Static Structural Comparision Analysis For Composite Mono leaf Spring

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Abstract

Present scenario in automotive industry forms by replacing leaf springs from steel with composites. Studies show the benefits of leaf springs from composite materials over steel forging metals. Present work uses the CATIA V5 platform to describe its architecture and modelling in Ansys 18.1 platform to test its static content that can be comparable and analysed for steel over various other composites. The findings show that the structural strength has more superior in E-glass epoxy with less weight than the steel mono leaf spring.

Introduction

Recent advances in automotive suspension systems has brought major improvements in performance and efficiency. In vehicles, the leaf spring in graduated laminated strips carries more power. The automotive industry is still seeking to take advantage of overall performance and to simplify the leaf spring structure and cost-efficient suspension systems. Over the life cycle, the laminated steel leaf springs become heavier, more spacious and corrosive because they are fully exposed to external environments. A compound leaf spring has an advantage and provides comparable mechanical performance such that it is possible to replace the next generation suspension system with single-leaf springs. In order to optimise the cost and shape, however the required strength to weight ratio and stress on the durability of the spring should be met. Studies using composite materials, a mixture of fibres and a refurbishing material embedded in the polymer matrix has been suggested for mono leaf springs. “The matrix protects the fibres against environmental and external damage and transfers the load between the fibres. The fibres offer strength and rigidity to the matrix and allow it to resist cracks and fractures”. For chipping, fatigue and impact resistance, the prototype of “the carbon/glass reinforced plastic leaf spring” (Tanabe 2018) has been selected and experimentally tested. The results show that compared with steel springs, the CFRP/GFRP (Swanson et al. 1997) leaf springs with high weight loss capabilities have optimum durability.The most critical one in today's mono-blade springs made from different composite combinations resign in their weight-to-weight strength and corrosive properties. In addition, a special mixture of composite material and experimental testing involves tremendous expenditure and procurement costs. Therefore, simulation processes using the FEA module yield faster test results that can produce and produce mono-leaf springs. Laminated leaf spring design and analysis with ANSYS software (Janarthanan et al. 2018), used to analyse carbon-/glass epoxy leaf spring comparison content EN45. The results of the simulation show improved mechanical properties with a weight reduction of 78 percent. It was a challenge to build the best combination of carbon fiber/epoxy composites, in particular, based on “the effects of a variety of piles, the fibre quality and the angle plying layers. (Ke et al. 2019), a composite leaf spring analysis based on material selection, design methods and efficiency”. The theory of the laminated plate using FEA methods, which can be optimised using genetic algorithms to estimate production costs and its recyclability. In selecting the leaf spring, the importance of the use of natural or basalt fibre was emphasised. EM500 Epoxy Resin (Rahmani et al. 2014) predicts that “the highest improved tensile and pliable characteristics in 35^{o} fibre orientations are showed by the different combinations of fibre orientation, the amount of laminates and the resin in use.(Thippesh 2018) has studied the effect of stress and deflection using E-Glass/Epoxy composites mono leaf spring experimentally”. He found that the mono-leaf spring is more effective than the steel leaf spring with a weight reduction of 80 percent. The same material has been used for one-way laminates in the design of composites to be studied with Ansys FEA for multilaminated leaf spring (Sorathiya et al., d.). The findings conclude that 80% of weight

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