SEMI IMPREGNATED MICRO-SANDWICH STRUCTURES

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A number of different micro-sandwich panels were fabricated, using glass fabric prepreg and non-woven needle-punched PET fleece, both pre-impregnated and dry, within an investigation program addressed to the development of improved toughness, low cost laminates for automotive applications. Thin sandwich structures, containing long fibre composite skins and low-cost fleece core have been widely used, both in automotive and sporting goods applications [1]. In the course of this investigation, thick plies of dry non-woven fleece were used, in combination with thin woven prepreg plies, in order to maximize thickness and reduce both weight and cost. Among different configurations tested, a number of panels containing different levels of dry fibre within the non-woven core thickness showed very interesting results. We have observed that the properties of the studied materials are influenced by the microstructure achieved during the manufacturing process. Indeed, toughness depends on the dry regions of the non-woven plies due to the deformation mechanism in these regions. Poor fleece impregnation may lead to the formation of only stiff bridging between the two composite skins, and the resulting panel showed poor dimensional stability. On the other hand, good fleece wetting lead to bridging between the two composite skins leading to good dimensional stability.
Tensile [2], flexural [3] tests were performed along with impact (ball and drop testing machine) and penetration [4] tests.

References

[1] P. Renard, M. Roure; *Thin composite laminate and use thereof in making sports articles, especially boots*, US 2002/0064640 to Salomon S.A., (2002).
[2] ASTM D3039 M - *Standard Test Method for Tensile Properties of Polymer Matrix Composite Materials*.
[3] ASTM D790 - *Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.*
[4] UNI-EN 12568 – 2001 - *Foot and leg protectors - Requirements and test methods for toecaps and penetration resistant inserts.*