EVAPORATOR DESIGN AND SELECTION OF STEAM TURBINES IN *ORGANIC RANKINE CYCLE* USING R-134A AS WORKING FLUID

Name	**: Frans Aprio Maruli P.**
NRP	**: 2105 100 109**
Supervisor	**: Dr.Eng. Ir. Prabowo, M.Eng.**

ABSTRACT

Organic Rankine Cycle (ORC) is a power generation system that capable for utilizing waste energy by using organic fluid which can evaporate at low temperatures. Because ORC has not been widely known, it is necessary to plan for its components.

This final project performed on the evaporator design with compact type heat exchanger - continuous circular fin tubes to generate steam. Thermodynamic analysis is used to obtain the amount of heat needed by the system. Heat transfer analysis with logarithmic mean temperature difference to get the dimensions of the three region, region 1 (subcooled zone), region 2 (evaporation zone), and region 3 (superheated zone). The flow in the tube in the design is in the accordance with the maximum permitted speed for the flow in the tube due to vibration so that the number of lines can be identified. The selection of steam turbine for the Organic Rankine cycle analysis was also performed using the velocity triangle to get the relative efficiency of the turbine that will be chosen. Analysis of heat reduction in the nozzle and the blade motion is to get the overall efficiency of the turbine so that with these two analyses, the steam turbine dimension that suited with this system acquired.

The design of organic Rankine cycle with a power output of 100 Kwe appropriate with the evaporator dimensions that could generate 1029 Kw steam with the dimensions of 15.75" x 15" x 17.5 with a length of tube of 307.05 for 1st region, 988.64" for 2nd region and 149.21" for 3rd regions. In the selection of turbine, the turbine design results for the efficiency of 79%, while in the design also resulted the minimum diameter and maximum diameter nozzle for a steam turbine of 23 mm and 27 mm, diameter 0.62 m and the turbine blade height of 30 mm.

***Keywords**: ORC, R134a, steam turbin, impulse turbin, evaporator, compact heat exchanger, geothermal*