

The effect of model updating of crash box structures with trigger mechanisms towards the crashworthiness output of the structures

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ABSTRACT

This paper would focus on the structure of aluminium alloy spot welded crash box with the trigger mechanism as the structure are widely studied for its crashworthiness as well as the location of the structure itself at the car chassis which are subjected to dynamic loading of the car. Aluminium alloy is broadly used in the car body-in-white due to the properties of sufficient strength, better formability, light weight as well as good crashworthiness properties while welded joints are also extensively used as a joining of car components. As this study use both approach of finite element and experimental, in order to validate the finite element analysis (FEA) data, it would be correlated with the experimental approach and further optimization of the finite element (FE) modelling would be made to reduce the discrepancies of data. In this study, the model updating method which update the most sensitive modal parameters would be used towards the crashworthiness analysis to observe for any significant difference with the initial crashworthiness analysis. Finite element modal analysis would be done for the crash box structure and the data would then be correlated with experiment modal analysis (EMA). The same finite element modelling would also be used for the finite element crashworthiness analysis. For modal analysis of both approach, model updating was done to reduce the discrepancies and the sensitive modal parameters were identified and it were used in the new crashworthiness analysis. From the study, it could be observed that the crashworthiness output of the crash box structure with the updated model were different from the initial crashworthiness output in term of its total energy absorbed.

KEYWORDS

Crashworthiness; Finite element analysis (FEA); Finite element modal analysis

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