

## Composite manufacturing process selection using analytical hierarchy process

### ABSTRACT

This paper describes an approach, based on the analytical hierarchy process (AHP) that assists decision makers or manufacturing engineers determining the most appropriate manufacturing process to be employed in manufacturing of composite automotive bumper beam at the early stage of product development process. There are 5 types of processes under consideration namely injection moulding (IM), resin transfer moulding (RTM), structural reaction injection moulding (SRIM), reaction injection moulding (RIM) and compression moulding (CM). The analysis ranks the 5 types of processes for suitability of use in manufacturing automotive bumper beam based on 6 main selection factors and 12 sub-factors. Determining the right manufacturing process was performed based on AHP concept through utilizing Expert Choice software. The results indicated that the injection moulding was the most appropriate manufacturing process because it has the highest value (22.8%) among the other manufacturing processes. The sensitivity analysis was performed to test the stability of the priority ranking and study the effect of different factors on deciding the best decision option.

**Keyword:** Analytical hierarchy process (AHP); Manufacturing process selection; Conceptual design stage; Automotive bumper beam; Concurrent engineering