Dynamics investigation on motorcycle chassis based on Finite Element (FE) modelling and updating.

K.M. Jelani[1], M.H.M. Razip[2], N.A. Nazri[1], M.S.M. Sani[1,2*] and Muhammad Yasar[3]

[1]Advanced Structural Integrity and Vibration (ASiVR), Faculty of Mechanical Engineering, Universiti Malaysia Pahang, 26600 Pekan, Pahang, Malaysia.

[2]Automotive Engineering Centre, Universiti Malaysia Pahang, 26600 Pekan, Pahang, Malaysia.

[3]Politeknik Aceh Selatan (POLTAS), Tapaktuan, Aceh, Indonesia
mshahrir@ump.edu.my

Abstract.
Motorcycles built from multiple materials such as steel and aluminium that formed a welded of beams to construct the chassis. The frame is designed by combining the part-by-part saddle, handlebar and wheel that are attached together. In this study, the identification of structural dynamics study for motorcycle chassis was conducted to identify modal properties such as natural frequencies and mode shapes. This could be achieved by using two different analysis approaches; Finite Element Analysis (FEA) and Experimental Modal Analysis (EMA). For FEA analysis, 3D modeling of the chassis frame is needed and modelled using CAD software. Normal mode analysis was run on modelled structure to determine modal properties after meshing type and properties of materials declared. Impact hammer testing using roving accelerometer method was conducted for EMA study and comparison of modal properties with FEA is carried out. Discrepancies that appeared after correlation among two approaches attempted to be reduced by performing model updating procedure and it was successfully reduced the average percentage of error to be less than 10%. The results show that the model updating was an effective technique for improving the discrepancy that may exist due to modelling issue and material properties prediction in FEA. This study clearly shows that model updating technique is an effective way of reducing the discrepancies between EMA and FEA.