
Departmental Seminar

Seminar Title	: Mechanical and Chemical Surface Treatments for Aluminum-GFRP Bonding
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Venue	: CE Seminar Hall
Date and Time	: 17 Jul 2025 (11:00 AM)
Abstract	: Strengthening of structural members has become a common need for different types of structures for multiple reasons. Researchers explored the utilization of steel plates, steel meshes, FRPs, and Aluminum alloys (AA) as strengthening systems for shear, flexure, and seismic. In order to get the advantages of FRPs and Aluminum alloys (AA), a hybrid system made of FRP and AA emerged, forming a fiber metal laminate FML. The FMLs combine the advantages of both systems, obtaining attractive characteristics like strength and durability. GLARE is a popular FML that combines GFRP with AA under special conditions of temperature and pressure to get a proper bonding. However, exploiting such a system in the strengthening field will be challenging due to the absence of similar conditions like temperature and pressure. In this paper, we explore the possibility of producing a hybrid system of GFRP and AA through the hand lay-up technique under normal conditions (room temperature and low pressure) through different AA surface treatments. Mechanical treatment using grit paper and grinder, chemical treatment, and mechanical/chemical treatment mixed are studied. Single lap-joint and tensile strength tests were performed for a clear interpretation of bond strength and the mechanical behaviour of the produced GLARE. Both mechanical treatment using a grinder and chemical treatment obtained good results regarding bond shear strength and the tensile behaviour of GLARE coupons. The grit paper treatment obtained the lowest bond strength, and premature debonding occurred through the tensile test. Additionally, combining both mechanical and chemical did not help in improving the bond better than each treatment individually. Keywords: GFRP-Aluminum alloy-Bonding.