

ABSTRAK

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Judul Proyek Akhir : Analisis Kerugian Disposisi *Guide Vane*
Terhadap Efisiensi Turbin Unit 4 PLTA Tes

Pada penelitian ini berjudul “*Analisis Kerugian Disposisi Guide Vane Terhadap Efisiensi Turbin Unit 4 PLTA Tes*”. Penelitian ini bertujuan untuk mengevaluasi pengaruh disposisi *guide vane* pada Turbin Francis di PLTA Tes yang berlokasi di Kabupaten Lebong, Provinsi Bengkulu. Disposisi *guide vane* dapat menimbulkan berbagai dampak negatif, antara lain penurunan efisiensi turbin, peningkatan getaran melebihi ambang batas, serta kerugian finansial akibat hilangnya potensi energi listrik.

Metode yang diterapkan dalam penelitian ini mencakup pengukuran presisi terhadap posisi *guide vane*, observasi langsung terhadap kondisi lapangan, serta analisis data kinerja turbin yang diperoleh dari catatan operasi dan laporan pemeliharaan. Penelitian juga meninjau hasil energi yang hilang akibat disposisi serta membandingkannya dengan kondisi operasional normal untuk memperoleh gambaran menyeluruh mengenai kerugian yang ditimbulkan.

Hasil penelitian menunjukkan bahwa pada kondisi normal, Turbin Unit 4 mampu menghasilkan daya rata-rata sebesar 3.800 kW. Namun, saat terjadi disposisi *guide vane*, daya aktual turun drastis hingga mencapai 0 kW karena unit harus dihentikan untuk perbaikan. Disposisi tercatat terjadi sebanyak 12 kali, dengan setiap perbaikan berlangsung selama 30 menit, sehingga total kerugian energi dan finansial mencapai sekitar Rp 17,74 juta. Faktor penyebab utama disposisi adalah masuknya material asing akibat kerusakan trash rack, gangguan fungsi racking mesin, serta vibrasi berlebihan dengan nilai mencapai 12 mm/s, melebihi batas aman 8 mm/s. Dengan demikian, penelitian ini menegaskan bahwa disposisi *guide vane* tidak hanya menurunkan efisiensi turbin, tetapi juga berdampak langsung pada peningkatan risiko kerusakan serta kerugian finansial perusahaan.

Kata Kunci : Disposisi *Guide Vane*, Efisiensi Turbin, PLTA Tes, Kerugian Finansial, Turbin Francis.

ABSTRACT

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Tittle : *Analysis Of Guide Vane Disposition Loss On
Turbine Efficiency of Test Plta 4 Unit*

This study, entitled “Analysis of Guide Vane Disposition Losses on the Efficiency of Turbine Unit 4 at PLTA Tes”, aims to evaluate the impact of guide vane disposition on the Francis Turbine at PLTA Tes, located in Lebong Regency, Bengkulu Province. Guide vane disposition can lead to several adverse effects, including reduced turbine efficiency, excessive vibration beyond safe limits, and financial losses due to the loss of potential electrical energy production.

The methodology applied in this research includes precision measurement of the guide vane position, direct field observations, and analysis of turbine performance data obtained from operational records and maintenance reports. The study also evaluates the amount of energy loss caused by guide vane disposition and compares it with the normal operating condition to provide a comprehensive understanding of the resulting losses.

The findings show that under normal conditions, Turbine Unit 4 produces an average power output of 3,800 kW. However, during guide vane disposition, the actual output dropped to 0 kW because the unit had to be shut down for repair. A total of 12 disposition events were recorded, each requiring 30 minutes of repair time, resulting in an estimated energy and financial loss of approximately IDR 17.74 million. The main contributing factors to the guide vane disposition were the entry of foreign materials due to damage to the trash rack, malfunction of the racking system, and excessive vibration reaching 12 mm/s, which exceeded the safe threshold of 8 mm/s. Therefore, this study concludes that guide vane disposition not only decreases turbine efficiency but also directly increases the risk of mechanical damage and financial loss for the company.

Keywords: *Guide Vane Disposition, Turbine Efficiency, PLTA Tes, Financial Losses, Francis Turbine.*