

Evaluation of mechanical behaviour of Glass Fiber-Epoxy composite laminates

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Abstract: This paper presents the manufacture and evaluation of Glass fiber reinforced-epoxy laminates as per the ASTM(American Society for testing and Materials) standards. As it requires high strength to weight ratio and design flexibility for applications of aerospace industry etc, the composites are made by using epoxy as a structural matrix material which is then reinforced by glass fiber to enhance the flexural strength.

The composite laminates are fabricated manually by using hand layup process with the help of moulds of required shape. The hand lay up process is capable of producing complex parts which involves manipulating each ply by hand and then firmly stuck using epoxy resin to the previous layer so that no air pockets lie between the plies. The strength of composite material depends on the amount of fiber and matrix content which are indicated by fiber matrix volume fractions. Also the fiber orientation plays an vital role in the strength of composites. The composites are made with different volume fractions of epoxy resin with various glass fiber orientations.

The mechanical properties such as tensile, impact and flexural strengths of fabricated composites are found by conducting experiments such as tensile, impact and flexural tests. Further these results are compared using softwares such as MATLAB and ANSYS. For various fiber orientations and volume fractions of epoxy-resins, analysis was carried out for obtaining the optimum volume fraction and orientation. Further these results can be used for analysing structural components made of composites.

Keywords: hand layup, glass-fibre, epoxy resin.