

ABSTRAK

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Severe plastic deformation (SPD) adalah metode yang digunakan untuk memperoleh baja dengan sifat mekanis yang baik tanpa penambahan microalloyed. Perubahan struktur mikro setelah SPD akan meningkatkan sifat mekanis material dengan penghalusan ukuran butir.

Pada penelitian ini digunakan baja karbon AISI 1010 yang di proses menggunakan metode *Thermo-Mechanical Control Process* (TMCP) dengan pemanasan awal hingga 1100 °C dan pengerolan pada temperatur 650 °C dengan variasi deformasi *double pass rolling* dan pendinginan udara.

Pengamatan struktur mikro menggunakan teknik metalografi dengan etsa nital 2% dan 5%. Pengukuran ukuran butir dengan metode Jeffries sesuai ASTM E-112-96 dan uji kekerasan dengan metode Vickers. Uji korosi menggunakan metode polarisasi dalam larutan NaCl 3,5% sesuai ASTM G5 dan *hydrogen charging test*. Tujuan dari penelitian ini adalah untuk mempelajari struktur mikro dan kekerasan baja karbon rendah setelah proses severe warm plastic deformation dan ketahanan korosinya terhadap NaCl dan Hydrogen Induced Cracking.

Key words : severe warm plastic deformation, low carbon steel, hardness, hydrogen induced cracking

ABSTRACT

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Judul : The Effect of Deformation Degree on the Microstructure, Mechanical Properties and Corrosion Resistance of Low Carbon Steel AISI 1010

Severe plastic deformation (SPD) is one method used to get steel with excellence mechanical properties without micro alloyed addition. The structural changes caused by SPD are reflected in improved mechanical properties of metals especially hardness and yield stress by converting coarse grain to ultrafine grained.

In this research used low carbon steel AISI 1010 treated with Thermo-Mechanical control process (TMCP) consist of reheating until 1100°C and double pass reverse rolling on 650°C with variation of deformation and air cooling. Metallographic technique implemented in order to observe the final microstructure and 2% and 5% nital etch used to observe final ferrite size and morphologies. Grain size measured using Jeffries methods according to ASTM E 112. Hardness test used Vickers method. Corrosion test worked out using polarisation with NaCl 3,5% as per ASTM G5 and Hydrogen charging test.

The main objective of this research is to studying morphology of microstructure and hardness of low carbon steel after severe warm plastic deformation and the corrosion resistance to NaCl and Hydrogen Induced Cracking.

Key words : severe warm plastic deformation, low carbon steel, hardness, hydrogen induced cracking