

A simplified life cycle analysis of an automotive parking brake lever using polymer composites

ABSTRACT

This paper presents a simplified life cycle analysis case study of a new developed automotive parking brake lever using polymer composites. Two composite materials were analysed for the component construction, namely glass fiber/polypropylene composites and hybrid kenaf/glass fiber/polypropylene composites. The rule of mixture and hybrid rule of mixture composite's micromechanical models were utilized to determine the functional unit in the life cycle analysis. Later, the life cycle inventory data were defined for the production, use and end-of-life stages for the component. The Eco-indicator 99 method was selected for the overall LCA process. The final life cycle analysis results show that parking brake lever using the hybrid kenaf/glass fiber/polypropylene composites scores better environmental impact when compared to the similar component using glass fiber composites. This proved that the introduction of kenaf natural fiber, as the alternative reinforcement material in the polymer composites construction, is able to reduce the environmental impact throughout the product life cycle towards achieving better sustainable performance of the product.

Keywords: Life cycle analysis; Parking brake lever; Polymer composites