Energy Audit on Gas Turbin Power Plant

Case of Study in Indonesia Power Region Pesanggaran Unit 3

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Abstract

Energy Audit is a process for evaluating power plant according to energy uses and optimization to increase the efficiency of power plant and minimize losses occurs. This energy auditing is done to gas turbine power plant. Gas turbine power plant consists of compressor, combustion chamber, and gas turbine. The performance of this power plant is shown by thermal efficiency. During the process, the heat losses will affect the plant performance decreasing. Because of that, it’s really a must to do energy auditing to recalculating the plant performance and calculate the value of heat losses occurs, so the optimization can be found to increase the thermal efficiency.

Energy auditing is done according of thermodynamics analyze and Test Performance code Standard from ASME. The data of work condition of gas turbine power plant are available from operation data of gas turbine power plant region Pesanggaran unit 3, called log sheet. Those data are use to get
properties from work fluid on every component according to ASME PTC 22 standard. The losses from the cycle can be calculated according to ASME PTC 22 standard. Thermal efficiency can be calculated by actual Brayton cycle principle.

The results of this final project are thermal efficiency and heat losses from power plant. Minimum heat losses occur is 7,06139994 MW at December 22, 2011 and the maximum is 9,99759284 MW at December 28, 2011. The minimum thermal efficiency is 27,392% at December 12, 2011 and the maximum is 30,816% at December 29, 2011, and have the average of thermal efficiency is 29,34% at December 2011. Optimization done get a result that changing fuel to natural gas produce the biggest thermal efficiency, that is 35,74% followed by HFO 27,36% and MFO 25,26%. While optimization that change the load get conclusion that the bigger load given, the smaller heat losses occurs. But, notice that the efficiency thermal can’t be predicted by changing load. Because there’s a condition that the thermal efficiency reaches the maximum value, so if the load still added, the thermal efficiency will goes down.

Keywords : Energy auditing, ASME PTC 22, Brayton Cycle, Heat Loss, Thermal Efficiency