

PENGARUH PERLAKUAN PANAS TERHADAP LAJU KEAUSAN EROSI BAJA SKD11

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ABSTRAK

Keausan erosi menjadi salah satu penyebab utama penurunan kinerja komponen industri, sehingga diperlukan upaya peningkatan ketahanan material melalui perlakuan panas. Penelitian ini dilakukan untuk mengetahui pengaruh perlakuan panas terhadap ketahanan erosi baja SKD11 dengan membandingkan kondisi *as-cast*, *quenching*, *normalizing*, dan *annealing*. Metode penelitian meliputi proses perlakuan panas berupa *quenching* dengan media pendinginan oli, *normalizing*, dan *annealing* pada suhu 1000°C dengan waktu tahan 1 jam. Spesimen diuji menggunakan metode Pengujian kekerasan *Vickers* untuk mengukur kekerasan, *sand blasting* pada sudut tumbukan 30° dengan tekanan *nozzle* 0,49 MPa menggunakan pasir silika (SiO₂) untuk menentukan laju erosi, serta SEM-EDS dan XRD untuk mengamati perubahan mikrostruktur. Hasil penelitian menunjukkan bahwa kondisi *quenching* menghasilkan kekerasan tertinggi dan laju erosi terendah akibat terbentuknya struktur *martensite* dengan distribusi karbida yang homogen. Kondisi *annealing* memiliki kekerasan paling rendah didominasi matriks γ -*austenite*, sedangkan *normalizing* memberikan hasil menengah dengan keseimbangan sifat mekanik. Adapun kondisi *as-cast* menunjukkan kekerasan lebih rendah dibanding *quenching* namun lebih tinggi dari *annealing*, dengan ketahanan erosi yang relatif lebih rendah akibat matriks *austenite* dan *eutectic carbide*. Kesimpulannya, perlakuan *quenching* terbukti paling efektif dalam meningkatkan ketahanan erosi baja SKD11.

Kata Kunci: Baja SKD11, Perlakuan Panas, Mikrostruktur, Kekerasan, dan Keausan Erosi

THE EFFECT OF HEAT TREATMENT ON THE EROSIVE WEAR RATE OF SKD11 STEEL

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ABSTRACT

Erosive wear is one of the main causes of performance degradation in industrial components; therefore, efforts to improve material resistance through heat treatment are necessary. This study aims to investigate the effect of heat treatment on the erosion resistance of SKD11 steel by comparing as-cast, quenching, normalizing, and annealing conditions. The heat treatment was carried out at 1000°C for 1 hour, followed by oil quenching, normalizing, and annealing processes. The specimens were tested using the Vickers hardness test to measure hardness, sand blasting at a 30° impact angle with 0.49 MPa nozzle pressure using silica sand (SiO₂) to determine erosion rate, and further analyzed by SEM-EDS and XRD to observe microstructural changes. The results showed that the quenched condition produced the highest hardness and the lowest erosion rate due to the formation of martensite structure with homogeneous carbide distribution. The annealed condition exhibited the lowest hardness dominated by γ -austenite matrix, while normalizing resulted in intermediate values with a balanced mechanical property profile. Meanwhile, the as-cast condition showed lower hardness than quenching but higher than annealing, with relatively reduced erosion resistance due to austenitic matrix and eutectic carbides. In conclusion, quenching proved to be the most effective treatment in improving the erosion resistance of SKD11 steel.

Keywords: *SKD11 Steel, Heat Treatment, Microstructure, Hardness, and Erosive Wear*