

ABSTRACT

Bucket teeth are the first component on an excavator that comes into direct contact with the work material. Bucket teeth will receive high impact and vibration loads. The material that makes up bucket teeth must have high hardness, wear resistance and ductility.

PT Baja Kurnia in Klaten Central Java produces excavator bucket teeth with the main constituent composition of 16,85% manganese steel (Mn). Manganese steel is a material that has high hardness and ductility. Manganese steel bucket teeth experience material failure, namely breaking and wearing out during use. Improving the physical and mechanical properties of manganese steel is carried out by providing heat treatment. The heat treatment given is in the form of annealing, normalizing, quenching, and quenching-tempering. Tests for hardness (Vickers), wear resistance (Ogoshi), and microstructure analysis are carried out on the material after heat treatment. Research was conducted to determine the most optimal heat treatment to improve the physical and mechanical properties of manganese steel material.

Material test results show that manganese steel specimens with optimal annealing heat treatment improve physical and mechanical properties compared to as-cast manganese steel materials or other heat treatments. The hardness and wear resistance values of the material are (358,8 VHN) and ($51 \times 10^{-6} \text{ mm}^3/\text{kg.m}$)

Keywords : Manganese Steel, Bucket Teeth, Heat Treatment, Material Testing

INTISARI

Bucket teeth merupakan komponen pertama pada *excavator* yang besentuhan langsung dengan material kerja. *Bucket teeth* akan menerima pembebanan impak dan vibrasi yang tinggi. Material penyusun *bucket teeth* harus memiliki sifat kekerasan, ketahanan aus dan keuletan tinggi.

PT Baja Kurnia di Klaten Jawa Tengah memproduksi *bucket teeth excavator* dengan komposisi penyusun utama *manganese steel* (Mn) 16,85%. Baja mangan merupakan salah satu material yang memiliki sifat keras dan keuletan yang tinggi. *Bucket teeth manganese steel* mengalami kegagalan material yaitu patah serta aus pada saat digunakan. Peningkatan sifat fisik dan mekanik *manganese steel* dilakukan dengan memberi perlakuan panas (*heat treatment*). Perlakuan panas yang diberikan berupa *annealing*, *normalizing*, *quenching*, dan *quenching-tempering*. Pengujian kekerasan (*Vickers*), ketahanan aus (*Ogoshi*), serta analisa struktur mikro dilakukan pada material setelah diberi perlakuan panas. Penelitian dilakukan untuk mengetahui perlakuan panas yang paling optimal meningkatkan sifat fisik dan mekanik material baja mangan.

Hasil pengujian material menunjukkan bahwa spesimen baja mangan dengan perlakuan panas *annealing* optimal meningkatkan sifat fisik dan mekanik dibandingkan material baja mangan *as-cast* maupun perlakuan panas lain. Nilai kekerasan dan ketahanan aus pada material yaitu (358,8 VHN) dan (51×10^{-6} mm³/kg.m)

Kata Kunci : Baja Mangan, Perlakuan Panas, Ketahanan Aus, Pengujian Material