

## ABSTRAK

Jihan Azzahra Diovant. Analisis Pengaruh Variasi Beban Terhadap Efisiensi *Thermal Gas Turbine* Sebelum Dan Sesudah *Major Inspection* PLTG Priok Unit 4.2.

Dibimbing oleh Ir. Roswati Nur Hasanah, S.T., M.T.

*Gas Turbine* GT 4.2 pada PLTG Priok Blok 4 menjalani pemeliharaan periodik berupa *Major Inspection* untuk menjaga kinerja dan efisiensi unit. Penelitian ini bertujuan menganalisis perubahan performa turbin gas sebelum dan sesudah *Major Inspection* yang ditinjau dari efisiensi *thermal*, *heat rate*, *specific fuel consumption* (SFC), serta kinerja komponen utama menggunakan analisis *fishbone* dan *Sankey Diagram* pada variasi beban 181 MW, 211 MW, dan 250 MW. Hasil analisis menunjukkan bahwa efisiensi termal sebelum *Major Inspection* sebesar 29,67%, 30,43%, dan 31,59%, kemudian berubah menjadi 29,39%, 30,71%, dan 31,57% setelah *Major Inspection*. Nilai *heat rate* sebelum *Major Inspection* tercatat sebesar 2898,30 kCal/kWh, 2826,17 kCal/kWh, dan 2722,28 kCal/kWh, sedangkan setelah *Major Inspection* menjadi 2926,59 kCal/kWh, 2800,09 kCal/kWh, dan 2724,21 kCal/kWh. *Specific fuel consumption* sebelum *Major Inspection* sebesar 0,0115 mmbtu/kWh pada beban 181 MW, senilai 0,011215 mmbtu/kWh pada beban 211 MW dan 0,010803 mmbtu/kWh pada beban 250 MW, kemudian meningkat menjadi 0,0116 mmbtu/kWh, dan menurun menjadi 0,011111 mmbtu/kWh dan relatif stabil sebesar 0,010810 mmbtu/kWh setelah *Major Inspection*. Analisis *fishbone* menunjukkan bahwa kondisi kompresor, sistem pembakaran, dan turbin merupakan faktor dominan yang memengaruhi perubahan efisiensi, *heat rate*, dan SFC. Secara keseluruhan, *Major Inspection* terbukti meningkatkan kinerja *Gas Turbine* GT 4.2, terutama pada beban menengah dan tinggi.

**Kata kunci:** *Efisiensi Thermal*, *Gas Turbine*, *Major Inspection*, PLTG Priok, Variasi Beban

## **ABSTRACT**

Jihan Azzahra Diovant. *Analysis of the Effect of Load Variation on Gas Turbine Thermal Efficiency Before and After Major Inspection of Priok Gas Power Plant Unit*

4.2. *Supervised by Ir. Roswati Nur Hasanah, S.T., M.T.*

*Gas Turbine GT 4.2 at PLTG Priok Block 4 underwent periodic maintenance in the form of Major Inspection to maintain unit performance and efficiency. This study aims to analyze changes in gas turbine performance before and after Major Inspection in terms of thermal efficiency, heat rate, specific fuel consumption (SFC), and main component performance using fishbone analysis and Sankey Diagram at load variations of 181 MW, 211 MW, and 250 MW. The results of the analysis show that the thermal efficiency before Major Inspection was 29.67%, 30.43%, and 31.59%, then changed to 29.39%, 30.71%, and 31.57% after Major Inspection. The heat rate values before the Major Inspection were recorded at 2898.30 kCal/kWh, 2826.17 kCal/kWh, and 2722.28 kCal/kWh, while after the Major Inspection they were 2926.59 kCal/kWh, 2800.09 kCal/kWh, and 2724.21 kCal/kWh. Specific fuel consumption before Major Inspection was 0.0115 mmbtu/kWh at 181 MW load, 0.011215 mmbtu/kWh at 211 MW load and 0.010803 mmbtu/kWh at 250 MW load, then increased to 0.0116 mmbtu/kWh, and decreased to 0.011111 mmbtu/kWh and relatively stable at 0.010810 mmbtu/kWh after Major Inspection. Fishbone analysis shows that the condition of the compressor, combustion system, and turbine are the dominant factors influencing changes in efficiency, heat rate, and SFC. Overall, the Major Inspection has been shown to improve the performance of the Gas Turbine GT 4.2, especially at medium and high loads.*

**Keywords:** *Gas Turbine, Load Variation, Major Inspection, Priok Gas Power Plant, Thermal Efficiency*