

ABSTRAK

Bagus Harie Rachman. Pengaruh *Ambient* Temperatur Terhadap Efektivitas *Close Cooling Water Cooler Fan* Pada GT 2.2 di PT. PLN Indonesia Power UBP Priok.

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Keandalan operasional Pembangkit Listrik Tenaga Gas dan Uap (PLTGU) sangat bergantung pada efisiensi sistem pendingin untuk mencegah *overheating* pada peralatan vital pembangkit. Penelitian ini bertujuan menganalisis pengaruh fluktuasi temperatur *ambient* (T_{ci}) terhadap efektivitas kinerja *closed cooling water cooler fan* pada unit GT 2.2 di PT PLN Indonesia Power PLTGU UBP Priok. Metode penelitian menggunakan studi lapangan eksplanatori melalui pengamatan operasional langsung, studi literatur, serta wawancara teknis. Seluruh pengolahan data termodinamika dikerjakan menggunakan Microsoft Excel dengan pendekatan *Log Mean Temperature Differential* (LMTD) dan *Number of Transfer Units* (NTU). Hasil analisis menunjukkan bahwa peningkatan temperatur *ambient* dari 29,4 °C hingga 34,5 °C berdampak signifikan terhadap efektivitas pendinginan. Kinerja efektivitas tertinggi mampu dipertahankan oleh sistem pada angka 68% saat beroperasi pada kisaran suhu lingkungan 29,4 °C hingga 32 °C. Namun, ketika suhu lingkungan melonjak ke titik ekstrem 34,5 °C, persentase efektivitas menurun menjadi 67%, yang mengindikasikan keterbatasan kapasitas termal akibat menyempitnya selisih gaya pendorong (*driving force*) perpindahan panas ke atmosfer. Pada kondisi suhu luar tertinggi tersebut, sistem dituntut bekerja ekstra untuk membuang kalor, terbukti dari tercatatnya laju perpindahan panas maksimum (Q_{max}) tertinggi sebesar 660.445 W, meskipun tingkat efektivitas sistem secara keseluruhan melemah. Penelitian ini memberikan wawasan teknis mengenai batasan kinerja *closed cooling water cooler fan* GT 2.2 terhadap kondisi cuaca terik dan merekomendasikan eksplorasi penerapan teknologi modifikasi pendingin bantu serta optimalisasi strategi pemeliharaan terencana jangka panjang.

Kata Kunci : Pengaruh Temperatur *Ambient*, *Closed Cooling Water*, *Cooler Fan*, efektivitas, PLTGU UBP Priok.

ABSTRACT

Bagus Harie Rachman. The Effect of Influence Ambient Temperature on the Effectiveness of the Closed Cooling Water Cooler Fan at GT 2.2 in PT. PLN Indonesia Power UBP Priok. Supervised by Dr.Hendri, S.T., M.T.

The operational reliability of a Gas and Steam Turbine Power Plant (PLTGU) depends heavily on the efficiency of its cooling system to prevent overheating in critical generating equipment. This research aims to analyze the effect of ambient temperature (T_{ci}) fluctuations on the effectiveness of the closed cooling water cooler fan performance in Unit GT 2.2 at PT PLN Indonesia Power PLTGU UBP Priok. The research method employs an explanatory field study through direct operational observation, literature review, and technical interviews. All thermodynamic data processing was executed using Microsoft Excel by applying the Log Mean Temperature Differential (LMTD) and Number of Transfer Units (NTU) approaches. The analytical results demonstrate that an increase in ambient temperature from 29.4 °C to 34.5 °C significantly impacts cooling effectiveness. The system successfully maintained its highest effectiveness at 68% when operating within an ambient temperature range of 29.4 °C to 32 °C. However, when the ambient temperature surged to an extreme point of 34.5 °C, the effectiveness percentage declined to 67%, indicating a limitation in thermal capacity due to the narrowing driving force differential for heat transfer to the atmosphere. Under these highest external temperature conditions, the system was required to work harder to reject heat, as evidenced by the highest recorded maximum heat transfer rate (Q_{max}) of 660,445 W, despite the overall decline in system effectiveness. This study provides technical insights into the operational boundaries of closed cooling water cooler fans in GT 2.2 under hot weather conditions and recommends exploring auxiliary cooling modification technologies and optimizing long-term planned maintenance strategies.

Keywords : *Influence Ambient Temperature, Closed Cooling Water, Cooler Fan, Effectiveness, PLTGU UBP Priok.*