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A REVIEW ON STUDY OF DESIGN AND ANALYSIS OF CAR PROPELLER SHAFT USING FEM

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ABSTRACT

In automotive Industries a drive shaft play a major role in power transmission, which transfer the motion from gear box to the rear wheel of the vehicle. And it is generally made of conventional steel metallic structure. The drive shaft is connected by transmission shaft with the help of a universal joint and rotates about its own axis. The aim is to show that how can a two piece of metallic drive shaft is replaced by using composite drive shaft, which is play an essential role for reduction of weight, cost and, improve the performance of Vehicle. Because they have higher strength and specific stiffness, corrosion resistance, low coefficient of thermal expansion etc. The conventional shaft is made up of a steel-SM45C, in this project the use of aluminum alloy, composite material are studied and analyzed. The 3D cad model of drive shaft is created by using the software Uni-graphics NX 8.0. Later this Uni-graphics model is imported to ANSYS APDL for analysis work. ANSYSR 14.5 software is the latest used for simulating the different forces, pressure acting on the component and also for calculating and viewing the results. ANSYS static analysis work is carried out by considered two different materials namely Aluminum alloy, Steel alloy, Carbon Fiber, Polyamide 6 and their relative performances have been observed respectively. By observing the results of both Transient structural and model analysis it was concluded that polyamide is the best material for Mahindra XYLO.

In This paper by observing the results of both static and model analysis obtained polyamide is suggested as best material.

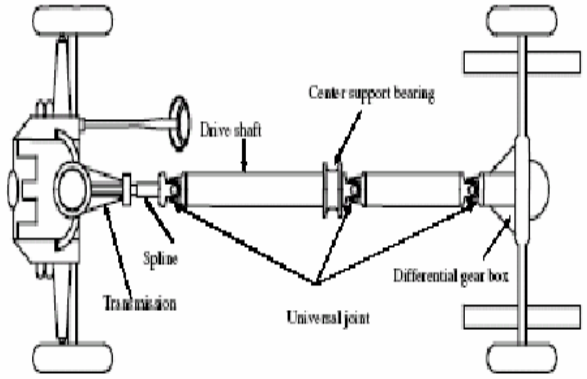
KEYWORDS: ANSYS, Uni-graphics, Stress Analysis, Propeller shaft, Aluminum alloy, Steel alloy, Carbon fiber, Polyamide

I. INTRODUCTION

The Propeller Shaft or Drive shaft is the mechanical device or component that transmitting Torque/Power and Rotation from one end (Gear Box) to another end (differential gear box). This is hold between the transmission System and Differential on the vehicle.

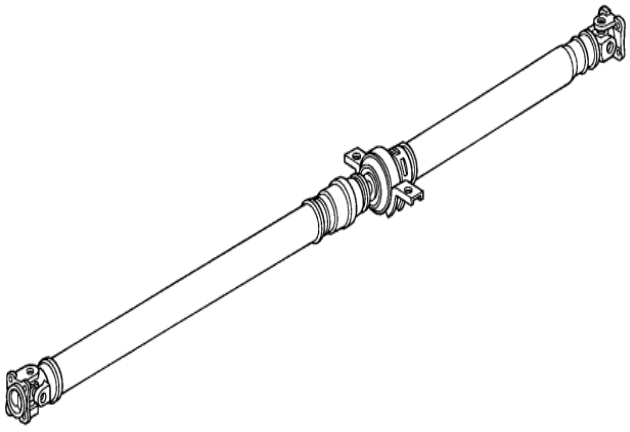
Automotive drive shaft is a very essentatial component of vehicale.The Present Project focuses on the design of such automotive driveshaft by using composite materials. Recently in steel drive shaft used in two parts of steel shaft are interconnected to each other in vehicles. This drive shaft design having own limitations & advantages their only one piece of composites drive shaft allow the entire requirement. The basic requirement are bending Natural frequency, torsional & buckling strength & also weight reducing is important factor in automobile applications. The propeller shaft mainly consists of three parts main shaft, universal joint & slips joint. In which

the shaft has also bear the torsional load withstands. It has to be easily balanced & avoid High Speed, when the Vehicles are running. & the universal joint move up & down movement of rear axle. The universal joint journal (UJ) mainly used to connect two shaft and they are inclined to each other. The Slip joint adjust the length of propeller shaft when rear axle is movement. It is shown in figure 1



II. THEORY OF PROPELLER SHAFT

The Propeller shaft of any vehicle is most important component. The main function of Propeller shaft transmits power from the transaxle/transmission to the differential. It provides the movement of vehicle and also carries the loads. The propeller shaft of vehicle is assembled with transmission and differential these assemblies provide the function and performance of the automobile vehicle. The propeller shaft of vehicle is design by manufacturer according to its suitable engine power & also loads carrying capacity and models, because various type of Propeller shaft is available for different types of vehicles. It is shown in figure 2



III. PROPELLER SHAFT NOMENCLATURE

1. Drive Shaft: It is a part of the machine which is fixed at the center part of the vehicle for rotating the rear axle to move the vehicle towards, It is mainly consists of a two universal joints, the shaft rotate about axis at high speed & transmit power from one end to another ,on the outer dia of shaft weld with metal piece of universal joint at both ends of shaft. Because to balancing the weight at the time of rotation of shaft and also avoid vibration of the passenger car.

2. Centre Support Bearing: The centre bearing supporting element connecting two parts of propeller shaft at the middle portion of vehicle, & this installed via flange & frame. The centre bearing consists of rubber bushing that covers with bearing bracket. Because the propeller shaft separated into two sections, & vibration & noise in propeller shaft absorbed by the rubber bushing.

3. Universal Joint Sleeve yoke: The universal joint is used to connect two shafts which are inclined to each other. The main components of universal joint are driving yoke driven yoke, & spider or UJ-cross etc.

4. Sliding yoke: The sliding yoke or driving yoke is connected with UJ-cross to driven yoke means Universal joint sleeve yoke. When the driving yoke rotates so that's connected driven yoke will also be rotates.

5. Cross: The cross or Spider is a metal parts which is mainly connecting between both joints of propeller shaft like- sliding joint to universal joint of an vehicle.

6. Seal & Bush Retainer: Seal & bush are the supporting elements of the sliding Universal joint sleeve yoke etc.

IV. FORMULATION OF PROBLEM

In existing design of Propeller shaft of vehicle was very weighted so fuel consumption rate is higher. And its minimizing the weight of Propeller shaft through new material selection. And we have applying all loads on the model of Propeller shaft with different materials and find results with the help of analysis software.

V. CONCLUSION

Transient structural and model analysis is helpful for understanding and improving the operating performance of alloy Propeller shaft. Transient structural and model analysis are very important significance for the of the life of the specific parts. This concept of Transient structural and model analysis is followed by number of researches for their application. This review provides the background of alloy propeller shaft Transient structural and model analysis to carry out further research work in same era.

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