

**A PROJECT REPORT ON
DESIGN OF SYMMETRICAL AND UNSYMMETRICAL AEROFOIL
USING CFD ANALYSIS BY USING CATIA & 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 work entitled “**DESIGN OF SYMMETRICAL AND UNSYMMETRICAL AEROFOIL USING CFD ANALYSIS BY USING CATIA AND ANSYS**” is the record of the work carried out by **GULLA VIVEK (21815A0318), NAKKINA JAYA SAI VINAY (21815A0329), KAMPATI LAKSHMI SRINIVAS (21815A9320), KONETI SATYA SIVA SAI (21815A0322), CHADARAM VENKAT ANAND (21815A0348)** to Avanthi Institute of Engineering and Technology, Makavarapalem, Anakapalli in partial fulfillment for the award of the degree of Bachelor of Technology in Mechanical Engineering, is a bonafide record work carried out by them, under guidance and supervision during 2020- 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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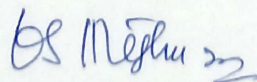
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ABSTRACT

This project investigates the design and analysis of aerofoils, crucial components in aerodynamics, employing CATIA for design and ANSYS for Computational Fluid Dynamics (CFD) analysis. Aerofoils play a pivotal role in various applications, including aerospace, automotive, and wind energy, influencing lift, drag, and overall aerodynamic performance. An “aerofoil” is the term used to describe the cross-sectional shape of an object that, when moved through a fluid such as air, creates an aerodynamic force. Aerofoil plays a vital role in any airplane structure whether it is a commercial plane or jet plane. It decides whether the lift force is sufficient to balance the weight or not, the amount of drag force required to be applied on the plane and how these forces are directly related to change in momentum.

Aerofoil is basically divided into two categories i.e. Symmetrical and Asymmetrical aerofoil. We have tried to differentiate between the two types i.e. on the basis of their moment, lift, drag coefficients varying with angle of attack, Mach number and magnitude of the coefficients respectively. An attempt has been made to make a detailed study on lift, drag and momentum of various aerofoil's i.e., NACA 0012 and NACA 4421 using CFD tool which is popularly used in this area. The study resulted in deciding the better performing aerofoil is NACA 4421 which is asymmetrical in nature.

Keywords: Aerofoil, Symmetrical and Unsymmetrical Aerofoil, CATIA V5, ANSYS, CFD.