
Performance Evaluation and Exergy Analysis of Different Working Fluids used in Organic Rankine Cycle for Power Generation Operates under Constant Temperature Heat Reservoirs.

T. Kankeyan, M.A. Wijewardane, R.A.C.P. Ranasinghe and J.G.A.S. Jayasekara

Abstract: This paper investigates the thermal efficiency and exergy analysis of one of the predominant low-grade energy recovery technique, Organic Rankine Cycle. Working fluids R113, R123, R141b, R245fa, R600a, R601a, neopentane, methanol, ethanol, cyclopentane, propanone and isohexane are considered during the analysis. The model was developed based on DWSIM software and MATLAB software linked with thermo-physical properties database REFPROP. The modelling system is proposed based on two different conceptual experimental test rig containing scroll expander, condenser, plunger pump, evaporator and superheater and containing scroll expander, condenser, plunger pump and evaporator only. It was found that the maximum thermal efficiency can be obtained for ethanol for the heat source temperature of 200 °C.

Keywords: Exergy Analysis, Low Grade Energy Harnessing, Organic Rankine Cycle, Waste Heat Recovery

*Eng. T. Kankeyan. AMIE(SL), AMIMechE(UK)
B.Sc. Eng. Hons (Moratuwa), Graduate Student,
Department of Mechanical Engineering, University of
Moratuwa.*

*Eng. (Dr.) M.A. Wijewardane.
B.Sc. Eng. Hons (Moratuwa), Dr. (Loughborough), Senior
Lecturer, Department of Mechanical Engineering,
University of Moratuwa.*

*Eng. (Dr.) R.A.C.P. Ranasinghe.
B.Sc. Eng. Hons (Moratuwa), Dr. (Loughborough), Senior
Lecturer, Department of Mechanical Engineering,
University of Moratuwa.*

*Eng. (Dr.) J.G.A.S. Jayasekara.
B.Sc. Eng. Hons (Moratuwa), M.Sc. Power Generation
(KTH), Dr. (Melbourne), Senior Lecturer, Department of
Mechanical Engineering, University of Moratuwa.*

