© UNIVERSAL RESEARCH REPORTS | REFEREED | PEER REVIEWED
ISSN : 2348 - 5612 | Volume : 04 , Issue : 09 | October - December 2017

Structural Analysis Of Differential Gearbox Of Different Grade Of Aluminum Alloys

Anand Pali
Department Of Mechanical Engineering
S.S.S.U.T.M.S, Sehore
M.P.
anandpali0011@gmail.com

Prof.Sanjay Kalraiya
Department Of Mechanical Engineering
S.S.S.U.T.M.S, Sehore
M.P.
skalraiya64@gmail.com

***Abstract*— The primarily objective of this research to design CAD model & perform the static structural analysis of differential gear box of three different grades of Aluminum Alloys that are "AA5182, AA6061 & AA7108" iterated at three different magnitude of torque value that are 190N-m, 235N-m & 320N-m to calculate the total deformation & equivalent stress value for each. This paper also shows that among these three alloys which one is the light & helps to reduce the weight of vehicle. To design the CAD model in CATIA v5 & for the static structural analysis ANSYS 15.0 has been used. From result it shows that the total deformation occur less in Aluminum Alloy 6061 grade & it is lightest among three of them.**

Keywords*— *Differential Gear Box; Static Structural Analysis; Design and Structural; Aluminum Alloys Grade; Magnitude of Torque.

I. INTRODUCTION

A transmission or gearbox provides speed and torque conversions from a rotating power source to another device using gear ratios the term transmission refers to the whole drive train, including gearbox, clutch, prop shaft (for rear-wheel drive),differential and final drive shafts. In American English, however, the distinction is made that a gear box is any device which converts speed and torque, whereas a transmission is a type of gearbox that can be "shifted" to dynamically change the speed: torque ratio, such as in a vehicle.

Differential gear box is the component in the automobile that have the set of gear arrangement that provide different angular velocity to inner & outer wheels of automobile while taking turn or slippage between ground surface & wheel. This is necessary when the vehicle turns, making the wheel that is traveling around the outside of the turning curve roll farther and faster than the other. The average of the rotational speed of the two driving wheels equals the input rotational speed of the drive shaft. An increase in the speed of one wheel is balanced by a decrease in the speed of the other. When used in this way, a differential couples the input shaft (or propeller shaft) to the pinion, which in turn runs on the ring gear of the differential. This also works as reduction gearing. On rear wheel drive vehicles, the differential may connect to half-shafts inside axle housing, or drive shafts that connect to the rear driving wheels. Front wheel drive vehicles tend to have the pinion on the end of the main-shaft of the gearbox and the differential is enclosed in the same housing as the gearbox. There are individual drive-shafts to each wheel.

ISSN : 2348-5612 © URR
9 770234 856124

A. Types of Differential

- Epicyclic Differential
- Spur Gear Differential

Epicyclic Differential An epicyclic differential can use epicyclic gearing to split and apportion torque asymmetrically between the front and rear axles. An epicyclic differential is at the heart of the Toyota Prius automotive drive train, where it interconnects the engine, motor generators, and the drive wheels (which have a second differential for splitting torque as usual). It has the advantage of being relatively compact along the length of its axis (that is, the sun gear shaft).

Fig 1 Epicyclic Gear Differential Arrangements

Spur Gear Differential A spur-gear differential has two equal-sized spur gears, one for each half-shaft, with a space between them. Instead of the Bevel gear, also known as a miter gear, assembly (the "spider") at the centre of the