STUDY OF THE EFFECT OF SUPERFICIAL TREATMENT ON THE ADHERENCE OF PULTRUDED COMPOSITE JOINTS

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Abstract: The composite material studied in this work is made of polyester resin reinforced with glass fiber (GFRP). The use of this pultruded composite as substrates in adhesively bonded joints is very difficult due to some components usually added at the matrix resin during its manufacture process. Before the cure process its usual the addition of release agent on the resin to prevent friction with surface of the die (heat source). The release agent becomes part of the matrix and it tends to migrate to the surface of the composite reducing its adhesion properties. In this sense, the superficial treatment of the substrate before bonding is important to improve the adherence of pultruded composite. Since adhesive bonding is the principal process to joint composite materials, the study of techniques of surface treatment to improve the interfacial adherence is necessary. Nonetheless, to the best of authors' knowledge, the research on this field and the available data are very scarce. The aim of this research was to evaluate the influence of the superficial treatment on the interfacial adherence between pultruded substrate and four different adhesives. Samples treated with manual abrasion and untreated were analyzed for all adhesives and the roughness was evaluated by 3D rugosimeter. Single lap joints tests (SLJ) were carried out to evaluate the adherence. The type of failure was identified with an optical microscope. The treatment promoted an increase on the shear strength for all adhesives. However, for two ones the increase was about 150%. Before the treatment adhesive and mixed failure were observed. After the treatment mixed failure with more percentage of adhesive failure was identify. The results showed that the treatment is important to improve the interfacial adherence and the knowledge of the mechanical properties of the adhesive is necessary to choose the best material to bonding.

Keywords: Adherence, single lap joints, pultruded material.