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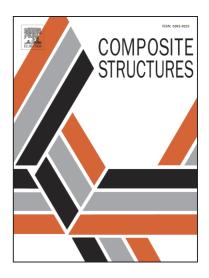
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Mechanical behavior of Punched Holes produced on thin Glass Fiber Reinforced Plastic laminates

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Abstract

The present investigation deals with an experimental analysis of punching process of Glass Fiber Reinforced Plastics (GFRP) sheets. The process has the potential to dramatically reduce the cycle time; thus, it can be used for industrial applications where large numbers of holes are needed. However, the laminate damage represents the major concern for the employment of hole punching. Thus, a campaign of experimental tests was conducted on thin laminates with varying the punch-die clearance. In addition, drilled holes were performed in order to compare the quality and strength of the holes performed by drilling and punching processes. To assess the influence of the process parameters on the holes quality, mechanical characterization was performed by means of tensile test with central hole and bearing test. Moreover, morphological analysis was conducted to determine the quality of the punched hole and the extension of the delaminated region. According to the achieved results, the damage produced by punching process, especially when small clearances were used, is limited and comparable to that produced by drilling process.

Keywords: Punching, drilling, hole, mechanical behavior, thin laminate, joining.

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