Lap Shear Strength of GFRP Adhesive Joints Reinforced with Borax Micro-Fillers

Omar A. Abood *
Division of Mechanical Engineering, School of Engineering, Cochin University of Science and Technology, Kochi, India

Akhil S. Karun
Division of Mechanical Engineering, School of Engineering, Cochin University of Science and Technology, Kochi, India

Biju N
Division of Mechanical Engineering, School of Engineering, Cochin University of Science and Technology, Kochi, India

Yousif J. Shaker
Iraqi Ministry of Industry and Minerals, Iraqi State Company for Cement, Baghdad, Iraq

Ahmet Erklig
Mechanical Engineering Department, Engineering Faculty, Gaziantep University, Gaziantep, Turkey

Abstract

There are many benefits to using adhesive bonding instead of mechanical fastening. Adhesively bonded joints are less likely to fatigue because there are no stress concentrations that come with fasteners. Because of this, it is very important to make the adhesives used for bonding better. The aim of this research is to enhance the strength of adhesive single lap joints (SLJs). To enhance the mechanical properties of SLJs, borax microparticles (45 μm and smaller) were blended with epoxy resin in proportions of 0%, 5%, 10%, 15%, 20%, and 25% wt. The adherends were 2 mm thick of ten-layer glass fiber/epoxy composite laminates. A tensile test was used to examine how borax particles affected the shear strength of adhesive joints. This procedure was done to find out how strong SLJs were. Based on experimental findings, the incorporation of 15% and 20% wt. of borax enhanced the shear strength of SLJs. The effect of adhesive layer thickness was also examined, revealing that the ideal thickness is 0.5 mm.

Keywords

Adhesive, Borax, Epoxy, GFRP, Shear Strength, SLJs.