

A novel approach for detecting, localising and characterising damages in glass fibre reinforced polymer (GFRP) using the drop weight impact tester

ABSTRACT

The aim of this work is to conduct an experimental study of a low velocity impact test by changes in the type of materials, number of layers and impact energy level using an IM10 Drop Weight Impact Tester. The composite material used in this study was Glass Fibre Reinforced Polymer (GFRP) in two forms: Type C-glass 600 g/m² and Type E-glass 600 g/m². These materials were fabricated using a hand lay-up technique to produce laminated plate specimens with a dimension of 100 mm × 150 mm. Each type of specimen was fabricated into 10 layers, 12 layers and 14 layers of GFRP woven roving plies. The low velocity impact test was performed using an IM10 Drop Weight Impact Tester with 10 mm hemispherical striker cap. The impact energy was set to 14, 28, 42 and 56 Joule with velocity ranging from 1.73 m/s to 3.52 m/s for 10 layer specimens and 7, 14, 21, 28, 35, 42, 49 and 56 Joule for 12 layer and 14 layer specimens. The relationships between impact energy and impact force, displacement, damage area and energy absorbed are presented. The comparison and behaviour between the two types of GFRP is discussed.

Keyword: Low Velocity Impact (LVI); Glass Fibre Reinforced Polymer (GFRP); Energy absorbed; Drop weight impact tester