

Material selection of natural fibre using a stepwise regression model with error analysis

ABSTRACT

The nature of natural fibre such as it is lightweight, recyclable, biodegradable and gives a high performance in relation to its mechanical properties makes this material an excellent alternative to currently used materials in the manufacture of automotive components. The significant mechanical properties are identified using the best statistical model suggested by stepwise regression in this study. The estimation and error analysis of the response variables are discussed to select the best natural fibre for automotive component applications. The results using statistical measurement indicate that tensile strength is the most significant mechanical property for all the selected natural fibres. The final ranking that considered high performance score and minimum error analysis for a hand-brake lever application found that coir, kenaf and cotton are the top three candidates with average scores of 4, 4.5 and 5, respectively. The statistical model presented in this study can be used in multiple applications. In fact, this approach is helpful to the design engineer when huge amounts data are involved.

Keyword: Material selection; Natural fibre; Stepwise regression; Error analysis