COMPUTATIONAL FLUID DYNAMICS (CFD) ANALYSIS OF UITM BLENDED-WING-BODY (BWB) BASELINE-n UAV WITH CANARD DEFLECTION OF -5 DEGREE AT 0.1 MACH NUMBER

NIK MOHD HANIF BIN NIK IBRAHIM
2006200054

A thesis submitted in a partial fulfillment of the requirement of the award of
Bachelor Engineering (Hons) (Mechanical)

FACULTY OF MECHANICAL ENGINEERING
UNTVERSITITEKNOLOGI MARA (UiTM)
MAY 2010

ACKNOWLEDGEMENT

First and foremost, in the name of Allah, The Almighty and The Most Merciful, peace be upon His Messenger, Prophet Muhammad S.A.W and his companion. I am forever thankful and I would like to express my greatest gratitude for His divine inspirations and guidance towards the completion of this project.

Next, I would like to thank my project advisor Assoc. Prof. Dr. Hj. Wirachman Wisnoe for his time and interest towards my project. Not forgotten my gratitude to Mr. Rizal Affendy Mohd Nasir for his support and his helps towards my project. Their guidance and help has always inspired me to go further towards the completion of my project.

I would also like to give my personal thanks to all my group members for their never ending support and encouragement. Thanks to you all I was able to complete the project and be where I am today. The friendship we had is a treasure more valuable than everything in this world, for that, I am forever indebted to you.

For my parents, siblings and friends, I would like to express my deepest gratitude. Your continuous support and encouragement has always made me determined and focused towards achieving my goal. Your encouragement has also made me to be persevere through all the hardship in the making of the project.

Thank you, all of you.

ABSTRACT

Renewable energy is a common issue that has been discussed continuously since the past few decades. Attaining and developing new ideas to create and restore energy to be used and at the same time not affecting the environment are one of the biggest hurdles that the issue tries continuously to overcome. Along the way, there are many inventions and ideas that have been stumbled upon to generate these renewable energies. The basic design of the project is in fact a system whereby energy is produced by the principles of generating electricity by using kinetic energy. In this design, the system is initiated by fluid flow of the water in the pipeline thus causing a movement of rotation of the water turbine. As the turbine rotates, this will turn the shaft that is attached to an electrical generator. This will result in the change of the kinetic energy of the turbine be turned into the electrical energy produced by the rotation of the shaft inside the electrical generator. The energy produced will be stored in a battery for mobility and convenience of usage. As an aspect of design, the current result has exceeded initial aim based on wattage and voltage capacity. With potential as big as this, the project promises a future in its functionality and application in the near future.

TABLE OF **CONTENT**

Declaration

Acknowledgment

Abstract

Table of Content

List of Abbreviation

CHAPTER 1: INTRODUCTION

1.1 Project Title

1.2 Background

1.2.3 Literature Review

1.2.3.1 BWB

1.3 Problem Statement

1.4 Objective

1.5 Significant of The Project

1.6 Scope of Work

1.7 Methodology

1.8 Project Plan

CHAPTER 2: LITERATURE REVIEW

2.1	Introduction	13
2.2	Unmanned Arial Vehicle (UAV)	14
2.3	Computational Fluid Dynamics (CFD)	15
2.4	Previous Research	16
2.5	Aerodynamics	18
2.6	Aerofoil	20
2.7	Dimensional Analysis	20

CHAPTER 3: COMPUTATIONAL PARAMETER VALIDATION

3.1	Introduction	22
3.2	Geometry Setup	23
3.3	Grid Generation and Meshing Process	23
3.4	Boundary Condition and Solver Setup	25
3.5	Solution Control	26
3.6	Parameter Validation Results	27

CHAPTER 4: SIMULATION PROCEDURE OF BLENDED WING BODY (BWB)

4.1	Introduction	30
4.2	CAD Modeling of UiTM BWB	31
4.3	Export The Model To STAR DESIGN Software	32
4.4	Meshing In STAR-CCM	35