Pengaruh proses perlakuan panas terhadap sifat mekanik dan struktur mikro roda kereta api buatan lokal = Effect of heat treatment process on the mechanical properties and microstructure of locally-made railway wheels

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Abstrak

In order to reduce the dependency on imported products of railway wheels, efforts have been made to produce it in the country. The manufacture of railway wheels is done through a casting process of raw materials originated from used railway wheels. The results of the casting process requires heat treatment processes to improve the mechanical properties in accordance with the standards. This study has begun with the manufacture of test specimens for chemical composition, tensile strength, hardness and microstructure. It is followed by heat treatment processes namely normalizing, flame hardening and tempering. The normalizing process, at a temperature of 850°C with a holding time of 2 hours followed by cooling in the air, has resulted in tensile strength of 906.1 MPa and hardness of 24 HRC. The flame hardening process at a temperature of 800°C with a holding time of 60 seconds followed by water quenching has resulted in hardness of 57.33 HRC. The tempering process at a temperature of 500°C with a holding time of one hour followed by cooling in the air, has resulted in a final surface hardness of 34 to 37 HRC that complies with the railway standard with effective depth of hardening of 10 mm.
<hr>Dalam rangka untuk mengurangi ketergantungan terhadap produk impor roda kereta api, maka telah dilakukan usaha untuk membuatnya di dalam negeri. Usaha pembuatan roda kereta api dilakukan melalui proses pengecoran dengan bahan baku dari roda kereta api bekas. Hasil dari proses pengecoran tersebut memerlukan proses perlakuan panas untuk mendapatkan sifat mekanik yang sesuai dengan standar. Penelitian ini diawali dengan pembuatan spesimen untuk pengujian komposisi kimia, kekuatan tarik, kekerasan dan struktur mikro. Selanjutnya dilakukan proses perlakuan panas berupa normalizing, flame hardening dan tempering. Proses normalizing dilakukan pada temperatur 850°C, waktu penahanan selama 2 (dua) jam dan didinginkan di udara menghasilkan kekuatan tarik sebesar 906.1 MPa dan kekerasan 24 HRC. Proses flame hardening pada temperatur 800°C, waktu penahanan 60 detik dengan media pendingin air menghasilkan kekerasan permukaan sebesar 58.35 HRC. Proses tempering pada temperatur 500°C, waktu penahanan selama 1 (satu) jam menghasilkan kekerasan antara 34-37 HRC dengan kedalaman pengerasan efektif sebesar 10 mm.