

Manufacturing process selection of “green” oil palm natural fiber reinforced polyurethane composites using hybrid TEA criteria requirement and AHP method for automotive crash box

ABSTRACT

In this study, the best manufacturing process will be selected to build an automotive crash box using green oil palm natural fibre-reinforced polyurethane composite materials. This paper introduces an approach consist of technical aspects (T), the economic point of view (E) and availability (A), and it's also called as TEA requirement. This approach was developed with the goal of assisting the design engineer in the selection of the best manufacturing process during the design phase at the criteria selection stage. In this study, the TEA requirement will integrate with the analytical hierarchy process (AHP) to assist decision makers or manufacturing engineers in determining the most appropriate manufacturing process to be employed in the manufacture of a composite automotive crash box (ACB) at the early stage of the product development process. It is obvious that a major challenge in the manufacturing selection process is lack of information regarding manufacturing of ACB using natural fibre composite (NFC). There have been no previous studies that examined ranking manufacturability processes in terms of their suitability. Therefore, the TEA-AHP hybrid method was introduced to provide unprejudiced criteria-ranking selection prior to evaluation of pairwise comparisons. At the end of this study, the pulforming process was selected as the best manufacturing process for fabrication of the ACB structural component.

Keyword: Manufacturing process selection; Automotive crash box; Natural fibre composites; TEA requirement