

INTISARI

Analisis Kekerasan, Keausan, dan Struktur Mikro *Track Roller Genuine* dan *Non-Genuine* Pada Unit *Excavator* Kapasitas 20 Ton

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Penelitian ini menilai kualitas *track roller* pada *undercarriage excavator* dengan membandingkan sifat mekanik dari *genuine*, *non-genuine*, dan *non-genuine* setelah perlakuan panas. Pengujian yang dilakukan meliputi uji komposisi kimia (*Thermo ARL 3560 OES*), uji kekerasan *Vickers* (*ASTM E92*), uji keausan dengan mesin *Ogoshi* (*Type OAT-U*), serta pengamatan struktur mikro menggunakan mikroskop metalografi dengan etsa nital 2,5%. Perlakuan panas pada spesimen *non-genuine* dilakukan dengan austenisasi 900°C selama 30 menit, *quenching* air, dan *tempering* 200/300/400°C selama 2 jam. Hasil menunjukkan adanya sedikit perbedaan komposisi kimia antara kedua jenis *track roller*. Kekerasan *non-genuine* meningkat signifikan setelah perlakuan panas, dengan nilai tertinggi 518,17 HVN pada *tempering* 200°C. Laju keausan terendah juga pada perlakuan *tempering* 200°C $2,17 \times 10^{-5} \text{ mm}^3/\text{kg.m}$. Struktur mikro mengindikasikan transformasi *martensite* hasil *quenching* menjadi *tempered martensite*, selaras dengan peningkatan kekerasan dan ketahanan aus. Estimasi umur pakai memperlihatkan *lifetime non-genuine* berperlakuan panas lebih panjang yaitu meningkat 137% dibanding kondisi awal.

Kata kunci: *Track Roller*, *Excavator*, Perlakuan Panas, Kekerasan *Vickers*, Keausan *Ogoshi*, Struktur Mikro.

ABSTRACT

Analysis of Hardness, Wear, and Microstructure of Genuine and Non-Genuine Track Rollers on 20 Ton Excavator Units

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This study assesses the quality of excavator track rollers in the undercarriage by comparing the mechanical properties of genuine, non-genuine, and heat-treated non-genuine parts. The tests include chemical composition (Thermo ARL 3560 OES), Vickers hardness (ASTM E92), wear testing using the Ogoshi machine (Type OAT-U), and microstructural observation with a metallographic microscope using 2.5% nital etching.). Heat treatment of the non-genuine specimens involved austenitizing at 900°C for 30 min, water quenching, and tempering at 200/300/400 °C for 2 hours. Results indicate minor differences in chemical composition between the two roller types. The non-genuine material exhibited a significant hardness increase after heat treatment, achieving a maximum of 518.17 HVN at 200°C tempering. The lowest wear rate was also obtained at 200°C, namely $2,17 \times 10^{-5} \text{ mm}^3/\text{kg.m}$. Microstructural observations indicate transformation of as-quenched martensite into tempered martensite, consistent with the observed increases in hardness and wear resistance. Service-life estimation shows that heat-treated non-genuine rollers have a longer lifetime an increase of approximately 137% compared with the as-received condition.

Keywords: *Track Roller, Excavator, Heat Treatment, Vickers Hardness, Ogoshi Wear Test, Microstructure.*