



## **UNIVERSITI TEKNIKAL MALAYSIA MELAKA**

### **Renewable Energy Technology: AIRco Wind Turbine**

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor Degree of Manufacturing Engineering Technology (Product Design) with Honours

by

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## APPROVAL

This report is submitted to the Faculty of Engineering Technology of UTeM as a partial fulfillment of the requirements for the degree of Bachelor of Manufacturing Engineering Technology (Product Design) with Honours. The member of the supervisory is as follow:



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## **ABSTRAK**

Collecting energy from the wind when riding the motorcycle is the new way of generating the electrical energy. Beside that, it also can be as a green device that used the renewable energy of the wind to be used for charging the gadget when riding the motorcycles. The aerodynamic air flow that being produce when we riding the motorcycle is a free source that can be used to generate energy. The AIRCo Wind Turbine is a new kind of product that generate the electrical energy from aerodynamic air flow that can be used to charge the power bank and the phone. As a result, this device will be design to ease the rider to get the source for charging their gadget battery due to avoid them lack of battery power when riding the motorcycles in short period and long period in long distance.

## ABSTRACT

Pengumpulan tenaga semasa daripada angin semasa menunggang motorsikal adalah suatu cara pendekatan yang baru dalam penghasilan tenaga elektrik. Sehubungan itu, ia juga adalah sebagai sebuah alat berteknologi hijau yang menggunakan tenaga boleh diperbaharui daripada angin bagi digunakan untuk mengecas gajet semasa menunggang motorsikal. Aliran angin aerodinamik yang terhasil semasa kita menunggang motorsikal adalah suatu sumber percuma yang boleh digunakan untuk menghasilkan tenaga. Alat AIRCo Wind Turbine adalah suatu produk yang baru yang digunakan untuk mengecas tenaga elektrik hasil daripada aliran angin aerodinamik yang boleh digunakan untuk mengecas “Power Bank” dan juga telefon bimbit. Keputusannya, alat ini direka bagi memudahkan penunggang untuk mendapat sumber bagi mengecas bateri gajet mereka adalah untuk menghindari daripada kehabisan bateri apabila menunggang motosikal dalam jangka masa yang pendek mahupun jangka masa yang panjang.



## **DEDICATION**

ALHAMDULILLAH.

TO MY PARENTS,

PUAN JAROMA BINTI ABU BAKAR

TO MY SUPERVISOR

PUAN NURUL AIN BINTI MAIDIN

TO MY FRIENDS

FOR EVERYTHING.

AL-FATIHAH

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## LIST OF ABBREVIATIONS, SYMBOLS AND NOMENCLATURE

HAWT	-	Horizontal Axis Wind Turbine
VAWT	-	Vertical Axis Wind Turbine
CAD	-	Computer Aided Design
CFD	-	Computational Fluid Dynamics
3D	-	3 Dimension
RP	-	Rapid Prototyping
UV	-	Ultra Violet
FDM	-	Fused Deposition Modelling
ABS	-	Acrylonitrile Butadiene Styrene
PLA	-	Poly Lactic Acid
DC	-	Direct Current
A	-	Ampere

# **CHAPTER 1**

## **INTRODUCTION**

This chapter will cover the introduction, background of project and problem statement. From that, the conclusion will be determined based on the problem. The objectives and scope of the project are also will be explained briefly through this chapter. Besides, the objectives and scope are very important towards this project because it will give guidance through the whole process. On the other hand, with objectives and scope, it can give an overview on how to handle and conduct this project clearly.



## **1.1 Background of the Project**

The aerodynamic air flow that being produce when we riding the motorcycle is a free source that can be used to generate energy. The AIRCo Wind Turbine is a new kind of product that generate the electrical energy from aerodynamic air flow that can be used to charge the phone. It is a green technology that used the wind as a source of energy to rotate the wind turbine and then rotate the small electrical motor to generate the electrical power. This product is assemble and attached to the side of motorcycles basket in order to collect the wind energy to generate the electric power and also come with a gadget storage to place the phone when charging the battery.

## **1.2 Problem Statement**

When travelling by riding the motorcycle, the energy that we waste is the aerodynamic air flow that occurs when we accelerate the motorcycle. This energy can be used to generate electrical energy to charge our gadgets. In travelling in a long distance period of time, the problem occurs for the motorcycles is to be prepare by charging their phone and the power bank before start their journey. So, this Wind Turbine is a Go-green tech use to ease and help the rider to charge their gadgets such as phone when they travel by riding the motorcycle. It is an alternative way to generate the electrical power using the aerodynamic air flow as a free green energy.

## **1.3 Objectives of the Project**

1. To analyze and purpose the best blade design for wind flow.
2. To design and develop funtional prototype of AirCo Wind Turbine.
3. To generate electrical power for charging phone.

## **1.4 Scope of the Project**

The scope of these project are :

1. To focus and study on the AirCo Wind Turbine.
2. Used Solidworks for design AirCo Wind Turbine.
3. Analyze wind flow by using CFD Simulation Software.
4. To fabricate prototype using Rapid Prototyping Machine, electrical circuit and another manufacturing process.

## **1.5 Organization of the Project**

The report will be conducted in few chapters and each of it has been stated respectively:

### **(a) Chapter 1: Introduction**

This chapter will simply introduce about the project. This chapter contains introduction, background of project, problem statement, objectives and scope of project.

### **(b) Chapter 2: Literature Reviews**

This chapter shows about the studies and research that relevant to the project.

### **(c) Chapter 3: Methodology**

This section will shows about the flow about the project methodology that have been used in this project.

### **(d) Chapter 4: Result & Discussion**

This part will state out the result that have been obtained and describe the discussion of the project respectively.

### **(e) Chapter 6: Conclusion & Recommendation**

This chapter will discuss about the summarization of the project and the major conclusion of the project. Hence the recommendation for a future use.

## 1.6 Result Expectation

The expectations for this project are:

- (a) The prototype can be functional.
- (b) The wind turbine can rotate and collect the wind energy.
- (c) It can be assemble and attach to the motorcycle basket.
- (d) The prototype can generate 5V electrical power to charge phone and the power bank



## **CHAPTER 2**

### **LITERATURE REVIEW**

The literature review for this Airco Wind Turbine is huge. These several book, journal and article are available on describing the methods used to design, analyze and developed this wind turbine to generate electrical power for charging the gadgets. All the information, points, data that are related and link to this project will be discussed and attach on this chapter. Hence, it will elaborate and explain more on what is the renewable energy, wind turbine, the aerodynamic air flow for motorcycles, CFD, Electrical component, the element of Product Design and Development and software that have been used to develop this project.

#### **2.1 The renewable energy**

In conventional energy source according to Antonia V. Herzog, et. al (2001) are based on oil, coal, and natural gas have proven to be highly effective drivers of economic progress, but at the same time damaging to the environment and to human health. In order to save the environment and to human health the renewable energy is the best way to solve this problem. According to the Australian Renewable Energy Agency or know as ARENA (arena.gov.au, 2012-2016), the renewable energy is the energy which can be obtained from natural resources that can be constantly recharged. These renewable energy technologies include the technologies that use or enable the use of one or more renewable energy sources. There are several types of renewable energy technologies that include bioenergy, geothermal energy, hydropower, ocean energy, solar energy and the wind energy. So for this project, most suitable renewable energy than can be used is the wind energy because most energies produce occurs when the rider accelerates the motorcycles is the wind energy. Wind energy is generated by converting the wind as the kinetic energy into other forms of energy using wind turbines. Winds are generated by complex mechanisms involving the rotation of the