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POTENTIAL OF WOOL FELTS IN COMBINATION WITH GLASS FIBRES: MECHANICAL AND LOW VELOCITY IMPACT ASSESSMENT

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Abstract. Glass/wool felts hybrid laminates have been manufactured by hand lay-up using an epoxy resin and subjected to tensile, flexural and falling weight impact loading up to penetration. Two configurations with glass mat skins and wool felt cores with different thickness were compared and impact behaviour of both configurations was modelled. It can be suggested that the insertion of two wool felts instead of one in the laminate core would slightly improve their tensile and impact characteristics, less so for flexural ones. However, early occurrence of pull-out and the likely presence of porosity were found to affect the performance of the laminates, especially in terms of the appearance of early damage under impact loading. On the other side, the model proved largely capable of predicting the features of impact hysteresis cycles on these structures, which presented some mechanical complexity due to the tendency of wool fibres to be highly coiled in felts.

INTRODUCTION

In recent years, possibilities are sought to deal with the reduced profitability of wool fibres: among these, a viable route is their introduction as fillers for bio-composites with various matrices, including e.g. conductive polymers (polypyrrole) [1], polypropylene [2] and even as a reinforcement to improve impact resistance of soil [3]. Wool presents the structure of a biological composite with three main morphological components, namely cuticle, cortex, and cell membrane, hierarchized with additional subcomponents [4].