

## **ABSTRAK**

Naufel Arief Noor

Analisis dan Implementasi Kendali Otomatis Coal Feeder PLC untuk Stabilitas

Pembakaran dan Efisiensi PLTU Tarjun

Dibimbing oleh Hasna Satya Dini, S.T., M.T

Penelitian ini bertujuan menganalisis dan mengimplementasikan sistem kendali otomatis coal feeder berbasis Programmable Logic Controller (PLC) untuk meningkatkan stabilitas pembakaran dan efisiensi operasi pada Unit PLTU Sewa ITP Tarjun. Rumusan masalah penelitian meliputi implementasi sistem PLC pada proses blending batu bara, kinerja sistem dalam menjaga kestabilan rasio pencampuran dan total flow secara real time, serta pengaruhnya terhadap efisiensi pembangkitan. Metode penelitian menggunakan pendekatan kuantitatif komparatif dengan membandingkan kondisi sebelum dan sesudah sistem otomatis berdasarkan perhitungan nilai kalor campuran, deviasi blending, stabilitas laju aliran, standar deviasi, dan heat rate. Hasil analisis menunjukkan nilai kalor campuran meningkat dari 5640 kcal/kg pada sistem manual menjadi 5795 kcal/kg setelah penerapan PLC sehingga mendekati target operasi. Deviasi rasio blending menurun dari 6,8 persen menjadi 2,1 persen, sedangkan standar deviasi aliran batu bara turun dari 3,25 ton per jam menjadi 1,12 ton per jam yang menunjukkan peningkatan stabilitas total flow. Selain itu, nilai heat rate membaik dari 2550 kcal/kWh menjadi 2430 kcal/kWh sehingga konsumsi bahan bakar lebih efisien dan stabilitas pembakaran meningkat. Berdasarkan hasil tersebut, sistem kendali otomatis coal feeder berbasis PLC terbukti efektif meningkatkan akurasi blending, efisiensi energi, dan keandalan operasi pembangkit.

**Kata Kunci** : coal feeder, PLC, blending batu bara, stabilitas pembakaran, heat rate.

## **ABSTRACT**

NAUFEL ARIEF NOOR

*Analysis and Implementation of PLC Coal Feeder Automatic Control for Combustion Stability and Efficiency at Tarjun Power Plant Unit.*

*SUPERVISED BY HASNA SATYA DINI, S.T.,M.T*

*This study aims to analyze and implement a Programmable Logic Controller (PLC)- based automatic coal feeder control system to improve combustion stability and operational efficiency at the Sewa ITP Tarjun Steam Power Plant Unit. The research problems include the implementation of a PLC-based control system in the coal blending process, system performance in maintaining blending ratio and total fuel flow stability in real time, and its impact on power plant efficiency. The research method uses a quantitative and comparative approach by comparing operational conditions before and after the automatic system based on calculations of mixed calorific value, blending deviation, flow stability, standard deviation, and heat rate. The results show that the mixed calorific value increased from 5640 kcal/kg in the manual system to 5795 kcal/kg after PLC implementation, approaching the operational target. Blending ratio deviation decreased from 6.8 percent to 2.1 percent, while the standard deviation of coal flow decreased from 3.25 tons per hour to 1.12 tons per hour, indicating improved total flow stability. In addition, the heat rate improved from 2550 kcal/kWh to 2430 kcal/kWh, resulting in more efficient fuel consumption and better combustion stability. It can be concluded that the PLC-based automatic coal feeder control system effectively enhances blending accuracy, energy efficiency, and power plant operational reliability.*

**Keywords:** *coal feeder, PLC, coal blending, combustion stability, heat rate.*