

ABSTRACT

Selecting and designing a turbine should be consistent with certain condition in order to operate efficiently. Rotation speed of the turbine (n) and nozzle spray speed (V) of *pelton* turbine is determined by the width of opening or closing of spear valve. The phenomenon has effect on efficiency of *pelton* turbine. This study was to understand the effect of nozzle closing variation of nozzle spray on efficiency (η) of *pelton* turbine and spray coefficient (K_u).

This study used a model of *pelton* turbine by one nozzle with diameter of 0.0045 m having specification of rotor with 10 blades of 0.07 m in diameter. The process of nozzle closing was done by a manual valve to drive spear valve so that it moves forward (the nozzle closes) and backward (the nozzle opens) for some variations, such as, 1/3 closing against complete open, 1/2 closing against complete open, and 2/3 closing against complete open, and opening the nozzle completely. Data of measurement results would be displayed on monitor screen after analog signals were transmitted into interfaces IFD4 (measure sensor), and converted into digital signal.

The results of study indicated that there were decreases in efficiency and coefficient of nozzle along with wider closing of nozzle. For 1/3 closing, there was decrease in efficiency as much as 9.968 %, 1/2 closing as much as 13.235 %, and 2/3 closing as much as 20.319% against complete open. The biggest and best efficiency was obtained as much as 74.664 % when the nozzle was opened completely, because tangential speed ($U = 6.563$ m/s) approached 1/2 of spray speed ($V = 13.149$ m/s), so that the spray coefficient was obtained as much as (K_u) = 0.499.

Keywords : Nozzle closing, discharge, speed, sensor and efficiency.