THERMODYNAMIC ANALYSIS OF THE CONFIGURATION’S EFFECT TO COMBINED CYCLE PERFORMANCE OF PLTGU BLOCK I UP GRESIK

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Abstract
The operating variation of a power plant adapted to the energy needs at the time. A combined cycle power plant (power plant gas and steam) can be operated with various types of operation. Because the operation varies, plants can not operate in optimal conditions at all times. Of variations in the operation of 3-3-1 (3 gas turbine, 3 HRSG, 1 steam turbine), 2-2-1 (2 gas turbines, 2 HRSG, 1 steam turbine) and 1-1-1 (1 gas turbine, 1 HRSG, 1 steam turbine) can be analyzed on how the operation of the combined cycle variations operate at high efficiency and low heat rate.

To analyze the efficiency and heat rate on the combined cycle, the thermodynamic analysis by ignoring friction losses between the working fluid and equipment can be used. On this analysis, the law of conservation of mass is applied by assuming no leakage of the working fluid, either gas or vapor. The fuel is natural gas with specific gravity (SG) 0.60620.

As the result, at 1-1-1 operation, has obtained the lowest efficiency, 46.2904963% with heat rate 1857.832749 kcal/kWh. At 2-2-1 operation 46.7471454% efficiency with heat rate 1839.684525 kcal/kWh. Meanwhile, at 3-3-1 operation has obtained the highest efficiency, 47.2836565% with heat rate 1818.810268 kcal/kWh.

Key Word: Configuration, Efficiency, Heat Rate, PLTGU Block I