Determination of Foaming Behavior in thermoplastic Composite Nonwoven Structures for Automotive Applications

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Abstract : The use of nonwoven textile materials in many application areas is rapidly increasing thanks to their versatile performance properties. The automotive industry is one of the largest sectors in the world, with a potential market of more than 2 billion euros for nonwoven textile materials applications. Lightweight materials having higher mechanical performance, better sound and heat insulation properties are of interest in many applications. Since the usage of nonwoven surfaces provides many of these advantages, the demand for this kind of material is gradually growing, especially in the automotive industry. Nonwoven materials used in lightweight vehicles can contain economical and high strength thermoplastics as well as durable components such as glass fiber. By bringing these composite materials into foam structure containing micro or nanopores, products with high absorption ability, light and mechanically stronger can be fabricated. In this respect, our goal is to produce thermoplastic composite nonwoven by using nonwoven glass fiber fabric reinforced polypropylene (PP). Azodicarbonamide (ADC) was selected as a foaming agent, and a thermal process was applied to obtain a porous structure. Various foaming temperature ranges and residence times were studied to examine the foaming behaviour of the thermoplastic composite nonwoven. Physicochemical and mechanical tests were applied in order to analyze the characteristics of composite foams.

Keywords : composite nonwoven, thermoplastic foams, foaming agent, foaming behavior

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