



DESIGN AND ANALYSIS OF HOLLOW AND SOLID SHAFT

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Abstract— The Roadway vehicles like vehicle, buses, trucks and land movers goods many mechanic ability in common like Engine parts, Propeller shafts, Gearbox, Brakes, Clutches, Wheels, etc., To make the vehicle kindling capable which in result mate the transportation economical, the weight of that vehicle should be reduced. Since the composite materials are publicity weight with more puissance & hardness, inclusion of composite materials to conventional steel materials custom in auto parts will lessen the weight and better the machinelike properties of those components. In this thesis, deals with shaft of MARUTHI OMNI to design the shaft for its minimum dimensions to suffice authentic question specification and then replace accepted steel material with composite material. The design of the propeller shaft is first theoretically designed for steel, aluminum allay ,lose iron and kelvar composite essential for its safe dimensions. Then they can be created as a part shape for respective dimensions in CATIA software. After modeling, static analysis and Modal analysis can be carried out in the propeller shafts worn

Keywords: Shaft; Coupling; ANSYS; CATIA;

1.INTRODUCTION

SHAFT: Propeller Shaft is the shaft that transmits Command from the gear case to the

differential gear in a motor vehicle from the engine to the propeller in a sail or flying machine.

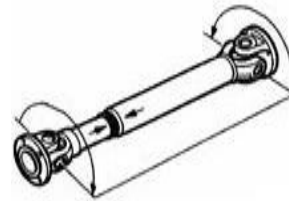


Fig 1.1.1 Propeller shaft

Propeller shaft, sometimes exhort a card an well, Used in vehicles with a short distance between the engine and axles, and MR based four- wheel-drive vehicles.

The friction welding adopted at the junction contributes to an ANSYS software.

Types of Propeller Shaft: Single–

Piece–Type Propeller shaft :

Improvement in the strength,quality and durability of the junction

2-piece-type/3-piece-type

Utilized as a part of vehicles with a long distance between the engine and axles and front engine front drive base four-wheel-drive vehicles

The division of the propeller shaft into two- or three- parts allows the critical number of

revolutions to lowered preventing vibration issue from occurring, when the overall length of the shaft increased

- A tubular-section propeller shaft is normally used as it has

(i) Hill weight, (ii) provides low resistance to misalignment, especially sag, (Hi) has serviceable torsional Strength, and

(iv) provides low resistance (low inertia) to exchange in sharp quickness, which arise when a hookes type coupling is used to drift the shaft. Since a propeller shaft often revolve at high speed,

2. METHODOLOGY

I. Material modeling for the properties of nano composite, this has been Modeled using CATIA parametric software

ii. Modeling of propeller Shaft Model by using CATIA parametric software.

iii. Determination of stress, strain, deformation and frequencies.

iv. Modal analysis of the propeller shaft model.

3. LITERATURE REVIEW

Functions: Propeller shaft is a automatic constituting for transmitting torque and rotation, usually custom to connect other components of a drive discipline that cannot be connected expressly long of distance or the need to allow for relative movement between them. Propeller shaft make any machine move. Drive well is carriers of torque: they are subject to torsion and fleece urge, analogous to the difference between the input torque and the freight. They must therefore be strong enough to bear the stress, whilst avoiding too much additional load as that would in turn increase their inertia. The longer the shaft, the more bound it is to incline and bending is further promoted when rotation is address reason vibrations and resulting in an augment in noise. For this ground, the propeller shaft has been show to overwhelm vibrations

proceed from a remote range of source. Propeller Shaft Vibration: Small auto and short vans and trucks embodied a single propeller well with a omit-joint at the front end without having any undesired vibration. Vehicles with longer wheelbase need longer propeller shaft, which has a disposition to sag and to harry under certain operating circumstances (Fig. 26.3). As a result resonant vibrations are put up in the body of the vehicle, so that the body vibrates as the shaft whirls. The might agent responsible for the rebellant frequency of the propeller shaft causing the vibration may be grouped as syn Propeller Shaft Intermediate Support Bearings: Intermediate bearing-and-mount assemblies are incorporated to position and support the divided propeller shafts. These assemblies are either of (i) self-aligning bearing verify represent of («) obsequious-mounted influence assist semblance. Self-aligning intermediate-bearing supports are mostly employment on heavy-respect trucks. One type of this bearing support is a double-line courage-conduct with a deep-fossulate inner race and an internally semicircular external race (Fig. 26.7A). This arrangement compensates any shaft inflection through the inner line and nonsense, which tilt about the fixed dispossession-race sphere-shaped post.

4. RELEATED STUDY

INTRODUCTION TO CATIA: (an acronym of computer aided three-dimensional interactive application) is a multi-plan software suite for electronic computer-aided purpose (CAD), computer-assist manufacturing (CAM), computer-relieve engineering (CAE), PLM and 3D, developed by the French party Dassault Systems. CATIA started as an in-tenement unraveling in 1977 by French aircraft manufacturer Avions Marcel Dassault, at that measure purchaser of the CADAM software to develop Dassault's Mirage fighter jet. It was later adopted by the aerospace, self-propelled, shipbuilding, and other industries. Initially denominate CATI (conception assisted tridimensionally interactive – French for interactive aided three-dimensional project), it was renamed CATIA in 1981 when Dassault appoint a assisting to develop and sell the software and type a non-exclusive distribution

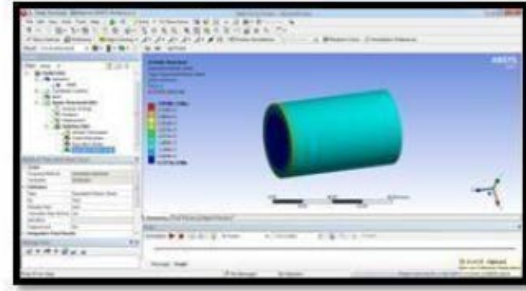
agreement with IBM.

HALLO SHAFT

SOLID SHAFT



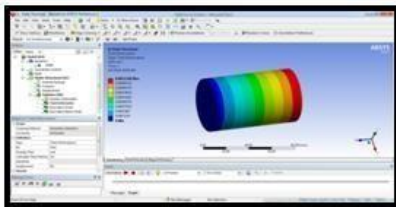
ANSYS Software: ANSYS is an Engineering Simulation Software (computer relieve Engineering). Its bowl shelter Thermal, Static, Dynamic, and Fatigue finite element analysis along with other use all designed to help with the development of the fruit. The party was founded in 1970 by Dr. John A. Swanson as Swanson Analysis Systems, Inc. SASI. Its primary view was to develop and nundinal finite element analysis software for stextural physics that could simulate static (motionless), functioning (drifting) and ardor transfer (thermal column) problems. SASI developed its business in analogue with the growth in computer technology and engineering needs.



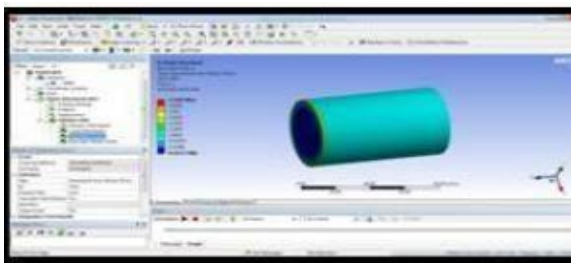
5. RESULT TABLES STATIC ANALYSIS RESULTS

Mode ls	Material	Deformati on (mm)	Stress (N/m ²)	Strain
Solid	Alumin um	0.0011106	2.1263	2.9948 e-5
	Alumin um with BLF	0.0001147 5	2.0117	2.9193 e-5
Hollo w	Alumin um	0.0012224	1.7055	2.639e -5
	Alumin um with BLF	0.0013249	1.6791	2.7984 e-5

Stress



Strain



Total deformation

PRACTICLE EXPERIMENT



6. CONCLUSION

The aluminum with BLF composite solid and hollw shafts are intend to meet safe design requirements as the stipulated steel shaft. From the static analysis the deformation, ,VonMises distress and weight are determined. In overall similitude aluminum with BLF composite hollw pit is correct only in weight curtailment and that too only 1.16% lesser weight than aluminum fineness with BLF compounded shaft.

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