DEPARTMENT OF MECHANICAL ENGINEERING

K. D. K. COLLEGE OF ENGINEERING, NAGPUR

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CERTIFICATE

Certified that the project titled **DESIGN ANALYSIS & OPTIMIZATION OF DRIVE SHAFT** is bonafide work done under my guidance and is submitted to Rashtrasant Tukadogy Maharaj Nagpur University, Nagpur for the partial fulfillment of requirement for the award of post graduation degree, **Master of Technology (M.Tech.)** in Mechanical Engineering Design (M.E.D.)

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ABSTRACT

Automotive drive Shaft is a very important component of vehicle. This work deals with design, analysis and optimization of composite drive shaft for power transmission applications. The one-piece composite drive shaft is designed to replace conventional steel drive shaft of an automobile using E-glass / epoxy and high modulus (HM) carbon/epoxy composites. A formulation and solution technique using genetic algorithms (GAs) for design optimization of composite drive shafts is presented here. The purpose of using GA is to minimize the weight of shaft that is subjected to the constraints such as torque transmission, torsional buckling capacities. The weight savings of the E-glass / epoxy and high modulus carbon/epoxy shaft were 83.47 % of the steel shaft respectively. For modeling Pro-E software is used. The finite element analysis method is used for analysis of both the drive shafts using ANSYS software.

Substituting composite structures for conventional metallic structures has many advantages because of higher specific stiffness and higher specific strength of composite materials.

6.3.1.4 Maximum Shear Elastic Strain

Steel Shaft

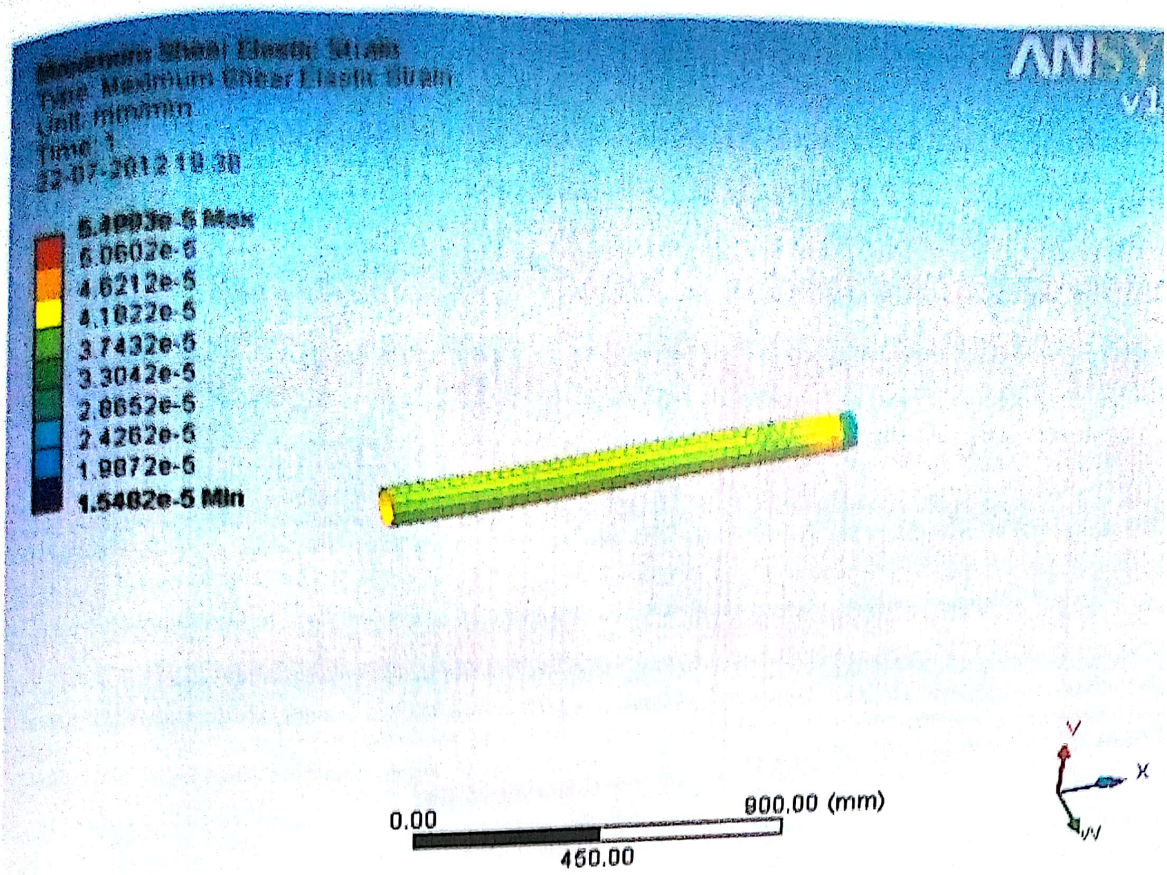
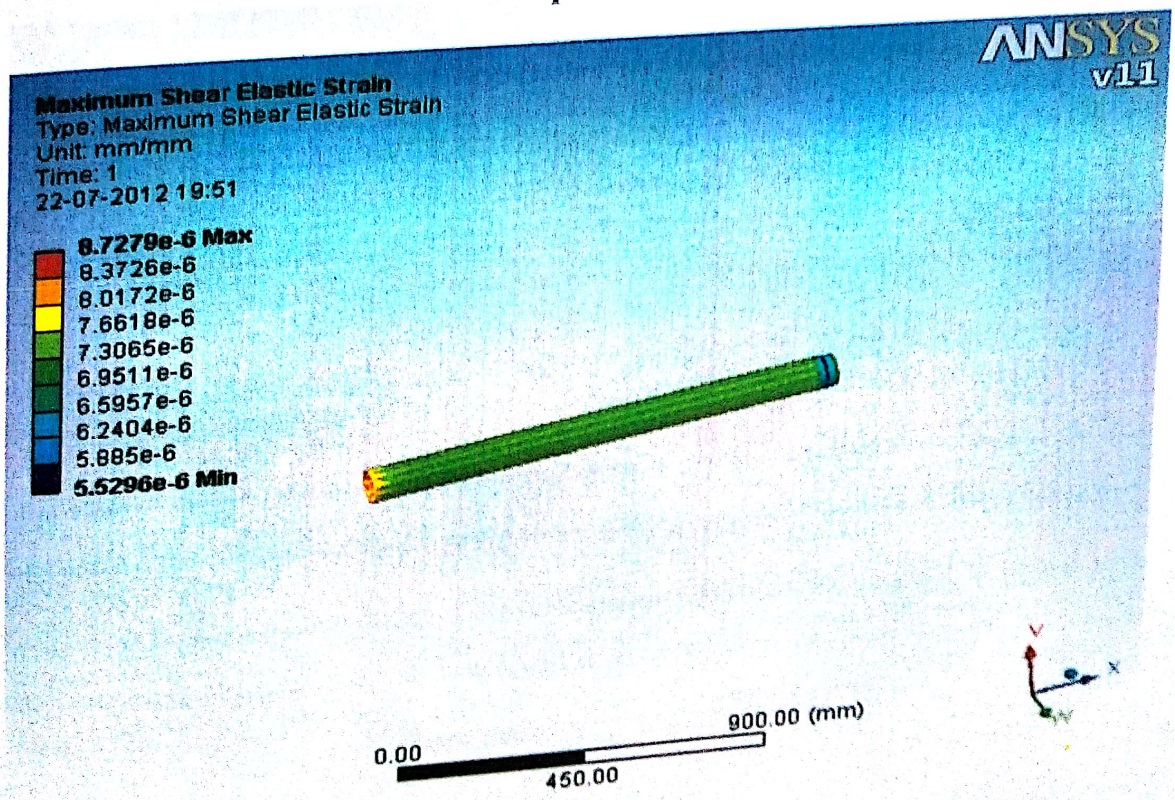


Figure: - 6.8

Composite Shaft



CONCLUSIONS

1. The high strength carbon/epoxy composite drive shaft has been design to replace conventional steel drive shaft of an automobile.
2. A composite drive shaft for rear wheel drive automobiles has been design optimally by using Genetic Algorithm (GA) with the objective of minimization of weight of shaft, & analyzed for better torque transmission capacity and bending vibration characteristics.
3. These results are encouraging and suggest that Genetic Algorithm (GA) can be used effectively and efficiently in other complex and realistic designs often encountered in engineering applications.
4. when the value of $tk = 0.31$ and $n = 8$ then the weight of composite drive shaft is 1.36 i.e. the weight saving by the composite drive shaft as compared to steel drive shaft is about 83.47 %.