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ABSTRACT

Natural fibre composite have a potential to be widely applied in the alternative to a fibreglass composites in sustainable energy impact absorption structures.

In this study, the behaviour of hemp fibre epoxy composites subjected to a low-velocity impact loading, using an instrumented falling weight impact equipment, is presented.

Two types of hemp reinforcements were used: unidirectional and bi-directional fabric and three balanced laminates ($0^\circ/90^\circ$) different in thickness were studied: 4 plies, 8 plies, 12 plies. The results were compared.

The laminates were fabricated by RIFT process using a common epoxy matrix. The reached volumetric fibre percentage V_f was not too high. It assumed a value of 34% for the unidirectional reinforcement and an average value of 30% for the bidirectional one.

Some laminates were impregnated by PLA resin at the aim to obtain a completely natural system.

The impact behaviour was analyzed carrying out tests impacting square specimens, 100x100mm, with a hemispherical tup geometry with a diameter of 19.8 mm and a velocity of 4.0 m/s. Both penetration and indentation tests were performed at the aim to investigate about the damage start and evolution.

The impact induced damage, characterised by an optical microscope, includes matrix cracking, delamination, fibre breakage and fibre pullout. An interesting compressed central zone of the laminate under the impact point was noted.

Key words: Low velocity, impact, natural, hemp, composite.

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