HIGHER TECHNICAL INSTITUTE

MECHANICAL ENGINEERING COURSE

DIPLOMA PROJECT

DESIGN AND CONSTRUCTION OF AN AIRFOIL TESTING UNIT

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DESIGN AND CONSTRUCTION OF AN AIRFOIL TESTING UNIT

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Project Report

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SUMMARY

Aviation industries throughout the world will take great pains in constructing what will be thought of as a perfect ideal aerofoil-testing unit. The need end importance of achieving this device will make all kinds of aviation safer, less expensive and open opportunities for new discoveries.

For this purpose in this project we will undertake, will test as accurately as possible the behaviour of an aerofoil by constructing an ideal aerofoil-testing unit.

Great importance will be given during the construction of the unit so that it will provide the best of conditions for safety, functionability, adjustability, ergonomics, reliability manufacturability, and cost.

The idea of how to construct this aerofoil testing unit and its basic theory will be discussed at a later stage. The formulas, which we will use, the problem we will face and the results of the various experiments will also be discussed.

INTRODUCTION

From the very old times we know that man showed a lot of interest in conquering and exploring the space.

From the time of Greek mythology one knows the attempt of Ikarus and Dedalus to fly. Another example is the book written by Julius Vern in 1865. The book was named the " The journey from earth to the moon". One more example is Leonardo da Vinci's writings " The birds have the secret of flying but man has the ability to find out what that secret is". We, also, know what the German philosopher Gkete once wrote "how do I wish to have the capability to throw myself in space and to fly over the terrifying abyss".

In his attempt to fly, man, managed to create the first air balloon. Not much latter Otto Lillienhal the first real pilot, in 1891 constructed the first flying machine and managed to keep it up so achieving the achievement, which so many men throughout the years had hoped for.

Soon afterwards, two brothers, the Wrights who are now known as the fathers of flying managed to construct the first flying machine. The Wrights studied the flight of birds and began building flying machines patterned after flying creatures. The Wrights soon realized that their effort was failing because they knew nothing about aerodynamic forces acting on surfaces cutting through the atmosphere. This problem was the reason, for them to build instrumented laboratories in which wings, fuselages and control surfaces could be tested under controlled conditions. It is not surprising that the first wind tunnel was built a full thirty years before the Wrights' success at Kitty Hawk. Man's history changed when Orville Wright took of on 17th December 1903. It was the first successful flight with a human on board. The key to the Wright Brother's success was that their engineering had gone beyond the trial and error methods of their contemporaries. Having only very limited resources they showed great scientific

ingenuity. When their test flights did not produce as much lift as they had expected, they went back to first principles and carried out a series of specific experiments, starting with a bicycle balance and moving on to their famous wind tunnel experiments. They were the first to understand how the lift from the airfoil changes in flight, and the first to design their propellers as a form of an airfoil.

Nowadays, with the high standard of technology, teams of expert scientists work together in order to design and construct an airplane to provide the necessary high standards of safety.

The wind tunnel is indispensable to the development of modern aircraft. Today, no aeronaughtical engineer would contemplate committing an advanced aircraft design to flight without first measuring its lift and drag properties and its stability and controllability in a wind tunnel. Tunnel tests first, free flight tests later, is the proper order of things.