



Comparison of Heat Recovery from Engine Test Cell by ORC and Kalina Cycles

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Abstract

In manufacturing the engines, it is needed to evaluate the engine performance which is accomplished in test cells. Test duration time is dependent to the engine power and application, as well as the kind of test. During the test, a significant portion of fuel heat energy is wasted. In this study, a turbocharged marine diesel engine test cell is used and in order to recover the heat loss, Organic Rankine Cycle (ORC) and Kalina cycle are used. Energy, exergy and exergoeconomic analyses are performed on the both combined cycles and these cycles are compared from view points of net power, first law efficiency, exergy destruction, exergetic efficiency, Exergetic Performance Coefficient (EPC), unit cost of produced power, cost rate associated with exergy destruction and exergoeconomic factor. Finally a parametric study is done to reveal the effects of such operating parameters as concentration of ammonia-water solution and turbine inlet pressure in Kalina cycle as well as temperature of boiler and degree of superheat at the ORC turbine inlet in organic Rankine cycle on important thermodynamic and exergoeconomic parameters of the combined cycles.

Keyword: engine test cell, heat recovery, ORC, Kalina, exergy, exergoeconomic