
MICRO HYDROPOWER AT LOW HEAD RIVER

Arutchelvi Thayanandan¹, Muhammad Fauzi Yaacob²,

Muhammad Farhan Mohd Saifful³, Luqman Nur Hakim Abdull Wahab⁴

^{1,2,3,4} Civil Engineering Department Polytechnic Ungku Omar, Ipoh, Perak, Malaysia

E-mail: arutchelvi@puo.edu.my, muhdfauzi.1005@gmail.com, farhan25857@gmail.com, lhqeemm@gmail.com

Abstract

This study investigates the potential of micro hydropower technology for electricity generation in Malaysia, focusing on low head river systems. Malaysia's increasing electricity demand, primarily met through fossil fuels, has led to significant greenhouse gas emissions, necessitating alternative energy solutions. Given Malaysia's abundant natural hydro resources, particularly its extensive river network, micro hydropower emerges as a promising renewable energy source. The project aims to design, construct, and evaluate a micro hydropower plant tailored to low head rivers. The design includes an Archimedes screw turbine to harness renewable energy from small-scale water resources. The turbine measures 1000 mm in length and features a helical structure optimized for converting water flow into rotational energy. The production of Archimedes turbine involves designing for location and power needs, selecting durable materials like PVC pipe and assembling the turbine with other components to complete the prototype. Prototype testing will take place at Ungku Omar Polytechnic. Initial findings highlight inherent inefficiencies in energy conversion and mechanical operation, with an initial turbine efficiency of 1.67% under clear weather conditions. Subsequent design optimizations, including enhancements to water flow concentration, significantly improved turbine efficiency to 4.07%. Challenges such as structural integrity and susceptibility to adverse weather were identified, emphasizing the need for continuous refinement. The successful prototype demonstrates the feasibility of generating electricity from low head rivers, marking a significant step toward sustainable energy solutions. The project's outcomes suggest that with ongoing design improvements, micro hydropower can play a crucial role in Malaysia's renewable energy landscape, offering a reliable and environmentally friendly alternative to traditional fossil fuel-based power generation.

Keywords : environmental; generation; hydropower; low head river; renewable energy; turbine
