Manufacturing process and experimental study of a small scale archimedes hydro powerplant by varying the number of blade

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Abstrak

This study investigated the optimum value of Archimedes Screw Turbine (AST) performance by taking into account blades number. This paper also addressed the design approach based on a fixed incline angle of 30°, where this paper also addressed the design approach. Variations of the single and double blades were experimentally carried out concerning the turbine power output, torque, and rotation speed. This study's aim was related to the optimum power output between two blade variations, while the manufacturing and design steps were addressed as well. In the design process, the obtained blade length dimension was 0.180 m and 0.269 m for the single and double blades. Furthermore, the overall turbine's length was 1.7m, and the inner and outer of the turbine's radius were 0.069m and 0.128m. Meanwhile, the manufacturing process began with turbine modeling, plate cutting, plate withdrawal (thread formation), welding, and attained finishing process. Based on the experimental result, a double blade turbine generated turbine power by 48.8W at an average rotational speed of 115.3 rpm. Moreover, a single blade turbine produced 37.5W with turbine power averaging a rotational speed of 109.8 rpm. It was obtained that the values of turbine efficiency were 42% and 38% for double and single turbine types, respectively. Based on this finding, it can be suggested that a double blade was more efficient than a single one. This study is beneficial for the design consideration of the AST system.