considered while designing in composite materials, such as the material properties and design, for example the lay-up of fibers & manufacturing process,& design of structure..

Key Words: Composite materials, design constrain, material property, and static analysis

1. INTRODUCTION

One of the most promising composite materials is carbon fiber composite materials, CFRP, a composite material with carbon fibers bond together by a adhesive. This type of material is used in aerospace industry. The definite modulus and strength of polymer matrix composites are better than other materials, which are the important reasons for polymer matrix composites are used broadly in aerospace and transportation. Carbon fiber composites are more and more useful and the market is expected to develop believe that the material have better prospectus in the automotive sector. Carbon fiber composites are previously used for vehicles, mainly in high performance cars where they generally are the primary structural material. To face the environmental burden from the automobile industry it is expected that the application of featherweight materials and design is included. This structures develop of lightweight material is therefore essential for companies in heavy vehicle industry, in order to maintain their position in the market. Carbon fibers (other Carbon Fiber, graphite fiber) are fibers 5to10 mm in diameter and composed largely of carbon. Carbon fibers have different advantages including good stiffness, high tensile strength, less weight, good chemical resistance, better temperature tolerance and less thermal expansion. All these properties of carbon fiber very famous in

aerospace, civil engineering, military, and motorsports, along with other competition sports.

1.1 Objectives of Investigation

1. Getting information about carbon fiber composite.
2. Study of different properties of materials.
3. To identify and evaluate material technical problems that can occur when using carbon fiber composites in the structural parts.
4. Testing of material for different properties.
5. Study of behavior of material under experimental conditions by Taguchi's Method

1.2 Performance Analysis

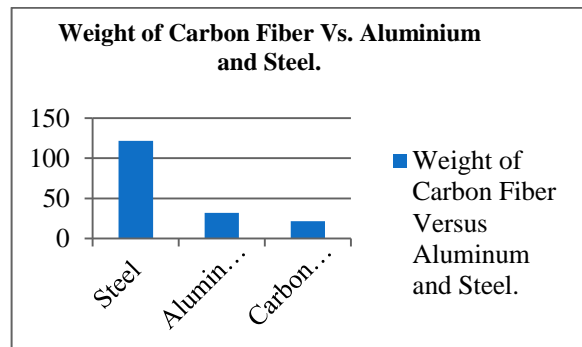
- a) Weight of Carbon Fiber vs. aluminium and Steel.
- b) Tensile Strength of Carbon Fiber vs. aluminium and Steel.
- c) Tensile Strength to Weight rations Of Carbon Fiber vs. aluminium and Steel.
- d) Effect of Acid (Erosion Test) on Carbon Fiber vs. aluminium and Steel.
- e) Evaluation of Damping loss Factor.
- f) Corrosion of Carbon Fiber vs. aluminium and Steel.

2. METHODOLOGY

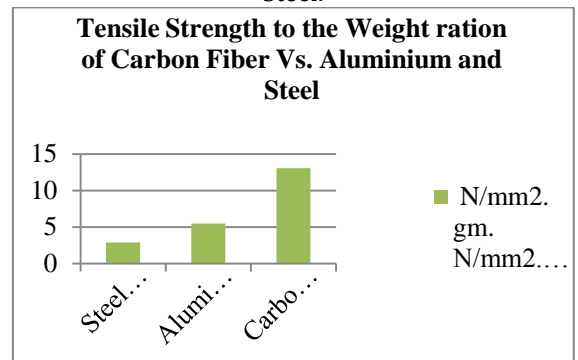
- 1) Study of Different properties of Carbon fiber composite.
- 2) Study of Different Manufacturing methods of Carbon fiber composite.
- 3) Preparing the specimen of given specifications.
- 4) Conducting Test for different properties for comparative analysis.
- 5) Concluding Results.

3. Results and Discussion

- A) Weight of Carbon Fiber vs. aluminium and Steel.**
Specimen Size: - 250 X 20 X 2.5 mm



Graph No1- Weight of Carbon Fiber vs. aluminium and Steel.



Graph No2- Tensile strength of Carbon Fiber vs. aluminium and Steel.

Fig -1: Weight of Carbon Fiber vs. aluminium and Steel.
B) Tensile Strength of Carbon Fiber vs. Aluminium and Steel

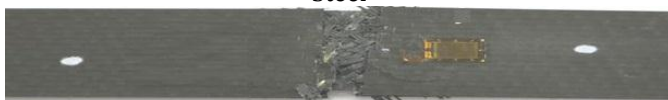


Fig -2: Weight of Carbon Fiber vs. aluminium and Steel

Table no 2:-Comparison of Properties of Carbon Fiber vs. aluminium and Steel.

Material	Carbon fiber composite	Aluminum	Steel
Weight (Gm)	21.5	31.9	121.7
Tensile test	281.20	174.81	351.1
Strength / Weight Ratio N/mm ² . gm.	13.08	5.47	2.88

4. CONCLUSIONS

Hence we can finally conclude that:

1. Composite materials offer more Stiffness and corrosion resistance.
2. Composite materials have more strength / weight ratio.
3. So that they are best and more suitable for various designs the light weight vehicle in automobile industry, Aeronautical industry and structural design in civil engineering etc.

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