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Influence End Stamp to Efficiency Turbine Wind Savonius Four Spoons

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ABSTRACT

The pattern of energy consumption which is constantly increasing over time causes scarcity energy so that almost all Country race for awaken energy from source - source energy new and renewable. Wrong One The chosen energy is wind energy. This study aims to examine the characteristics of the vertical Savonius type wind turbine by finding Torque, Power windmill, performance windmill use end stamp and without end stamp. From results study obtained data at speed wind 1.2 m/s without end stamp produce Power maximum as big as 0.0385 watt and torque maximum 0.00245 Nm and maximum efficiency of %. while at wind speed of 1.2 m/s using the end cap maximum power of 0.07701 watts and maximum torque of 0.00491 Nm and maximum efficiency of %. From these results it can be concluded that turbine wind Savonius four blade use end stamp more Good compared without end stamp.

Keywords
Power, Torque, Efficiency, Four Blade, End Stamp.

INTRODUCTION

A wind turbine is a device that rotates a machine by converting kinetic energy in the wind into mechanical energy by rotating an electric generator and converting it into electrical energy. From various type type And form turbine wind Which There is, turbine wind This on Originally designed to accommodate farmers' needs for rice milling and other activities, wind turbines were widely built in Denmark, the Netherlands, and other European countries. other Which more known with Name Windmill. Turbine wind modern more Lots used for accommodate need electricity public with use principle conversion energy from the source Power natural Which can updated, that is wind. From a number of development prototype system conversion energy wind (SKEA) Which has carried out, one of which is the Savonius wind turbine. This wind turbine is suitable for application as generator electricity in area rural or area remote Which Not yet or unreachable by generator electricity conventional or network PLN. In matter This area Mountains have great potential for building wind turbine systems, given the greater wind intensity. in region Indonesia, specifically Land Toraja Which part big its territory consists of from mountains and valleys. In addition, wind turbines also use simple equipment and are inexpensive. affordable as well as operation and installation Which No too complicated. Besides that, the capacity is relatively small so that it can be used individually or in one household, this is Of course just will make things easier in use and its operation daily. Power ideal wind Which obtained varies in accordance speed wind. the more big speed wind, so ideal power wind Also the more big (Samplewang P, 2012).

Turbine Wind Axis Horizontal

Turbine wind This on initially made for accommodate need for farmer in A wind turbine is a windmill that is used to generate electricity. The turbine does the grinding. paddy, needs irrigation, And etc. Turbine wind previously Lots built in Denmark, Netherlands, And countries Europe other and more known with Windmill. Turbine wind shared become two group main based on direction axis: a.Turbine Wind Horizontal b.Turbine Wind Vertical. Turbine Wind Axis Horizontal Horizontal-axis wind turbines have blades that rotate in a vertical plane, much like an airplane propeller. Figure 2.1 shows a typical horizontal wind turbine. Wind turbines typically have blades with a special cross-sectional shape where the flow of air is directed. air on Wrong One his side can move morefast from flow air on the side Which other when the wind passes through it.

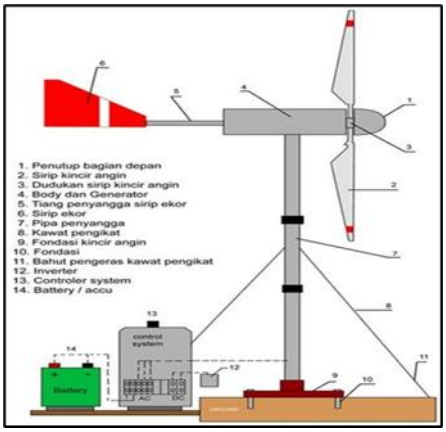


Figure 1. Turbine Wind Horizontal

Turbine Wind Axis Vertical

Turbine wind with axis vertical Work with principle Which The same like case in point horizontal group. However, the spoonturn in field Which parallel with land.

Figure 2. Turbine Wind Vertical

Turbine Wind Savonius

Turbine wind Savonius is Wrong One type turbine wind axis vertical. Savonius is a type turbine wind Which most simple and version big from anemometer. Turbine wind Savonius can rotate Because existence style pull (drag).The Savonius rotor was first made by the Findlanders (El-Vate, 1985). The blades formed installed on axis vertical, energy mechanic round rotor obtained from change kinetic energy wind Which pounding spoons rotor the. Excess from Turbine wind Savonius is:

1. Safe, And easy build it.
2. Can installed No Far from land, so that make it easier in maintenance.
3. Burden For tower No too big Because distance Which No Far from land.
4. Simple And practical, No affected by direction wind.

Scheme Installation Turbine wind Savonius

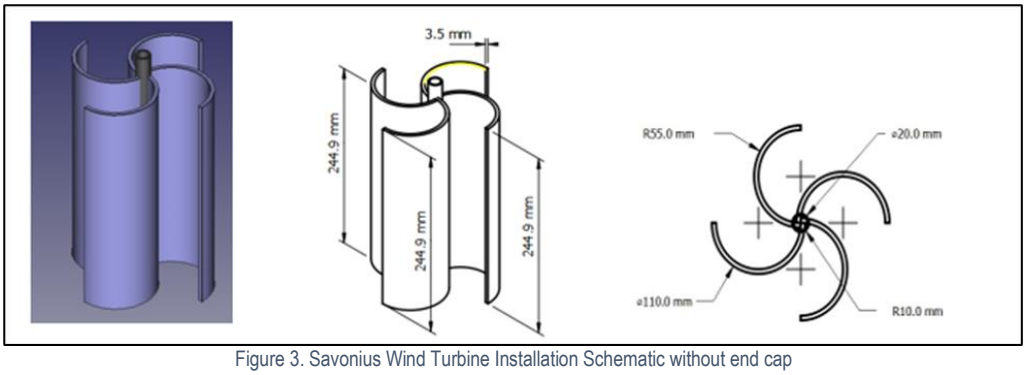
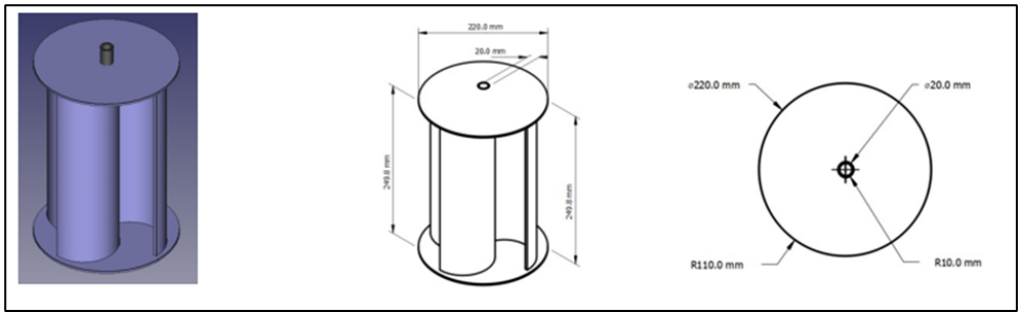


Figure 3. Savonius Wind Turbine Installation Schematic without end cap



Picture 4. Scheme Installation Turbine Wind Savonius with End cap

METHOD

Method processing data:

Data Which obtained processed into the formula empirical, then data from calculation presented in tabular and graphical form. Observation And stage testing: On testing This Which will observed is:

a) Parameter burden Which able by turbine the.
b) Parameter round turbine (rpm).
c) Parameter speed flow wind(v).
d) Efficiency turbine.

Research Procedures: Procedure study on testing This is as following:

1) Prepare tool aAnd completeness other.
2) Measure temperature with use thermometer and take notes the results.
3) Run the blower/fan and measure the wind speed it produces using an anemometer and record the results.
4) Measure heavy burden for loading round rotor with use scales and record the results.
5) Install windmill wind and blower/fan on wind tunnel wind, and install all the equipment.
6) Operate blower/fan and observe round windmill wind before given loading then measure speed round which produced windmill the with use tachometer and record the results.
7) Give loading on round windmill wind and return measure round from the windmill use tachometer Then take notes the results.
8) Take notes comparison round windmill wind before given loading and on moment given a burden.
9) Take notes how much long time Which used in testing.

RESULTS AND DISCUSSION

Air Density

In testing Which done known that temperature environment is 25 ° C. Based on the table density And viscosity air on 1 atmmaka density air (ρ) is 1,186 kg/m 3.

Power Ideal Wind

Energy Which owned by wind can obtained from equality:
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W = ½ ρAV³ With:
W = Energy wind (Watt)
ρ = Density air (Kg/m 3)
A = Wind capture area (m 2) V = speed wind (m/s)
Example calculation For speed wind 1.2 m/s. W = ½ ρAV³
W = 1 x 1,186 x (3.14 x 0.175 2) x 1.2 3 W = 0.098538 Watt
Torque
Torque can obtained with use system braking with hang burden
on pulley Which turn. Or with equality:
Q = F x r With:
Q = torque (Nm)
F = style loading (m) r = radius (m)
Example calculation torque on speed 1.2 m/s, And loading 10 gr.

$$Q = F \, x \, r$$

$$Q = \left(\frac{10}{1000} \text{ x } 9.81\right) \text{ x } (2.54/100)$$

$$Q = 0.002453 \, Nm$$

Power Windmill

Power windmill is output from Power wind, Power windmill can in get with equality:
P = Q x ω With:
P = Power (Watt)
Q = torque (Nm)
ω= rotation round windmill wind (Rad/s)
Example calculation on speed 1.2 m/s, round 150 rpm And loading 10 gr.
P = Q x ω
P = Q x 2πn/60
P = 0.002453 x (2 x 3.14 x 150/60) P = 0.038504 Watt

Ratio Speed End

If it is defined that the tip speed ratio (λ) is the ratio between the linear speed of the rotor and speed wind before blade or written in a way mathematics:

$$\lambda = \frac{\omega . R}{V}$$

With:
λ = ratio speed end
ω = rotation speed of the windmill (Rad/s) R = radius
V = speed wind
So that,

$$\lambda = \frac{2\pi n . R}{V}$$

$$\lambda = \frac{(\frac{2*3.14*150}{60}) \times 0.175}{1.2}$$

$$\lambda = 2.289583$$

Performance Windmill

Performance windmill is comparison between Power output and input from windmill wind, can written with the equation:

$$\eta = \frac{\Omega}{1} x\ 100\%$$

So that:

$$\eta = \frac{0.023504}{0.053523} x\ 100\%$$

$$\eta = 39.0755\%$$

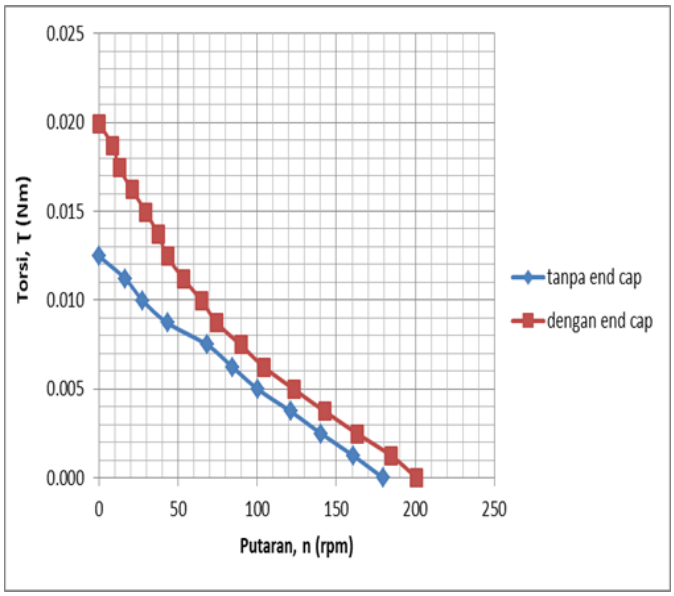

Figure 5. Comparison round to Torque with end stamp and without end stamp

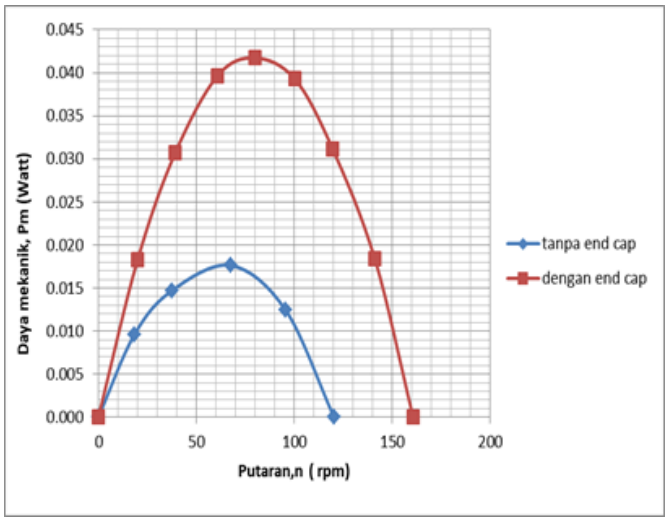

Figure 6. Comparison round to Torque with end stamp And without end stamp

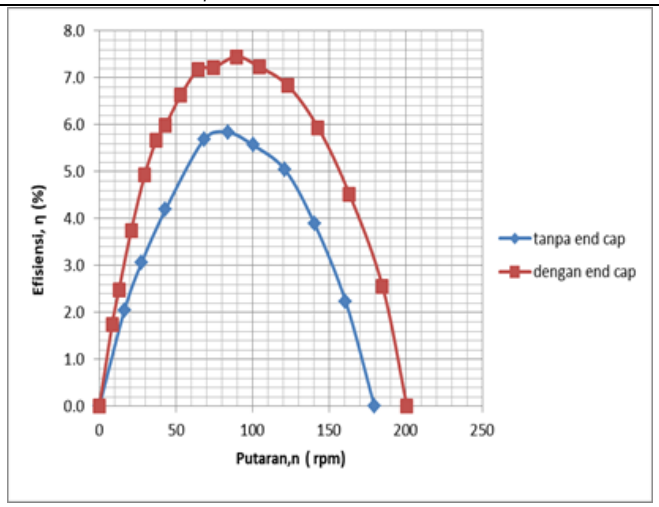

Figure 7. Comparison round to efficiency with end stamp And without end stamp

CONCLUSION

Based on results calculation on turbine wind Savonius 4 blade with use end cap, then it can be concluded that: 1. End stamp influential to speed Power turbine wind Savonius 4 blade Where the greater the power and load, the smaller the power produced. Maximum power at load 0.12 kg is 0.07 (Watt); 2. End stamp influential to torque turbine wind Savonius 4 blade Where the morebig power and burden, so torque Which produced the more big. Torque maximum on loading 0.3 kg is 0.019 Nm; 3.The end cap affects the efficiency of a 4-blade Savonius wind turbine, where the greater the power and load, the lower the resulting efficiency. The maximum efficiency at a load of 0.12 kg is 7.45%.

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