

A Simulation Study of E-Glass Reinforced Polyurethane Footbed and Investigation of Parameters Effecting Elastic Behaviour of Footbed Material

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Abstract : In this study, we mainly focused on a simulation study regarding composite footbed in order to contribute to shoe industry. As a footbed, e-glass fiber reinforced polyurethane was determined since polyurethane based materials are already used for footbed in shoe manufacturing frequently. Flat, elliptical and rectangular grooved shoe soles were modeled and analyzed separately as TPU, 10% glass fiber reinforced, 30% glass fiber reinforced and 50% glass fiber reinforced materials according to their properties under three point bending and compression situations to determine the relationship between model, material type and mechanical behaviours of composite model. ANSYS 14.0 APDL mechanical structural module is utilized in all simulations and analyzed stress and strain distributions for different footbed models and materials. Furthermore, materials constants like young modulus, shear modulus, Poisson ratio and density of the composites were calculated theoretically by using composite mixture rule and interpreted for mechanical aspects.

Keywords : composite, elastic behaviour, footbed, simulation

Conference Title : ICAMMME 2017 : International Conference on Applied Mechanics, Mechanical and Materials Engineering

Conference Location : Berlin, Germany

Conference Dates : May 21-22, 2017