

ABSTRACT

Currently, electrical energy is a basic human need. The need for electrical energy in Indonesia is very large, and it still relies on power generation from limited resources. Therefore, it requires a renewable source of electrical energy that will not run out if it is used. For storing electrical energy, renewable power plants still use batteries such as batteries which have several weaknesses, namely the raw materials used can be harmful to the environment and humans. In addition, the quality of the battery greatly affects storage which is maintained from moisture, heat and other environmental conditions, so routine maintenance must be carried out.

In this study, the authors have designed to overcome the shortcomings of battery energy storage, namely Flywheel Energy Storage (FES). Flywheel is energy storage in the form of kinetic energy that uses the moment of inertia of rotation. The main components of the flywheel are the rotor, stator and bearings. The flywheel itself works by rotating the flywheel rotor at a high enough speed to maintain the energy generated through this rotation. Furthermore, this energy will be converted back by slowing down the rotation of the flywheel rotor.

As a result achieved, the Flywheel Energy Storage that has been designed obtains voltage, current and power values from the INA219 Sensor readings which obtain a sensor accuracy of 99%. At the input voltage of the Flywheel Energy Storage, a Buck Converter system is used as a voltage step down. In this study, 1026 RPM was obtained at 12V input with a capacity of 0.0915667 watt-hours which can be used at 12V output loads. In testing the flywheel mechanical battery charging at 12V it was obtained for 36 seconds and 67 seconds for the flywheel mechanical battery emptying.

Keywords: *Flywheel energy storage, Mechanical Battery, Buck Converter.*