VISVESVARAYA TECHNOLOGICAL UNIVERSITY
BELGAUM, KARNATAKA

DESIGN AND CONSTRUCTION OF A WIND TUNNEL FOR RESEARCH ON AEROFOILS

A Project Report

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ABSTRACT

Low speed wind tunnel testing has evolved over the last century and has become a cornerstone in the development of aviation vehicles. Late in the 1970's, multiple groups of experts predicted that the need for aerodynamic experiments, particularly in the subsonic region of airflow, would rapidly disappear as computational fluid dynamics (CFD) would take over. Though the multiple formidable improvements in CFD prevail today and computer power continues to evolve, our mathematical models are still far for being a perfect analysis of an aircraft. Therefore it is safe to assume that CFD won't replace the standard wind tunnels any time in the near future. Study of the effects of aerodynamics and its influence are substantial in the design of aircrafts and much fluid effect based engineering machines. The veil covering the secrets of the forces involved in the dynamic interactions of fluids and solids has only begun to be lifted. Therefore the study of wind behavior is necessary to design large Airplanes.

In this project an attempt has been made to study the aerodynamic aspects of designing and fabricating a low-speed Wind tunnel. Detailed discussions and design attributes on the tunnel construction have been jotted in this report. Further special techniques in multi-disciplinary fields have been inculcated to obtain satisfactory output from various sensors both digitally and graphically. As per the NACA standards of Aerofoil design, suitable steps have been framed in order to manufacture aerofoil models. Efficient flow visualization has been achieved for an aerofoil profile of an Ultra-light aircraft. The wind tunnel works satisfactorily although conditions a little scope for further improvements to better its efficiency and versatility.