COMPOSITE MATERIAL ENGINEERING FOR FAST-TRAIN MASCARA APPLICATION

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ABSTRACT

This study aims to determine the mechanical strength of the Glass Fiber Reinforced Polymer composite material used for High Speed Train Mask Of Car Structure.
The tests were carried out according to the JIS E 7105 standard which included vertical load, compression load, rotation and three-point vertical load tests using Ansys software-assisted simulation. The simulation and experimental deviation error values were obtained from comparing the stress and deformation values of the tensile test cases and were confirmed in the bending tests according to ASTM standards. The structural material of the Mask of Car is a Glass Fiber Reinforced Polymer composite made by the Lay-Up method. Two types of GFRP composites were used, namely GFRP CSM with a 10-layer completely random fiber mass fraction of 35.8% and GFRP WR with a fiber mass fraction value of 36.6% with 12 layers of CSM plus one layer of WR. For the simulation of the finite element method for testing the structure of the Fast Train Mask Of Car, mechanical testing of the material must be carried out to determine its properties.
The results showed that the maximum stress occurred on the rear roof which was 25.26 MPa for GFRP CSM material and 25.92 for GFRP WR. The largest deformation value occurs at the bottom of the right side of the Mask Of Car with values for GFRP CSM 77.94 mm and 80.36 for GFRP WR. The value of the simulation error for tensile and bending conditions for GFRP CSM material is less than -11%, while GFRP WR for tensile load conditions is less than -10% and for maximum bending stress conditions -24%. So that the safety factor value of the two materials for the structure of the High Speed Train Mask of Car is at least above 4, which means it is safe and feasible.

Kata Kunci: *Ansys Simulation, GFRP Composite, JIS E7105, High Speed Train Mask Of Car*