Variance analysis of dynamic properties for multiple tophat section crash box structure

M. N. A. M. Asri[1] , N. A. Z. Abdullah[1] and M. S. M. Sani[1, 2, a)]
[1] Advanced Structural Integrity & Vibrational Research, Faculty of Mechanical & Automotive Engineering Technology, Universiti Malaysia Pahang.26600 Pekan, Pahang, Malaysia
[2] Automotive Engineering Centre, Universiti Malaysia Pahang, 26600 Pekan, Pahang, Malaysia
Corresponding author: mshahrir@ump.edu.my

ABSTRACT
Vehicle design is the most significant factor in determining and decreasing the impact of accidents and improving road safety. Therefore, studies on the safety components of vehicles should be focused primarily on crash boxes. This study is focusing on the crash box structures that straightforwardly experience the vibrational phenomena. This project was conducted to determine the modal property such as natural frequencies of car crash box structure by performing the Experimental Modal Analysis (EMA) on several specimens. Impact hammer test applied and the analysis using ME'Scope VES to identify the modal properties. For this purpose, the experimental modal test setup has been established. An impact hammer test made it possible to obtain Frequency Response Function (FRF). The FRF were curve fitted in order to obtain the mode shapes and natural frequencies. The modal parameters found from both numerical analysis and experimental testing methods are compared. The modal behaviour of the crash box structure would be analysed for nine different pieces with different fabrication through same process of manufacturing applied towards the crash box structures which is the aluminium alloy 6061 that is commonly used in automotive industry. These nine-sample result will be analysed from the deviation of the result of the modal properties.

KEYWORDS
Crash box; Experimental Modal Analysis (EMA); Frequency Response Function (FRF)

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