

Design, Analysis And Weight Optimization Of Composite Drive Shaft

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ABSTRACT

This paper is outline and examination of composite drive shaft. Substituting composite structures for traditional metallic structures has numerous focal points due to higher particular solidness and quality of composite materials. This work manages the substitution of ordinary steel drive shafts with a composite drive shaft. The plan parameters were enhanced with the goal of limiting the heaviness of composite drive shaft. Propelled composite materials can be characterized as mix of materials suitably masterminded utilizing fortifying filaments, precisely picked lattices, and some of the time assistant materials like glue center and different additions. These blends after legitimate control and preparing result in completed structure/thing with synergistic properties i.e. properties accomplished after manufacture can't be gotten by individual segments acting alone. FEM strategies play a critical job in dissecting of Composite materials. Present work is directed to examine the composite drive shaft by the FEM programming ANSYS 14.5. Results and charts will be recorded and displayed in the documentation.

Keyword : - material ,drive shaft 2, ANSYS3,

1. Introduction –

Quick mechanical advances in building configuration field bring about finding the substitute answer for the regular materials. The plan engineers conveyed to a point to finding the materials which are more dependable than ordinary materials. Scientists and creators are continually searching for the answers for give more grounded and strong materials which will answer the necessities of individual specialists.

A drive shaft, or propeller shaft (prop shaft) is a mechanical part to transmit torque and turn, generally used to interface different segments of a drive prepare that can't be associated straightforwardly on account of separation or the need to take into consideration relative development between them. Drive shafts are transporters of torque. They are liable to torsion and shear pressure, proportionate to the distinction between the information torque and the heap. They should along these lines be solid enough to tolerate the pressure, while maintaining a strategic distance from an excessive amount of extra weight as that would thusly build their dormancy.

1.1 Introduction to Drive Shaft

Drive shaft is been utilized in the vehicles. They are for the most part utilized in the business vehicles, for example, vans, trucks, SUV's and so on. There ought to be a medium from where the movement from motor is been exchanged to the uncommon wheels. To exchange this movement from the motor to the uncommon wheels, drive shaft assumes a critical job. At whatever point the separation between the motor and uncommon wheels is in excess of 1.5m utilization of two-piece drive shaft is been utilized. Plunge shaft is one of the vital parts of the vehicle, without which we can't exchange movement from motor to the uncommon wheel easily.

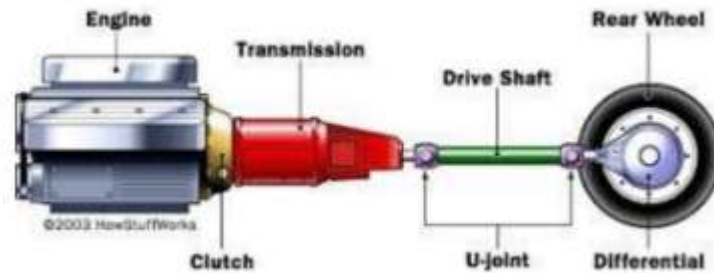


Fig – 1 One – Piece Composite Drive Shaft

1.2 Introduction of Composite Material

A composite material is characterized as a material made out of at least two constituents consolidated on a naturally visible scale by mechanical and compound bonds. Numerous composite materials offer a blend of quality and modulus that are either tantamount to or superior to any customary metallic materials. On account of their low particular gravities, better quality to weight-proportion and modulus weight-proportions, these composite materials are better than those of metallic materials. The exhaustion quality weight proportions and in addition weariness harm resistances of composite overlays are exceptionally fantastic. As a result of these reasons, fiber composite have created as a noteworthy class of basic material and are great decision for metals in many weight-basic segments in aviation, car and different ventures..

1.3 Application of Composite material

There are many commercial and industrial applications of composite as they have better mechanical properties than metals. The major application areas, are aircraft industry, space automotives, sporting goods manufacturer, marine engineering etc. where weight and strength are major designing criteria's.

1.4 Advantages and Limitations of Composite Material

1. High strength, durability.
2. Improved stiffness, fatigue and impact resistance.
3. Good thermal conductivity and corrosion resistance
4. Lesser weight i.e., more strength to weight ratio.

1.5 Limitations of Composite Material

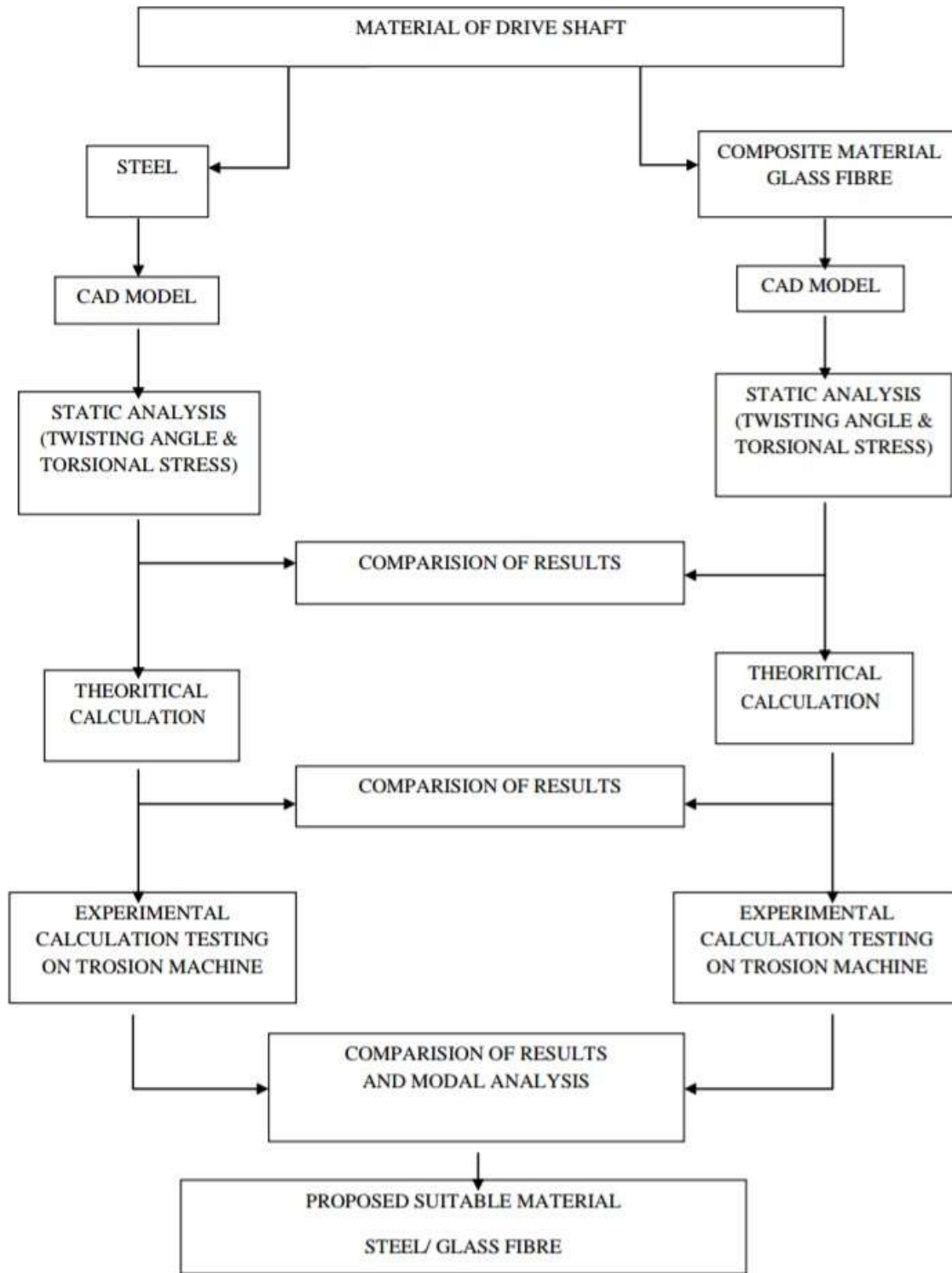
1. Comparatively high cost than metals
2. Improvements in processing and manufacturing techniques are needed for application
3. Composites do not necessarily give higher performance in all the properties used for material selection.

2. PROBLEM DEFINITION AND METHODOLOGY

With the end goal to monitor regular assets and to diminish fuel utilization, weight decrease of vehicle has been the fundamental point of car maker. Weight decrease can be accomplished basically by the presentation of better material, outline enhancement and better assembling procedures .The drive shaft is one of the key things for weight decrease in car.

In working condition, torque is been connected on the drive shaft because of which stretch is been incited. Subsequently, the worry of the material turns into a main consideration in planning the drive shaft. The presentation of composite materials made it conceivable to diminish the heaviness of the drive shaft with no decrease on load conveying limit. Composite Materials have high quality to-weight proportion when contrasted with those of steel.

3. Flow of Project-



4. CONCLUSIONS

Reducing weight and increasing strength of products have high demands in the automobile world. Composite materials can satisfy these demands considerably. The present work involves the static analysis of conventional steel shaft and composite shaft. Model is prepared in CATIA V5R20 and then analysis is performed through ANSYS R14.5. A comparative study has been made between steel and composite shaft to find out material having high strength to weight ratio. From the results obtained it is concluded that, 1) Stress occurred in the composite drive shaft is less as compared to conventional drive shaft. 2) Results obtained through ANSYS are validated from analytical calculations and experimental testing.

5. ACKNOWLEDGEMENT

The authors with gratitude thanks to HOD Dr. Sathawani S.V. for permitting us to do the project work at SND COE & RC Yeola, Maharashtra, India. and necessary help and cooperation, and also express deep sense of gratitude to Prof. Gange M. (Guide). and Mechanical Engineering Department staff for the necessary help & technical support.

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