ABSTRACT

This study designed and built a prototype steam power plant (PLTU) using a water gravity circulation system as an alternative to a circulation pump. The objectives of this study were to determine the system design, estimate the manufacturing costs, and evaluate the performance of a small-scale PLTU prototype used as a medium for teaching energy conversion techniques. The research methods included literature study, design using SolidWorks software, selection and fabrication of main components such as boilers, impulse steam turbines, and permanent magnet alternators (PMA), as well as system performance testing. The results showed that the water gravity circulation system was able to flow steam from the boiler to the turbine without the aid of a pump, thereby generating electrical energy through the rotation of the turbine and alternator. This prototype is considered efficient, simple, energy-efficient, and has the potential for further development with the addition of a condenser system and the use of renewable heat energy sources to make it more environmentally friendly.

Keywords: Steam Power Plant, Water Gravity, Prototype, Impulse Steam Turbine, Boiler, Permanent Magnet Alternator, Renewable Energy