

A PROJECT REPORT ON

**DESIGN AND CFD ANALYSIS OF WIND TUNNEL FOR
TESTING AERODYNAMIC BODIES**

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

BACHELOR OF TECHNOLOGY

IN

MECHANICAL ENGINEERING

Submitted by

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(PERMENANTLY AFFILIATED TO JNTU-KAKINADA, ACCREDITED BY NBA &
NAAC, APPROVED BY AICTE, RECOGNISED BY UGC 12f & 2b)
TAMARAM, MAKAVARAPALEM, NARSIPATNAM-531113
2018-2022

DEPARTMENT OF MECHANICAL ENGINEERING
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CERTIFICATE

This is to certify that the project entitled “**DESIGN AND CFD ANALYSIS OF WIND TUNNEL FOR TESTING AERODYNAMIC BODIES**” is the record of the work carried out by **PANCHADARLA SAI PAVAN KUMAR (19815A0358)**, **LAKSHMIPATHI RAJU PERICHARLA (19815A0364)**, **SURLA GANGADHAR (19815A0375)**, **PALIPINI RAMAKRISHNA (19815A03A7)** students of final year B.Tech in the department of Mechanical engineering. This work is done for the partial fulfilment for the award of BACHELOR OF TECHNOLOGY during the year 2021-2022.

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ABSTRACT

A Wind Tunnel is a tool that is used to study the effects of air over any aerodynamic body and the quality of flow and its aerodynamic characteristics. Nowadays almost all the aerodynamic bodies are designed and then analyzed for preliminary results. These designs however need to be verified and tested in real time. Wind tunnels are used to study various flow parameters and response of any aerodynamic body under varying conditions and orientations. These tunnels are usually of open or closed types which can be used to conduct studies over flows past any aerodynamic body or structure. This work focuses on aerodynamics design of a Wind Tunnel to simulate and disseminate results of subsonic flows, measurement of lift coefficient (C_L) and drag coefficients (C_D) which can be used to determine performance of any aerodynamic body. The proposed tunnel was designed based on flow theories to obtain a preliminary design of subsonic tunnel. An open type wind tunnel is designed using Solid works tool which is further simulated using ANSYS Fluent. The model comprises of three parts namely contraction cone which is a convergent tract, test section and a diffuser commonly referred to as diverging tract. In order to find the performance of wind tunnel that will be virtually created, a testing of car body is carried out inside the test section of the tunnel and the results are examined to conclude that the lift and drag coefficients so obtained in the tunnel are accurate or not based on the theory of aerodynamics.

Keywords: Open Wind Tunnel, CFD Analysis, Aerodynamics, Subsonic Flow Study.