

Crashworthiness analysis and optimization of sine wave beams

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The present work is to investigate the structural response and resulting energy absorbing performance of the sine wave beam as open section structure subjected to axial impact and later impact. A parametric finite element analysis follow by optimization was performed using the thickness of the upper and lower flange plates and the web, the amplitude of the sine wave web, and the number of sine wave periods along the length of the beam. Additionally, the layout optimization of point-to-point tie connection between the flange plates and the sine wave web which is implemented by welding corresponding to the impact experimental analysis in low velocity is taken into consideration to lead and control the deformation model. The optimal results indicate that larger number of design parameters as well as the layout of welding therefore allows effective control over the crush deformation and resulting energy absorption compared to the prismatic absorber designs.

Keywords: Sine wave beams, Crashworthiness, Optimization, Welding layout