

The Parametric Study of the Development of Magnesium Seat Frame for Passenger Vehicle by Design of Experiments Method.

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Abstract

Recently most of motors have striven to raise fuel efficiency against the era of high oil prices. In this part, most of concerns are vehicle seat frame. This paper was designed to change the material to magnesium in the vehicle seat frame. Magnesium seat is possible for light weight and anti-vibration of the seat is better than formal seat but the maximum stress of magnesium is lower than other material like steel.

A primary objective of the study is to develop a new magnesium seat frame for the passenger car. Back moment and seat belt anchorage analysis of the conventional steel seat frame was conducted as a base model. Back moment and seat belt anchorage strength with the developed magnesium seat frame were compared to those of the base model. Then this paper describes a study that was conducted to determine sensitivity of several design factors for finding main design factors to light weight and sustain strength as steel frame using the matrix of orthogonal arrays. The design factors that may have major effect on FEM simulations were selected and orthogonal array was set up for analysis. By the design matrix, the magnesium seat frame was analyzed using LS-DYNA. The performance sensitivities of magnesium seat frame are analyzed using Taguchi method.

In conclusion, we got the proper strength in the magnesium seat frame with comparison of steel frame and reduced the weight about 40% of the steel seat frame.