ABSTRACT

Design and Build of Pico Hydro Plant Using a Motorcycle Stator Coil with a Non-Center-Tapped Transformer

Alex Taufiqurrahman Zain, S.Si., M.T. (Advisor)

Muhammad Tajudit Ni'am

Study Program Of Automotive Mechanical Engineering,

Department Of Engineering

This study aims to design and test an electrical power generator using a motorcycle stator coil combined with a transformer as a voltage amplifier, along with current and voltage monitoring. The focus of this research is to produce sufficient power to operate a 20-watt lamp, with efficiency approaching that of conventional power plants. The system utilizes water flow to rotate a four-blade Kaplan turbine connected to the stator coil acting as a generator. The generated electrical energy is then stepped up using a transformer and monitored through an Arduino-based microcontroller equipped with current and voltage sensors. The research method applied is an experimental approach, involving system design, implementation, and performance testing of the power plant. Testing was conducted with a water flow rate of 10 L/s and a head of 1 meter. The results show that the system is capable of producing a voltage of up to approximately 240 volts after passing through the transformer. The system is also able to power a load of up to 20 watts. Sensor accuracy testing indicates an accuracy level of approximately 98% for voltage and 98.3% for current. In addition, the overall efficiency of the power plant is 19.1%. Although this efficiency is still below the standard of conventional power plants, the system demonstrates potential as a small-scale alternative energy source for remote areas.

Keywords: Power Plant, Efficiency, Arduino, Generator, Pico-Hydropower Plant (PLTPH)