

Project Report on

**DESIGN AND ANALYSIS OF A MULTI-STAGE GEAR BOX BY USING
CATIA AND ANSYS**

A Project report submitted for the partial fulfillment of the requirements for award of
Degree of

**BACHELOR OF TECHNOLOGY
IN
MECHANICAL ENGINEERING**

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CERTIFICATE

This is to certify that the project entitled “**DESIGN AND ANALYSIS OF A MULTI-STAGE GEAR BOX BY USING CATIA AND ANSYS**” is the record of the work carried out by **MOGILI GANESH (20811A0323)**, **THYHADI NEERAJ (20811A0342)**, **VANAMICHETTI SAGAR (20811A0345)**, **AMME SAMIL SURAJ (20811A0303)** and **MOGILI SUDHEER KUMAR (20811A0324)** students of final year B. Tech in the department of Mechanical Engineering. This work is done for the partial fulfillment for the award of BACHELOR OF TECHNOLOGY during the year 2023-2024.

The results embodied in this project work have not been submitted to any other university or institute for the award of any degree.



PROJECT GUIDE

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Abstract

Designing and analysing multistage gearboxes is a significant aspect of mechanical engineering, as they serve as vital components in various machinery across industries. This project focuses on the creation and evaluation of a multistage gearbox using CATIA for design and subsequent analysis.

The project begins with a thorough exploration of existing literature on gearbox design principles, multistage configurations, and analysis methodologies. This literature review establishes a solid foundation for understanding the theoretical and practical aspects of gearbox design.

Using CATIA, the multistage gearbox is meticulously designed, considering factors such as gear ratios, tooth profiles, shaft arrangements, and housing dimensions. CATIA's advanced modelling capabilities enable precise representation of each gearbox component, ensuring compatibility and optimal functionality within the system.

Following the design phase, the gearbox undergoes comprehensive analysis to assess its performance under various operating conditions. Finite Element Analysis (FEA) techniques are employed to simulate the gearbox's response to mechanical loads, thermal stresses, and vibration levels. This analysis provides valuable insights into the gearbox's structural integrity, durability, and efficiency.

Whenever a frequent change in speed/torque at the output is required, we use multispeed multistage gearbox. Aim of the paper is to design a 6 speed 2 stage gearbox using spur gears so as to make the transmission highly efficient as well as to keep the gearbox economically feasible. Cad plot for the same was plotted and stress-strain analysis for each was done. The paper includes all the calculations and verification of those at places to justify the success of design. Varying 500 RPM, 750RPM, 1000 RPM, 1200RPM and 1400RPM, with design load check stability of gear.

KEY WORDS: Multistage gearbox, Finite Element Analysis (FEA), CATIA.