

ABSTRAK

ANALISIS EKSPERIMENTAL SIFAT MEKANIS ASTM A532 PADA *HAMMER CRUSHER* BATUBARA PLTU TANJUNG ENIM 3 X 10 MW

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Hammer crusher merupakan komponen vital dalam sistem penyiapan bahan bakar batubara di PLTU, yang berfungsi menghancurkan batubara hingga ukuran partikel tertentu agar efisiensi pembakaran di dalam *boiler* dapat meningkat. Material ASTM A532, yang tergolong dalam besi tuang putih paduan tinggi, dipilih karena memiliki kekerasan dan ketahanan aus yang tinggi. Namun, kondisi kerja yang ekstrem tetap menyebabkan keausan dan penurunan performa pada material ini. Penelitian ini bertujuan untuk menganalisis pengaruh perlakuan panas terhadap sifat mekanis material ASTM A532, khususnya melalui uji kekerasan *Vickers* dan uji ketangguhan menggunakan metode *impact Charpy*. Sampel diuji dalam tiga kondisi: tanpa perlakuan panas, dengan *hardening* pada suhu 850°C diikuti *quenching* menggunakan media air, serta *quenching* dengan silikon oil. Hasil penelitian menunjukkan bahwa perlakuan panas secara signifikan meningkatkan kekerasan material. Sampel yang mengalami *quenching* dengan air menunjukkan nilai kekerasan tertinggi dibandingkan silikon oil maupun tanpa perlakuan. Sementara itu, hasil uji *impact* menunjukkan bahwa media silikon oil menghasilkan ketangguhan material yang lebih baik dibandingkan air. Analisis statistik ANOVA dan uji Beda Nyata Terkecil (BNT) menunjukkan perbedaan yang signifikan antar perlakuan. Dengan demikian, proses *heat treatment* dengan parameter yang tepat dapat meningkatkan performa dan umur pakai *hammer crusher*, serta memberikan rekomendasi teknis terhadap optimasi perlakuan material dalam aplikasi industri berat.

Kata Kunci: ASTM A532, *hammer crusher*, *heat treatment*, *quenching*, kekerasan, *impact Charpy*.

ABSTRACT

EXPERIMENTAL ANALYSIS OF THE MECHANICAL PROPERTIES OF ASTM A532 ON A COAL HAMMER CRUSHER AT TANJUNG ENIM 3 X 10 MW POWER PLANT

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The hammer crusher is a vital component in the coal fuel preparation system of a steam power plant (PLTU), functioning to crush coal into smaller particles to optimize combustion efficiency in the boiler. ASTM A532, a high-alloy white cast iron, is widely used due to its excellent hardness and wear resistance. However, extreme operating conditions still lead to wear and performance degradation of this material. This study aims to analyze the effect of heat treatment on the mechanical properties of ASTM A532 material through Vickers hardness testing and Charpy impact testing. Specimens were tested under three conditions: without heat treatment, with hardening at 850°C followed by quenching in water, and quenching in silicone oil. The results showed that heat treatment significantly increased the material's hardness. Samples quenched in water exhibited the highest hardness values compared to those quenched in silicone oil or untreated samples. Meanwhile, impact testing results indicated that quenching with silicone oil produced better toughness than water. Statistical analysis using ANOVA and the Least Significant Difference (LSD) test confirmed significant differences among the treatments. Therefore, proper heat treatment can enhance the performance and service life of hammer crushers and provide technical recommendations for material optimization in heavy-duty industrial applications.

Keywords: ASTM A532, hammer crusher, heat treatment, quenching, hardness, Charpy impact.