

Optimization of Organic Rankine Cycle System for Waste Heat Recovery from Excavator

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Abstract : This study describes the application of a single loop organic Rankine cycle (ORC) for recovering waste heat from an excavator. In the case of waste heat recovery of the excavator, the heat of hydraulic oil can be used in the ORC system together with the other waste heat sources including the exhaust gas and engine coolant. The performances of four different cases of single loop ORC systems were studied at the main operating condition, and critical design factors are studied to get the maximum power output from the given waste heat sources. The energy and exergy analysis of the cycles are performed concerning the available heat source to determine the best fluid and system configuration. The analysis demonstrates that the ORC in the excavator increases 14% of the net power output at the main operating condition with a simpler system configuration at a lower expander inlet temperature than in a conventional vehicle engine without the heat of the hydraulic oil.

Keywords : engine, excavator, hydraulic oil, organic Rankine cycle (ORC), waste heat recovery

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