CHAPTER I
INTRODUCTION

1.1 Background

The availability of national electricity cannot fulfill the national electricity needs, especially in eastern Indonesia which is constrained by transportation and weather conditions. Therefore, efforts to diversify electricity generation with environmentally friendly alternative energy sources become something needed. One of the government efforts for this problem is utilization from wind turbines. This Utilization as an electrical power supply in Indonesia had been doing until now. It is happened because development of new and renewable energy is an important point must obtain by a government which mandated by UU no. 30 in 2007 about energy, PP no. 79 in 2014 about National Energy Policy, and UU Number 16 in 2016 about Paris Agreement Legalization. Because of that, the government is accused to reach a target minimal 23 persen in 2025. Furthermore, the government also be accused of decreased greenhouse gas emissions until 29 persen in 2030 [1]. One of the government efforts to increased EBT in Indonesia is a wind turbine utilization had been doing in South Sulawesi is the PLTB Sidrap. PLTB Sidrap is the biggest energy generator in Indonesia. With 75 MW capacity, this environmental friendly generator consists of 30 wind turbine has a 2,5 MW capacity [2].

In general, the blade of the wind turbine use a airfoil. Commonly, a wind turbine with airfoil-shaped blades utilizes and prioritizes a smooth surface blades to produce high lift and optimum power at high wind speed condition. However, the lift performance drops considerably when there are some irregularities to the surface of the airfoil-shaped blades[3]. In addition, high noise level is produced by the wind turbine due to the rotor rotating at a high speed[4].

To increase the new and renewable energy percentage in Indonesia with wind utilization which is an unlimited energy source, there is an innovation on a wind turbine at the horizontal axis with Magnus effect utilization will be applied at the wind turbine blade. In general, the wind turbines will be rotated if wind contacted

to all wind turbine blades. So, the wind turbine can't be rotated if the wind didn't contacted to all wind turbine blades or the wind just has slow velocity. This Magnus effect will be testing on the wind turbine in order to the wind turbine can be rotated even though the velocity of the wind is small and the wind just contacted one of the wind turbine blades.

1.2 Formulation of Problem

There are the various effort to increase the efficiency of wind turbine. One of the effort has been doing is the variation of the wind turbine blade. From Ridhanu Hasan[13] experiment, there is a result where the power coefficient decrease when the wind velocity increase. So until now the variation of blade still being developed for the wind turbine utilization and get the wind turbine characteristic which has a suitable wind characteristic with the turbine and can be used for some region suitable with the wind turbine characteristic.

1.3 Objective

There are an objective at this final project :

1. Test the wind turbine model in a wind tunnel which is used a Magnus effect to get the characteristic and achievement.
2. To know the characteristic and achievements of Magnus effect on the wind turbine model.

1.4 Outcomes

The outcome that expect from this final project is can compare the characteristic of the wind turbine blade in general and the wind turbine blade with utilization of the magnus effect. So, wind turbine will developed until get the characteristic where suit with wind characteristic on some region that needed the electricity.

1.5 Problem of Scope

The Problem of Scope that will gives at this final project are:

1. The wind turbine manufacturer based on the wind turbine in Fluid Dynamic Laboratory in Mechanical Engineering Department at Andalas University.
2. Used a horizontal axis wind turbine.
3. This wind turbine model will be tested in a wind tunnel at Mechanical Engineering Department at Andalas University.
4. The result of this testing is a mechanics power.
5. It does not discuss wind turbine construction.

1.6 Writing Systematics

This Writing systematics on this final project is based on:

CHAPTER I : This chapter consists of a background, the formulation of the problem, research objectives, the benefits of research and systematic writing.

CHAPTER II : This chapter contains a summary of the basic theory of wind turbines, Magnus effect and wind turbine energy concept with Magnus effect.

CHAPTER III : This chapter describes the testing procedure, the calibration procedure of measuring instruments and data processing procedures.

CHAPTER IV : This chapter presents a graph of measurement results and analysis.

CHAPTER V : This chapter contains the conclusions and suggestions for the development of the final project towards the better.