

Advanced Polymeric Composite Product for Automotive Application

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Abstract.

Present long-term study explores the development and application of a polymeric composite product with end goal to represent a light-weight and eco-friendly alternative to an existing automotive car part. This paper focuses on product development, including concept design, modelling and simulation of resin flow inside a mould, sample manufacturing and testing. Selecting the right constituents for an advanced polymeric composite product, having its end functional role in mind, is the foundation for a good development process. As modelling and simulation are key for predicting, defining and controlling the manufacturing process, the paper includes mathematical modelling and numerical simulations of how the structure performs during the technological process, thus refining the concept and optimizing the process before producing real, physical samples. Several scenarios are being examined, leading to a few samples of the polymeric composite product being actually produced, with differences in constituents' participation by varying the volume fraction of the fibers versus that of the matrix. Glass fibers are used as reinforcement material, due to their reduced specific weight, affordable price and widespread availability. Concrete results consequently include designing, building and testing multiple variations of the polymeric composite product manufactured in semi-cylindrically-shaped samples using a research demonstration mould. Considering obtained results, the future large-scale industrial application is envisaged for a big automotive polymeric composite part that would be brought to market at competitive prices.