ABSTRAK

Gear sprocket merupakan salah satu komponen penggerak roda yang berfungsi sebagai pemindah daya. *Gear sprocket* umumnya menggunakan material jenis baja karbon rendah, salah satunya baja AISI 1020. Tugas akhir ini bertujuan untuk menginvestigasi pengaruh proses pengerasan *quecching* terhadap karakteristik kekerasan baja AISI 1020. Proses *quenching* menerapkan variasi temperatur pemanasan 850 °C dan 900 °C, masing-masing dengan *holding time* 50 menit. Proses pendinginan dilakukan melalui dua cara yaitu dengan dan tanpa agitasi. Setelah proses *quenching,* proses perlakuan panas *tempering* dilakukan pada temperatur 500 °C dengan *holding time* 50 menit untuk masing-masing spesimen. Hasil pengujian kekerasan Vickers menunjukan bahwa variasi metode *quenching* agitasi-*tempering* memberikan pengaruh signifikan terhadap peningkatan kekerasan baja AISI 1020. Nilai kekerasan tertinggi 217,0 HV pada perlakuan *quenching* agitasi 900 °C dan *tempering* 500 °C. Nilai kekerasan terendah 182,1 HV pada perlakuan *quenching* 850 °C dan *tempering* 500 °C. Pada pengujian *metallography*, distribusi fase yang halus dan merata pada spesimen *quenching* agitasi-*tempering*. Adanya fase *tempered martensite*, *ferrite*, dan *pearlite* menunjukkan peningkatan kekerasan dan keuletan pada baja AISI 1020. Metode *quenching* agitasi-*tempering* terbukti meningkatkan kekerasan baja serta memberikan solusi dalam pengembangan metode *quenching* yang lebih efektif.

Kata kunci: baja AISI 1020, *quenching*, *tempering*, Vickers, *metallography*

ABSTRACT

Gear sprockets are one of the wheel drive components that function as power transmitters. Gear sprockets generally use low carbon steel materials, one of which is AISI 1020 steel. This final project aims to investigate the effect of the quenching hardening process on the hardness characteristics of AISI 1020 steel. The quenching process involves heating temperatures of 850 °C and 900 °C, each with a holding time of 50 minutes. The cooling process was carried out in two ways: with and without agitation. After the quenching process, the tempering heat treatment was performed at a temperature of 500 °C with a holding time of 50 minutes for each specimen. The Vickers hardness test results showed that variations in the quenching-agitation-tempering method significantly influenced the increase in the hardness of AISI 1020 steel. The highest hardness value of 217.0 HV was obtained in the 900 °C agitated quenching and 500 °C tempering treatment. The lowest hardness value of 182.1 HV was obtained in the 850 °C quenching and 500 °C tempering treatment. In metallographic testing, the specimens treated with agitated quenching and tempering exhibited a fine and uniform phase distribution. The presence of tempered martensite, ferrite, and pearlite phases indicated an increase in hardness and toughness in AISI 1020 steel. The agitated quenching-tempering method was proven to enhance steel hardness and provide a solution for developing more effective quenching methods.

Keywords: AISI 1020 steel, quenching, tempering, Vickers, metallography