ABSTRAK

Parameter lingkungan dapat mempengaruhi performa kerja suatu mesin kalor. Analisis exergy merupakan sebuah metode analisis yang mengikut sertakan parameter lingkungan sebagai hitungan. Analisis exergy dapat menjabarkan seberapa besar laju kerusakan exergy dan seberapa besar efisiensi exergy pada mesin pembangkit listrik tersebut. Penelitian pada mesin PLTGU PT. INDONESIA POWER UNIT PEMBANGKITAN SEMARANG akan menganalisis pengaruh temperatur lingkungan antara 25°C hingga 35°C terhadap performa kerja mesin.

Nilai laju kerusakan exergy dihitung dari perbedaan nilai laju exergy input dan nilai laju exergy output sistem. Nilai laju exergy diperoleh dari pengukuran tekanan dan temperatur sistem serta temperatur dan tekanan lingkungan. Nilai efisiensi exergy diperoleh dari perbandingan antara nilai laju exergy output terhadap nilai laju exergy input. Efisiensi exergy sistem diperoleh dari perhitungan exergy pada kompresor, *combustion chamber*, turbin gas, HRSG, HP *transfer pump*, turbin uap, kondenser, dan *condensate pump*.

Berdasarkan penelitian pada mesin pembangkit listrik tersebut, efisiensi exergy mesin PLTGU memiliki nilai 41.3%. *Combustion chamber* berkontribusi besar terhadap laju kerusakan exergy yang nilainya 18.84% dari laju kerusakan exergy keseluruhan pada mesin PLTGU. Komponen yang memiliki nilai efisiensi exergy terendah terletak pada kondensor yang nilainya 57.59%. Analisis exergy dapat menjelaskan suatu letak laju kerusakan exergy terbesar dan nilai efisiensi exergy terendah pada suatu komponen mesin pembangkit listrik. Hal tersebut sangat membantu dalam modifikasi atau pengembangan mesin tersebut.

Kata kunci: exergy, laju kerusakan exergy, efisiensi exergy, PLTGU

ABSTRACT

Heat engine performance could be affected by its environmental parameters. Exergy analysis was a method that include the environmental parameters into performance calculation. Such calculation can explain the exergy destruction rate and the exergy efficiency of the engine. The research of environmental temperature influence to combined cycle power plant PT. INDONESIA POWER UNIT PEMBANGKITAN SEMARANG would have been done between 25°C to 35°C.

Exergy destruction rate can be calculated from the difference of input exergy rate and output exergy rate of system. Measurement were conducted on the system temperature and its pressure as well as the temperature and pressure of the environment. Exergy efficiency of system was calculated from the exergy components. They are compressors, combustion chambers, gas turbines, HRSGs, HP transfer pumps, steam turbine, condenser, and condensate pump.

Based on the research result, the exergy efficiency of combined cycle power plant was 41.3%. The research found out that the combustion chamber has been contributing 18.84% the exergy destruction rate of the overall exergy destruction rate on the power plant. Condenser was the component that had least exergy efficiency amongst all of the components which had the value 57.59%.While the exergy analysis can find the component which has the most exergy destruction rate and the minimum exergy efficiency, it would help to innovate the system or engine and the further research.

Keywords: exergy, exergy destruction rate, exergy efficiency, combined cycle