KARAKTERISASI KEAUSAN EROSI BAJA SKD11 SETELAH PROSES *QUENCHING* DAN *TEMPERING*

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ABSTRAK

Keausan erosi menurunkan kinerja komponen industri sehingga perlu peningkatan ketahanan material melalui perlakuan panas. Penelitian ini bertujuan untuk menganalisis pengaruh proses *quenching* dan *tempering* terhadap mikrostruktur, kekerasan, serta ketahanan erosi baja SKD11. Spesimen penelitian dibuat dengan dimensi 50 mm × 50 mm × 10 mm, kemudian diproses melalui *austenisasi* pada suhu 1000°C selama 1 jam, dilanjutkan proses *quenching* menggunakan media oli, serta proses *tempering* dengan variasi suhu 300°C, 350°C, 400°C, 450°C, dan 500°C selama 1 jam. Analisis mikrostruktur dan morfologi permukaan dilakukan menggunakan *Optical Microscope* dan SEM-EDS serta XRD. Uji kekerasan menggunakan metode *Vickers*, sedangkan uji erosi dilakukan dengan *sand blasting* pada sudut tumbukan 30°, 60°, dan 90°. Hasil penelitian menunjukkan bahwa spesimen *as-cast* memiliki kekerasan terrendah dan ulet. Proses *quenching* memiliki kekerasan tertinggi, namun cenderung getas. Proses *quenching tempering* mampu menurunkan kegetasan. Suhu tempering 400°C menghasilkan kekerasan optimum, sedangkan kenaikan suhu hingga 500°C menurunkan kekerasan. Uji erosi memperlihatkan bahwa laju erosi kondisi *as-cast* lebih tinggi dibandingkan *quenching* dan *quenching tempering*, dengan nilai tertinggi pada sudut 30°. Analisis SEM menunjukkan mekanisme keausan dominan berupa *micro cutting*. Secara keseluruhan, kombinasi *quenching tempering* pada suhu 400°C memberikan performa terbaik antara mikrostruktur, kekerasan, dan ketahanan erosi.

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

CHARACTERIZATION OF EROSIVE WEAR OF SKD11 STEEL AFTER QUENCHING AND TEMPERING PROCESSES

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ABSTRACT

Erosive wear reduces the performance of industrial components; therefore, improving material resistance through heat treatment is required. This study aims to analyze the effect of quenching and tempering processes on the microstructure, hardness, and erosive wear resistance of SKD11 steel. The specimens were prepared with dimensions of 50 mm × 50 mm × 10 mm, then subjected to austenitizing at 1000°C for 1 hour, followed by quenching in oil, and tempering at 300°C, 350°C, 400°C, 450°C, and 500°C for 1 hour. Microstructural and surface morphology analyses were carried out using an Optical Microscope, SEM-EDS, and XRD. Hardness tests were conducted using the Vickers method, while erosive wear tests were performed using sand blasting at impact angles of 30°, 60°, and 90°. The results show that the as-cast specimen exhibited the lowest hardness with ductile behavior. The quenched specimen had the highest hardness but tended to be brittle. The quenching–tempering process reduced brittleness, with tempering at 400°C producing optimum hardness, while increasing the tempering temperature to 500°C decreased hardness. Erosion tests revealed that the as-cast specimen experienced a higher wear rate compared to quenched and quenched–tempered specimens, with the highest erosion occurring at a 30° impact angle. SEM analysis indicated that the dominant wear mechanism was micro-cutting. Overall, quenching–tempering at 400°C provided the best balance of microstructure, hardness, and erosive wear resistance.

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