Environmentally conscious hybrid bio-composite material selection for automotive anti-roll bar

ABSTRACT

In the design of automotive components, substitution of metal with natural fibre as base material is commonly found due to high-energy consumption in producing metal components that affects the environment. Therefore, in this study, natural fibres were selected for a hybrid bio-composite material in the design for an automotive anti-roll bar in order to determine the suitable natural fibre that could satisfy the requirements both of customers and the environment. The study was performed using a combination of Analytic Hierarchy Process and Quality Function Deployment for Environment. In making the final decision, life cycle assessment was performed to support the environmental requirements. The results show that sugar palm fibre is the fibre that can best satisfy the design requirements, with 21.51 % of the total score, followed by kenaf, which obtained 20.18 %. Lastly, both the fibres were compared for the life cycle assessment and the results show that sugar palm has a 10 % lower impact on the environment due to its lower energy consumption and CO_2 footprint. Hence, sugar palm fibre is selected as the material to use in the hybrid bio-composite for the automotive anti-roll bar.

Keyword: Material selection; Life cycle assessment; Anti-roll bar; Hybrid bio-composites