



First and Second Law Analysis of Internal Combustion Engine Cogeneration System

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Abstract

In this article, the first and second law analysis of the diesel engine cogeneration system is performed. Furthermore fuel utilization efficiency, rate of power and rate of process heat of the plant are determined. Various efficiencies based on both energy and exergy methods and the performance assessment parameters are defined for both the system components and the entire cogeneration plant. Also the exergy destruction in each component is calculated. The system under survey in this work is an ICE cogeneration system that produces 250 KW of electricity and increases the temperature of water from 80 °C to 120 °C at 2 bar and 1.75 kg/s. Fuel utilization efficiency of the overall plant is found to be 90.47% and the exergetic efficiency is 51.08%.

Keywords: Energy, Exergy, Efficiency, Diesel engine, Cogeneration