

Pengaruh Variasi Media *Quenching* pada Proses Austenisasi dan *Tempering* Terhadap Kekerasan dan Struktur Mikro Besi Cor Nodular (FCD 500)

Abstrak

Penelitian ini dilakukan untuk mengetahui pengaruh *heat treatment* dengan variasi media *quenching* air, air garam, dan air oli serta pengaruh *tempering* setelah *quenching* terhadap kekerasan dan struktur mikro pada besi cor nodular. Proses perlakuan panas diawali dengan austenisasi pada temperatur 900°C selama 60 menit kemudian di-*quenching* dengan variasi 100% air, air garam (25% garam), dan campuran 80 air : 20 oli dan dilanjutkan *tempering* 400°C selama 120 menit.

Dari hasil penelitian menunjukkan variasi media *quenching* berpengaruh terhadap nilai kekerasan dan struktur mikro. Pada struktur mikro spesimen yang di-*quenching* air garam menunjukkan grafit nodul dan banyaknya martensit yang tajam dan tegas terbentuk sehingga memiliki nilai kekerasan rata-rata paling tinggi dengan nilai 556 HB. Media *quenching* air dan *quenching* campuran air oli memiliki struktur mikro yang hampir mirip dengan menunjukkan grafit nodul, martensit, perlit, dan ferit namun memiliki nilai kekerasan rata-rata yang berbeda 545 HB dan 477 HB. Proses *tempering* mengakibatkan terurainya martensit sehingga struktur mikronya berubah dan lebih didominasi perlit dan ferit menjadikan nilai kekerasan menurun. Nilai kekerasan rata-rata media *quenching* air garam 453 HB, *quenching* media air 445 HB, dan *quenching* campuran air oli 392 HB setelah menerima proses *tempering*.

Kata kunci: besi cor, *quenching*, *tempering*, kekerasan, struktur mikro.

The Effect of Quenching Media Variations in Austenization Process and Tempering on Hardness and Micro Structure of Ductile Cast Iron (FCD 500)

ABSTRACT

This research was conducted to identify the effect of heat treatment with the variety of quenching media such as: water, brine, and mixture water oil and the effect of tempering after quenching for hardness value and micro structure of ductile cast iron. Heat treatment began with austenization at 900°C with a holding time of 60 minutes then quenched with variety of 100 % water, brine (25% salt), and mixture 80 water : 20 oil, followed by tempering at 400°C with a holding time of 120 minutes.

The research showed that on micro structure test samples that was quenched with brine showed grafit nodules, sharp martensite and resolute shape with 556 HB average of hardness value. Samples that was quenched with water and water oil mixture had almost the same micro structure that showed grafit nodules, martensite, pearlite, and ferrite but had a different hardness value for 545 HB and 477 HB. Tempering process changed the sample's micro structure from martensite to pearlite and ferrite, it also decreased the hardness value. Hardness value from tempering process for samples that used brine as the quench media was 453 HB, sample that use water was 445 HB, and sample that use water oil mixture was 392 HB.

Keywords: *cast iron, quenching, tempering, hardness, micro structure*

