OPEN ACCESS Freely available online

ISSN: 2168-9873

Journal of Applied Mechanical Engineering

Perspective

Systematic Performance of Composite Leaf Spring

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DESCRIPTION

Increased specific stiffness, specific strength, damping and low coefficient of thermal expansion have enabled composite material to replace. Material science and technology have experienced exponential development worldwide through research activity in the past few decades. It has the likeliness in transforming the methods by which materials and products are created with a range and nature of functionalities that can be accessed. Its significant commercial impact has paved the way for its development in the future. The materials are classified as either isotropic (metal and polymer) or anisotropic. Anisotropic (composite) materials can also be classified as orthotropic materials which possess properties that vary in three equally perpendicular axes of symmetry while the load applied along to these axes create only normal strains. Nevertheless, loads applied that are not parallel to these axes produce normal and shear strains.

Recent technologies require materials with combinations of unusual properties which may not be met by conventional metal alloys, ceramics and polymeric materials. In aerospace, underwater and transportation applications this is particularly true. Combination of more than two materials forms a composite material which provides enhanced properties compared to individual components. Each material retains its unique chemical, physical and mechanical properties. The main advantage of composite materials is their high strength and stiffness, shared with low density, resulting in low weight of the finished product. Strength and stiffness are obtained at the reinforcing phase. Generally, reinforcement is tougher, rigid and firmer than the matrix.

The applications of composites are wide and multi-faceted. A large single piece of composite can be used as a substitute for many metal parts. High strength to weight ratio of the composite material ensures higher fuel efficiency in automobiles and airplanes. When compared to metallic materials like aluminum and steel, the endurance limit of few composites is high. Plastics or resins are matrix material in composites providing them an innately high level of resistance to corrosion. Few metallic materials require unique treatments like alloying/surfacing to protect them against corrosion. Composites with low co-efficient of thermal expansion offer better dimensional stability. Preparation of composite materials can be done in reduced time, while the parts can be synthesized to a particular shape or size, with minimum need for machining. Composites possess excellent impact properties when compared with metals. They act as good dampers thus absorbing the vibration and noise. This property of the composites helps them to be used in automobiles, aircrafts, tennis-racquets and golf clubs applications.

CONCLUSION

Adopting different fiber orientation in the fiber used and volume fraction besides the matrix material, the composites can be tailor-made to meet the required specifications. The composite materials are used in airplanes and automobile interiors, galley-ways and other related fields as the glass-reinforced and aramid-reinforced composites exhibit low toxic and smoke. Reinforcement in composite materials is primarily used to enhance, the tensile strength, stiffness and tensile modulus of the composites. Besides, it also determines the overall cost and performance of the composites. This kind of fiber used for reinforcement influences the mechanical properties of the composite material, as the reinforcing fibers exhibit better mechanical properties than those of the un-reinforced resin systems. Particulate composites are much weaker and show low stiffness when compared with continuous fiber composites, but are generally of low cost. Mostly particulate reinforcement is used for enhancing the hardness (abrasion resistance) and conduction.

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Received: 03-Oct-2022, Manuscript No. JAME-22-18847; **Editor assigned:** 05-Oct-2022, Pre QC No. JAME-22-18847 (PQ); **Reviewed:** 20-Oct-2022, QC No JAME-22-18847; **Revised:** 25-Oct-2022, Manuscript No. JAME-22-18847 (R); **Published:** 04-Nov-2022, DOI: 10.35248/2168-9873.22.11.440.

Citation: Sander S (2022) Systematic Performance of Composite Leaf Spring. J Appl Mech Eng. 11:440.