

INTISARI

Energi angin merupakan salah satu energi terbarukan yang dapat dimanfaatkan oleh masyarakat sebagai sumber pembangkit listrik. Tujuan dari penelitian ini adalah : merancang dan membuat desain sudu kincir angin propeller berbahan komposit pipa delapan inch, mengetahui unjuk kerja kincir angin dengan variasi sudu dan kecepatan angin, mengetahui *Coefficient Of Performance (Cp)* dan *tip speed ratio (tsr)* dari kincir angin propeller berbahan komposit pipa delapan inch.

Kincir angin yang dibuat adalah kincir angin propeller berbahan komposit, diameter 110 cm lebar maksimum 11 cm pada posisi 15 cm dari pusat poros. Terdapat tiga variasi jumlah sudu dan dua variasi kecepatan. Variasi jumlah sudu yang di uji adalah empat, tiga, dan dua sudu. Variasi kecepatan yang diuji adalah kecepatan 5 m/s dan 7m/s yang bersumber pada *fan blower*. Pengujian dilakukan di Laboratorium Konversi Energi Universitas Sanata Dharma. Besarnya pembebanan diatur dengan beban lampu. Variasi penelitian meliputi : putaran poros, torsi, kecepatan angin, arus dan tegangan hasil unjuk kerja kincir angin.

Dari hasil penelitian didapatkan koefisien daya tertinggi sebesar 25,57 % pada torsi sebesar 0,48 N.m, daya output 17,02 watt dan nilai *tip speed ratio (tsr)* sebesar 3,93 pada variasi 4 sudu dan variasi kecepatan 5 m/s. Pada kecepatan 7 m/s variasi sudu 4 didapat koefisien daya (C_p) sebesar 22,30%, torsi 0.95 N.m, daya output sebesar 40,72 watt dan tsr sebesar 3,36.

Kata kunci : kincir angin, koefisien daya, torsi, *tip speed ratio*

ABSTRACT

Wind energy is one of the renewable energy that can be used by the community as a source of electricity generation. The purpose of this research are: designing and making an eight inch composite pipe propeller windmill blade design, knowing the performance of windmills with blade and wind speed variations, knowing the Coefficient of Performance (C_p) and tip speed ratio (tsr) of the windmill propeller made from eight inch pipe composite

Windmill made is a propeller windmill made from composite pipe eight inch width maximum 11 cm in the cubicle 15 cm from the center of the shaft. There are three variations of blade and two variations of speed. The variation of the number of tested blades is four, three, and two blades. The speed variations tested were speeds of 5 m / s and 7m / s sourced from the fan blower. The tests were conducted at the Sanata Dharma University Energy Conversion Laboratory. The amount of loading is regulated with potassium. The value of the winding shaft rotation is measured by a tachometer, the torque with a digital scale mechanism placed on the axle arm. Wind speed is measured by anemometer, for currents and voltages measured by multimeters connected to the generator circuit.

The results showed that the highest power coefficient was 25.57%, torque of 0.48 N.m, output power of 17.02 watts and tip speed ratio (tsr) of 3.93 in the 4 blade variation and 5 m / s speed variation. At a speed of 7 m / s 4 blade variations obtained the power coefficient (C_p) of 22.30%, torque of 0.95 N.m, output power of 40.72 watts and tsr of 3.36.

Keyword : *wind turbine, coefficient of power, torque, tip speed ratio*