Design of HAWT (Horizontal Axis Wind Turbine) Blades Type Semi Inverse-Tapper To Know Turbine Output Power

Dr. Bayu Rudiyanto, ST., M.Si. as chief counselor, and Meilana Siswanto, ST., M.Sc. as a member counselor.

Sri Lestari Fitri Nuraini
Study Program of Renewable Energy Engineering
Majoring of Engineering

ABSTRACT

With the increasing need for electrical energy in Indonesia, alternative energy is needed. Horizontal axis wind turbine (HAWT) is one alternative to renewable energy that is environmentally friendly by utilizing wind energy which is then converted into electrical energy. The objective of the project was to design, it has been successfully designed, manufactured, and tested blades for low-speed and fluctuating winds. The selection of the shape of the blade geometry used is done by analyzing the performance characteristics of the blades using Qblade software to the variable chord and airfoil widening ratio. The selected geometrical shape of the slats is a semi-inversed taper with a 10% widening using mahogany wood material and NACA 4412 airfoil. The slats are designed to produce a maximum power of 500 Watt at a wind speed of 10 m / s with a radius of 1 meter, a chord of 12 –13.3 cm, and linearized twist. The blade passes the equilibrium test, then is installed in a tower as high as 10 meters to retrieve data. The test was carried out four times to produce an average power of 14.86 Watt. Comparison of slats that have been made with other types of blades shows that at low wind speeds that are below 2 m / s, the slats are made capable of producing an average power of 25.12% better than the taper blades.

Key words: *low wind speed, wind turbine, semi inverse-tapper*