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Analysis of laminated plain carbon steel leaf spring in maxi truck

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Abstract

The number of parts in motor vehicles can be replaced with composite materials and improvements in composite material mechanical properties. When compared to steel, it has a higher elastic strength and a higher strength-to-weight ratio. As a result, one of an automobile's components, the leaf spring, which bears the vehicle's full weight, is an excellent candidate for replacing steel with composite material. To reduce load of leaf spring, it has same dimensional geometry as the leaf spring. Leaf spring is built of a graphite epoxy composites material that is lower cost than steel and have geometrical as well as mechanical property that are comparable to the steel leaf spring. Leaf springs can be designed and analysed using Autocad, and static analysis can be performed on the springs using ANSYS software. Stresses and deflections can also be calculated.

Introduction

The leaf springs are a simple method of the springs that is mostly used for suspensions in automobiles. Initially named as laminated spring, it's also called semi

elliptical spring, elliptical spring without leaf springs, an automobile's suspension system is incomplete. They're designed to help support the whole weight of your car. When the vehicle accelerates or slows down, leaf springs also help with tyre grip on the road and wheelbase length regulation. The leaf spring gets its name from the fact that it resembles stacking several leaves on top of each other [5], [6], [7]. The arc is very thin and usually has a gap; it can be attached to a bottom piece that also has a thin gap. It's not at all difficult to make. Today, the leaf spring is rarely employed. A common vehicle leaf spring has a semi-elliptical shape, as seen in Fig. 1. It's made up of a number of plates (known as leaves). The leaves are usually cambered or given an initial curvature in order for them to straighten out when loaded. The Fig. 2 illustrates an assembled view of leaf spring which is used in heavy duty vehicles like bus, lorries [8], [9], [10].

Leaf springs are still used in heavy commercial vehicles including vans and trucks, SUVs, and railway carriages [11], [12]. They have the advantage of spreading the weight more uniformly across the chassis of large vehicles, whereas coil springs concentrate it in one place [13].

Section snippets

Literature review

This section discusses research publications that are relevant to the leaf spring related articles.

Vimal Teja et al. [1] steel leaf spring is composites leaf spring and combined leaf springs have all been designed for static structural analysis. These three leaf springs were compared because they had the same design and load carrying capacity. For light duty cars, the stress and displacements were estimated analytically as well as using ANSYS. The maximum displacement for LMV in the steel leaf…

Objective

Composites have become a very good alternative material for metals due to their ability to reduce weight while improving mechanical qualities. Material selection is dependent on price. and the material's strength Composite materials have a number of advantages. When compared to the strength-to-weight ratios of as a result, higher strain energy storage capacity and more elastic strain energy storages, multi leaf steel springs are being phased out in favor of springs made of mono-leaf composite…

Conclusion

The leaf springs are the easiest form of the spring that is mostly utilized for suspension in vehicles. Many vehicle industries are grappling with the issue of weight loss. Weight loss can be done through the development of novel materials and the use of advanced production methods. Due to growing rivalry and innovative in current situations, the automotive industries have expressed interest modifying standard leaf springs with fiber reinforced composites leaf springs. Fiber-reinforced…

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.…

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