

ABSTRAK

ANALISIS SIFAT MEKANIS *HAMMER* PADA MESIN *LIMESTONE CRUSHER* DI PT SEMEN BATURAJA TBK

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2025: xvi + 40 Halaman, 15 Gambar, 9 Tabel, 5 Lampiran

Hammer pada mesin *limestone crusher* di PT Semen Baturaja Tbk adalah komponen utama penghancur batu kapur, namun sering mengalami kegagalan seperti keausan akibat beban benturan dan gesekan tinggi. Kegagalan ini berdampak pada penurunan efisiensi kerja dan peningkatan biaya penggantian. Material *hammer* yang dianalisis adalah baja mangan cor standar ASTM A128 Grade B2, yang dipilih karena kemampuannya untuk mengalami pengerasan kerja. Penelitian ini bertujuan untuk menganalisis secara komprehensif sifat mekanis material *hammer* tersebut, meliputi komposisi kimia, kekerasan, dan ketangguhan impak, serta pengaruh perlakuan panas (*heat treatment*) untuk meningkatkan kekerasannya. Metode penelitian yang digunakan bersifat eksperimental di laboratorium. Spesimen diuji komposisi kimianya menggunakan *Optical Emission Spectrometry*. Selanjutnya, dilakukan pengujian kekerasan *Vickers* pada tiga variasi: spesimen asli (tanpa perlakuan panas), spesimen yang di-*hardening* pada suhu 850°C lalu di-*quenching* dengan media air, dan dengan media *silicon oil*. Pengujian impak *Charpy* juga dilakukan pada material asli. Hasil pengujian menunjukkan material ini merupakan baja karbon tinggi (1,18% C) dan baja mangan tinggi (15,47% Mn). Uji kekerasan menunjukkan peningkatan signifikan dari kondisi asli (rata-rata 262 VHN). *Quenching* dengan *silicon oil* menaikkan kekerasan menjadi 320 VHN, sementara *quenching* air menghasilkan kekerasan tertinggi (348 VHN) karena laju pendinginannya lebih cepat. Uji impak pada material asli menunjukkan energi serap rata-rata 14,82 J. Berdasarkan analisis data, disimpulkan bahwa perlakuan panas *hardening* dengan *quenching* air adalah metode paling efektif untuk meningkatkan kekerasan material *hammer*, yang berpotensi besar meningkatkan ketahanan aus dan memperpanjang umur pakai komponen.

Kata Kunci: *Hammer Crusher*, Sifat Mekanis, Baja Mangan, Perlakuan Panas (*Heat Treatment*), Kekerasan *Vickers*.

ABSTRACT

ANALYSIS OF HAMMER MECHANICAL PROPERTIES ON LIMESTONE CRUSHER MACHINE AT PT SEMEN BATURAJA TBK

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The hammer in the limestone crusher machine at PT Semen Baturaja Tbk is a primary component for crushing limestone, but it often experiences failures such as wear due to high impact loads and friction. These failures lead to a decrease in operational efficiency and an increase in replacement costs. The hammer material analyzed is standard cast manganese steel, ASTM A128 Grade B2, selected for its work-hardening capabilities. This research aims to comprehensively analyze the mechanical properties of the hammer material, including its chemical composition, hardness, and impact toughness, as well as the effect of heat treatment to increase its hardness. The research method used is experimental and conducted in a laboratory. The specimen's chemical composition was tested using Optical Emission Spectrometry. Subsequently, Vickers hardness testing was performed on three variations: the original specimen (without heat treatment), a specimen hardened at a temperature of 850°C and then quenched in water, and another quenched in silicon oil. Charpy impact testing was also conducted on the original material. The test results show that the material is a high-carbon (1.18% C) and high-manganese (15.47% Mn) steel. The hardness test indicated a significant increase from the original condition (average of 262 VHN). Quenching with silicon oil increased the hardness to 320 VHN, while water quenching yielded the highest hardness at 348 VHN due to its faster cooling rate. The impact test on the original material showed an average absorbed energy of 14.82 J. Based on the data analysis, it is concluded that heat treatment by hardening with water quenching is the most effective method for increasing the hammer material's hardness, which has great potential to improve wear resistance and extend the component's service life.

Keywords: Hammer Crusher, Mechanical Properties, Manganese Steel, Heat Treatment, Vickers Hardness.