

## ABSTRAK

David Parade Parulian Sianipar : *Karakteristik Sifat Mekanis Produk Pengelasan Baja Karbon Sedang St-52 Grade 0,3 Wt %C. Tugas Akhir.* Fakultas Teknik Universitas Negeri Medan.

Telah dilakukan observasi untuk mengetahui karakteristik sifat-sifat dari baja karbon St-52 grade 0,3Wt %C setelah perlakuan proses pengelasan dengan busur listrik menggunakan elektroda NK 6013 sebagai logam pengisinya.

Metode penelitian terhadap karakteristik pengelasan baja karbon St 52 grade 0,3Wt %C dimulai dari persiapan sampel, normalisasi sampai di temperatur 950°C, pengujian komposisi kimia, pengujian tarik, pengujian kekerasan baik makro maupun mikronya, dan diakhiri dengan pengujian mikrostrukturnya. Pengujian dilakukan dengan membandingkan tiga area baja yaitu di daerah welding, HAZ, dan raw areanya.

Dari Observasi didapat  $\sigma$  pada St 52 adalah sebesar 3161,19 Mpa,  $e = 5,90\%$ ,  $E = 536,13$  Gpa. Sementara  $\sigma$  hasil pengelasan sebesar 3069,69 Mpa,  $e = 2,46\%$ , dan  $E = 1260,48$  Gpa. Uji kekerasan makro menunjukkan nilai kekerasan St 52 sebesar 161,1 HV, kekerasan pada HAZ adalah 216,4 HV, sedangkan pada welding area 302,9 HV. Fraksi fasa yang terbentuk pada daerah raw dan HAZ material adalah fasa pearlite dan ferrite, dimana pada daerah raw persentase fasa pearlite sebesar 30,5225 % dan fasa ferritenya 69,4775%. Pada daerah HAZ didapat persentase fasa pearlite sebesar 84,6 % dan fasa ferritenya didapat 15,4%. Fasa yang terbentuk pada hasil pengelasan adalah fasa pearlite dan cementite, dimana persentase fasa pearlitenya sebesar 13,808 % dan fasa cementite yang terbentuk adalah 86,2%. Uji kekerasan mikro St 52 memberikan nilai kekerasan mikro fasa pearlite 210,6 HV dan fasa ferritenya 125,3 HV. Pada daerah HAZ nilai kekerasan mikro fasa pearlite sebesar 233,1 HV dan fasa ferritenya sebesar 160,1 HV. Pada welding material didapat nilai kekerasan fasa pearlite 196,7 dan fasa cementite sebesar 318,7 HV.

**Kata Kunci :** Karakteristik Baja, Observasi, Ferrite, Pearlite, Cementite



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David Parade Parulian Sianipar : *Mechanical characteristic properties of welded MCS St-52 product grade 0,3 Wt % C. Final Project.* Faculty of Engineering State University of Medan.

Observations have been made to determine the mechanical characteristic properties of medium carbon steel St-52 grade 0,3Wt %C after having treatment in welding process with electric arc by using electrode NK 6013 as its filler materials. The Methods research on the characteristics welding product of low carbon steel St 52 grade 0,3Wt %C is preliminary done from sample preparation, normalization on temperature of 950°C, chemical composition test, ultimate tensile test, hardness test for both macro and micro, and having deduction with the microstructural test. The examination test is done by comparing the three areas in steel welding product specifically in its welding zone, heat affected zone, and its raw region. From observation data we conclude that for MCS St 52 grade 0,3Wt %C exactly showed that the maximum stress ( $\sigma$ ) = 3161,19 Mpa,  $e$  = 5,90%,  $E$  = 536,13 Gpa before having welded condition. After having process of welding, it showed that the maximum stress ( $\sigma$ ) became decreased to nearly 3069,69 Mpa, where the elongation ( $e$ ) = 2,46%, and the Young Modulus ( $E$ ) = 1260,48 Gpa. For the macro hardness test on material St 52, observation study presented that the makro hardness value in raw region nearly 161,1 HV, on heat affected zone was 216,4 HV, while in the welding region 302,9HV.

The phases fraction that have been formed even on the raw region or its heat affected zone is specifically reknowned as pearlite and ferrite phase, where in the raw region the pearlite phase nearly 30,5225 % fraction and the ferrite phase is 69,4775%. In the HAZ region, it is obtained that percentage of pearlitic phase is about 84,6 % and the ferritic phase 15,4%. The phases in microstructural examination that was presented at the welding region are pearlite and cementite phases, where the percentage of pearlitic phase is nearly 13,808 % and the cementite phase is formed empirically 86,2%. The micro hardness examination on phases for its raw condition showed that the pearlitic phase is in the range of 210,6 HV and the ferritic phase approximately 125,3 HV. Its presently increased in the HAZ region that the hardness value for pearlitic phase is 233,1 HV and for the ferritic phase is 160,1 HV. Same as in HAZ region, in the product of welding region, it is obtained that the hardness value for pearlitic phase 196,7, and for the cementite phase 318,7 HV.

**Key-words:** Steel Characterism, Observation, Ferrite, Pearlite, Cementite