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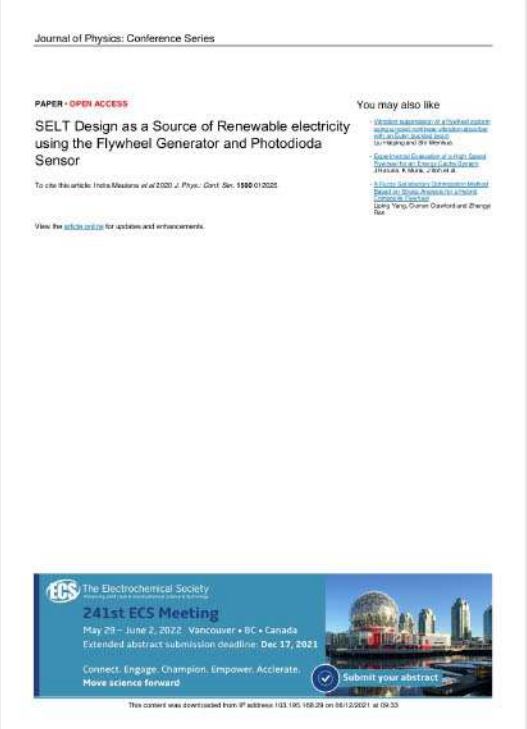

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SELT Design as a Source of Renewable electricity using the Flywheel Generator and Photodioda Sensor

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Abstract

Day by day, the use of electricity in Indonesia is increasing. This can be shown from the increase use of household electricity consumption in January to June 2018 which reached 42.25 percent or 47.5 TWh and increased by 3 percent per year. This makes many people compete in making free energy. One of the many free energy that is currently made is the energy flywheel. This flywheel uses a flywheel material as an additional material in stabilizing the rotation of a 1 phase motor. It uses sensors that is modified with a voltmeter. It also can be done automatically so that when the voltage reaches 220 V, the input electricity will be disconnected and will use electricity from rotational energy of the generator flywheel.

Keyword : SELT , Flywheel Generator, Sensor Otomatisasi, Relay, Arduino

1. Introduction

Surprisingly, electricity use in Indonesia is increasing. This can be shown from the increase use of household electricity consumption in January to June 2018, which reached 42.25 percent or 47.5 TWh and increased by 3 percent per year. Furthermore, industrial sector consumption was recorded at 36.32 TWh or grew by 5, 75 percent.

With the fact that the demand for electricity is increasing, Indonesia still needs resources to produce electricity in a friendly and safe way for the environment that is not only from nature but from the conversion of initial energy to produce more energy or free energy.

Free Energy in this case according to Prof. Sandeep B. Thakre, Mr. Swapnil H. Zode, Anand S. Singh, Shubham R. Ingole is a designed generator flywheel as a free power generator that can produce energy by utilizing motor rotation which is stabilized by flywheels. The produced electricity is very large by utilizing AC generators, flywheels, and motors 1 HP [1]. Furthere more, Agri Suwandi Research, Eka Maulana, Febrian Dio Rhapsody, also conducted a research on free energy with a very different system. The author uses a bicycle as a driving system, when the bicycle is used for 30 minutes, the electricity generated is 57.375 Wh with current 4 Ah [2]. With the various experiments above, it is possible to get free energy that is costless and can be used by various parties.

2. Working Principle

This tool is designed to use iron profile U as a framework for 1 phase motors, flywheels, and generators. Election profile U aims to maintain the stability of the framework when the process is running. This tool has 5 main points, namely 1 phase motor, flywheel, generator, pulley and belt in this tool, it uses microcontroller and Photodioda Sensor as a regulator of electrical input. Light sensor is an electronic component that functions to change an optical quantity (light) into an electrical quantity. Light sensors based on electrical changes produced are divided into two types, namely photovoltaic and photoconductive. One type of photoconductive light sensor is the Photodioda sensor [3].

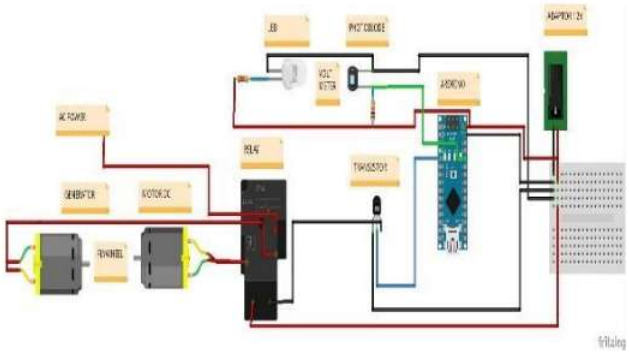

Figure 1. Electric Motor Microcontroller Circuit

Induction motor is an alternating electric motor (ac) whose rotor rotation is not the same as the stator field rotation, in other words the rotor rotation with the stator field rotation there is a difference in rotation called slip [4]. In the industry to move many machine tools using 1-phase motors [5]. SELT uses an electrical motor that is useful as a converter of electricity into rotational motion with the specifications of a 1 phase motor, 1 HP with a speed of 1400 rpm input from electric power. This is obtained from the formula

Figure 2. Electrical Motor

- $Torsi\ motor = \frac{716}{n\ (rpm)}, 56\ x\ power\ (HP)$
- Torsi electrical motor is 0,511 kgm

In this tool you can use the theoretical formula to compare the rotational speed with the diameter of the motor pulley to the generator pulley.

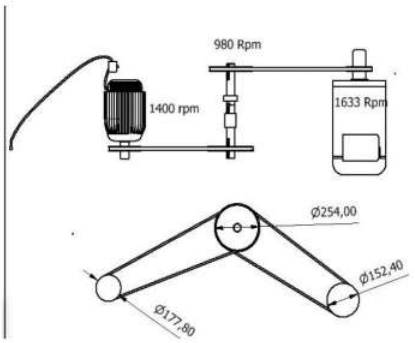

Figure 3. Design of Pulley

- $\frac{n1}{n2} = \frac{D2}{D1} \Leftrightarrow \omega 2 = \frac{\omega 1}{\theta 1} \times \theta 2$

Where :

- n1 = initial speed (rpm)
- D1 = diameter pulley (mm) D2 = diameter pulley (mm)
- n2 = final initial (rpm)

From this formula, the motor accepts electrical input which is then converted to rotational kinetic energy of 1400 rpm. According to the specifications of the tool turning the pulley with a 7 inch diameter, it is transmitted by a belt that connects the motor pulley and flywheel, so that the pulley at the flywheel with diameter 10 inch changes the rotation speed to 980 rpm. Then from that speed, it is transmitted again to the generator pulley to rotate the 10kW generator at a speed of 1633.3 rpm.

With all these circuits, the transmission connector requires a belt that connects the motor, flywheel and generator. To find out how long the belt can be found using the following formula

- L = 2C + π/2 (D1+D2) + ¼ C(D2-D1)^2 where C is the length of the pulley center point 1 to pulley 2. From this formula we can know that the belt length from the motor to the flywheel is 2090.32 mm and the belt length from the flywheel to the generator is 2097.91 mm

Flywheel is a machine tool that is useful as a stabilizer to rotationalize energy received. The flywheel specifications are as below:

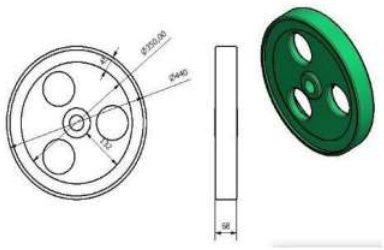

Figure 4. Flywheel

With the specifications of R is 0.44 meters, height 0.067 meters with a mass of 30 kg and weighing 294.3 N and input power of 1 Hp, it will be obtained

- R Center of weight flywheel = r√2
  0,156 m
- Moment of torsi flywheel = m x r
  45,91 Nm
- Inersia Flywheel = m x r^2
  1,452 kgm^2

From the data design of the Flywheel with a rotation power of 1 Hp and speed of 980 rpm, outer R1 = 0.22 m, R2 in = 0.175 m then R rotation of RIM K = R2 + (R1-R2) / 2, which is equal to 0.1975 m. Flywheel RIM length = R1 - R2 which is 0.045. with a flywheel RIM thickness of 0.068m and a density of 7800 kg / m ^ 3, the flywheel mass can be found with the flywheel RIM M = P x L x Roving K (2πr) x the density of the flywheel.

- m = 30 kg
- I = m. K
- I = 1.708 kgm2

The coefficient fluctuation in engine speed with belt transition is Cs = 0.03 with the formula

- E = $m.k^2.w^2.Cs$, the energy stored at the flywheel is 369,692 joules.

Generator is a device that can convert mechanical power into electrical energy [6]. The generators used in this apllication are a DongFeng Generator 10 kW and ST Series Generator 3kW, with specifications of 1 phase 220 V, with 47 A 1500 rpm, 50 Hz and generator.

Figure 5. Generator 10 KW and Generator 3 KW

3. Test Results and Analysis of Test Specimens.

The SELT tesr is done by doing two phases; testing by using genererator 10 kW in order to make the the welding machine ON with capcity is 1.3 kW and grinding machine ON with capacity 500watt, and by using generator 3kW in order to make grinding machine ON 500 watt and electro motor 1 hp.

Figure 6. Design and Actual of SELT

Testing SELT by using generator 10 W and motor 1hp with flywheel weight 300 kg in order to make welding machine ON with capacity 1.3 kW and grinding machine 500W is done in turn and all together. With the SELT generator speed 1633.3 rpm and motor SELT, this machine still supplies the electricity

source from PLN (State Electricity Company). SELT can supply power and makes welding machine ON with the capacity 1.3 KW in 15 minutes. It also supplies power to make grinding machine 500W ON and welding machine 1.3 kW in 5 minutes.

Table 1. SELT Power Anylis by Generator 10 kW

Testing SELT by Using ST Series Generator 3 kW

Load Type	Total Charges (B1)	Duration	Power from PLN (B2)	Power Gained (B1-B2}
Welding Machine	1.3 kW	15 Minutes	1 hp (745,7 watt)	554.3 watt
Welding and Grinding Machines	1.8 kW	5 Minutes	1 hp (745,7 watt)	1054.3 watt

SELT gains power or free energy 554.3 watt by using load welding machine with capicity 1.3 kW in 15 minutes and gains free energy 1054.3 watt in 5 minutes.

Testing SELT by using generator 3 kW and motor 1 hp with flywheel weight 30 kg in order to switch the motor 1 hp and grinding mechince 500 watt ON is done in turn and all together. With the generator speed SELT 1633.3 rpm by electric motor, it still supplies power energy from PLN (State Electricity Company). SELT can turn grinding machine 1 hp (745.7 watt) in 30 minutes, motor 1 hp and grinding machine 500 watt in 10 minutes.

Table 2. SELT Power Anylis by Generator 3 kW

Testing SELT by Using ST Series Generator 3 kW

Load Type	Total Charges (B1)	Duration	Power from PLN (B2)	Power Gained (B1-B2}
Motor 1 HP	745.7 kW	30 Minutes	1 hp (745,7 watt)	0 watt
Motor 1 HP Grinding Machine	1065.7 kW	10 Minutes	1 hp (745,7 watt)	500 watt

SELT can work abit longer or about 30 minutes with motor 1 hp or the power is the same with the one tsken by SELT from PLN in order to swtich the motor 1 hp on. The free energy 500 watt is gained by switching the motor 1 HP ON and grinding mechine with 1065.7 watt. The energy source is from PLN around 745.5 watt in 10 minutes.

4. Conclusions

SELT is a Renewable Electric Energy Source that utilizes 4 (four) main components, namely 1 HP Motor, Flywheel, 10 kW and 3 kW Generators, and pulley belt transmission systems. And has one supporting component, the photodiode sensor that functions as a breaker and connecting automatic current from the generator or PLN. From the analysis of SELT testing it has gained more power than the power received by SELT, but the energy produced by SELT is not perfect because it can only last for a duration of about 5-10 minutes. This is because the flywheel with a diameter of 0.44 meters, and weighing 30 kg is unable to store and produce enough energy to turn the generator.

5. Suggestions

When designing it must be done carefully, and the selection of frame material must be taken into account because the burden of SELT components has a large heavy weight and to reduce the drag caused by the rotation of the flywheel, motor and generator. Make sure the flywheel is in a balance state so that it has

stable power. Increase the size of the flywheel to increase the energy that can be stored on the flywheel. Use low-rpm generators so that tool performance is more efficient.

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