ABSTRAK

ANALISIS DISTRIBUSI TEMPERATUR PADA ISOLATOR PORSELIN 20 KV TERPOLUSI ABU BATUBARA MENGGUNAKAN *THERMAL IMAGING* DI PT BEST TANJUNG ENIM

(2026 : xv + 62 halaman + 17 Gambar + 9 Tabel + Lampiran)

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Penelitian ini bertujuan menganalisis distribusi temperatur pada isolator porselin 20 kV yang terpolusi abu batubara menggunakan *thermal imaging* di PT BEST Tanjung Enim. Isolator yang berada di lingkungan sekitar PLTU rentan terhadap kontaminasi *fly ash* yang dapat membentuk lapisan semi-konduktif, memicu arus bocor, dan mempercepat degradasi isolator. Pengambilan data dilakukan selama tujuh hari pada bulan Mei 2026 sebanyak tiga kali sehari (pagi, siang, sore) menggunakan kamera *thermal infrared* SKF TKTI 31. Citra thermal diolah dengan MATLAB untuk visualisasi *heatmap*, dan metode *Convolutional Neural Network* (CNN) diterapkan untuk mengklasifikasikan pola distribusi temperatur. Hasil menunjukkan distribusi temperatur yang relatif merata tanpa *hotspot* termal signifikan, dengan rentang temperatur 28,5°C–41,4°C dan ΔT antara 3,8°C–8,3°C. CNN berbasis citra thermal asli mencapai akurasi 100%, jauh lebih baik dibandingkan berbasis *heatmap* yang hanya 33,33%, sehingga *thermal imaging* dikombinasikan CNN terbukti efektif sebagai teknik inspeksi isolator secara non-kontak.

Kata kunci: isolator, *thermal imaging*, CNN, MATLAB.

ABSTRACT

TEMPERATURE DISTRIBUTION ANALYSIS ON COAL ASH-POLLUTED 20 KV PORCELAIN INSULATORS USING THERMAL IMAGING AT PT BEST TANJUNG ENIM

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This study aims to analyze the temperature distribution of coal ash-polluted 20 kV porcelain insulators using thermal imaging at PT BEST Tanjung Enim. Insulators near coal-fired power plants are susceptible to fly ash contamination, which forms a semi-conductive layer that triggers leakage current and accelerates insulator degradation. Data were collected over seven days in May 2026 with three daily measurement sessions (morning, noon, afternoon) using an SKF TKTI 31 infrared thermal camera. Thermal images were processed in MATLAB to generate heatmap visualizations, and a Convolutional Neural Network (CNN) was applied to classify temperature distribution patterns. Results show a relatively uniform temperature distribution with no significant thermal hotspots, with insulator temperatures ranging from 28.5°C to 41.4°C and ΔT values between 3.8°C and 8.3°C. CNN classification using original thermal images achieved 100% accuracy, significantly outperforming the heatmap-based approach at 33.33%, confirming that thermal imaging combined with CNN is an effective non-contact inspection technique for insulator condition monitoring.

Keywords: *insulator, thermal imaging, CNN, MATLAB***.**