

Decision support strategy in selecting natural fiber materials for automotive side-door Impact beam composites

ABSTRACT

The enforcement on sustainable design and environmental-friendly products has attracted the interest of researchers and engineers in the context of replacing metals and synthetic fibers with natural based fibers, especially in the automotive industry. However, studies on sustainable natural fiber material selection in the automotive industry are limited. Evaluation for the side-door impact beam was conducted by gathering product design specification from literature which amounted to seven criteria and it was forwarded to ten decision makers with automotive engineering and product design background for evaluation. The weightage required for decision-making was obtained using the Analytic Hierarchy Process (AHP) method based on six criteria. Following this, the best natural fiber materials to be used as reinforcement in polymer composites were selected using the ViseKriterijumska Optimizacija I Kompromisno Resenje (VIKOR) method. The results using both the AHP and VIKOR method showed that kenaf was the best natural fiber for the side-door impact beam composites. The result showed the lowest VIKOR value, $QA1 = 0.0000$, which was determined to be within the acceptable advantage and acceptable stability conditions. It can be concluded that the application of integrated AHP-VIKOR method resulted in a systematic and justified solution towards the decision-making process.

Keyword: Materials selection; Natural fiber; Side-door impact beam; Analytic Hierarchy Process (AHP)