



# A Review On Variation In Differential Gearbox Design and Its Materials

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**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 will also show 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.

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## 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.

### A. Types of Differential