

CHARACTERIZATION BY ENF OF SAMPLES WELDED BY ELECTRIC RESISTANCE WELDING PROCESS AND CONDITIONED IN UV RADIATION CHAMBER

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One of the limitations of the use of composites is to obtain parts without the presence of joints or joints between their components, which they are necessary due to inherent limitations in the manufacturing process. The union of pieces with thermoplastic composites can be a critical factor, because depending on the type of union used, they can generate concentration points and be susceptible to fracture (COSTA, 2011). Resistance welding is a specific technique for joining thermoplastic composites. The process uses the property of flow of the thermoplastic matrix when heated above the melting temperature (semi-crystalline polymers). It can be characterized as the union of parts through the fusion and consolidation under pressure. The ENF (end notched flexure) test was done to obtain the value of fracture toughness G_{IIc} . The PEEK/CF samples had the highest value (1114.8 ± 157.2 J/mm) in relation to the welded sample (679.6 ± 346.0 J/mm) and to the welded sample conditioned in the UV chamber (724.4 ± 421.4 J/mm). This behavior can be attributed to the non-existence of the metal mesh at the welding interface, which acts as a cracking propagation concentrator. With the results of ENF, it can be concluded that the shearing stress average is close to the yield strength average for PEEK pressed samples ($801.5 \pm 58.6/795.9 \pm 57.6$ MPa), PEEK welded ($341.9 \pm 55.9/314.6 \pm 50.7$ MPa) and PEEK welded and conditioned in the UV chamber ($449.5 \pm 111.9/414.9 \pm 115.7$ MPa). However, the fracture toughness mode is relatively low, when compared to the available values in the literature for other composites involving thermoplastic matrices and carbon fibers.

BIOGRAPHY

Samia Danuta Brejão de Souza did her Bachelor of Science in Materials Engineering from UNESP – Universidade Estadual Paulista in São Paulo, Brazil. Her graduate thesis was addressed the ceramic materials field, for prosthesis parts as well as filters. Furthermore, she has worked abroad at Institut für Verbundwerkstoffe (Germany) as a guest Scientist on induction welding process for PEEK/CF laminates to compare these samples with results from specimens manufactured through electrical resistance welding. At present, she is pursuing her Pos-doc in UFRGS (Federal University of Rio Grande do Sul – Brazil). The project is about composites for ballistic armor.

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