ABSTRAK

Ivan Suvantri Situmorang : *Karakteristik Sifat Mekanis Produk Pengelasan Baja Karbon Rendah St-37 Grade 0,05 Wt %C*. **Tugas Akhir**. Fakultas Teknik Universitas Negeri Medan.

Telah dilakukan observasi untuk mengetahui karakteristik sifat-sifat dari baja karbon St-37 grade 0,05Wt %C setelah perlakuan proses pengelasan dengan busur listrik menggunakan elektroda NK 6013 sebagai logam pengisinya. Metode penelitian terhadap karakteristik pengelasan baja karbon St 37 grade 0,05Wt %C dimulai dari persiapan sampel, normalisasi sampai di temperatur 950ºC, 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 σ pada St 37 adalah sebesar 1682,09 Mpa , e = 9,54%, E = 174,67 Gpa. Sementara σ hasil pengelasan sebesar 1268,48 Mpa, e = 2,43%, dan E = 523,87 Gpa. Uji kekerasan makro menunjukkan nilai kekerasan St 37 sebesar 96,9 HV, kekerasan pada HAZ adalah 219,1 HV, sedangkan pada welding area 291,5 HV. Fraksi fasa yang terbentuk pada daerah raw dan HAZ material adalah fasa pearlite dan ferrite,dimana pada daerah raw persentase fasa pearlite sebesar 4,07 % dan fasa ferritenya 95,93%. Pada daerah HAZ didapat persentase fasa pearlite sebesar 90,908 % dan fasa ferritenya didapat 9,092%. Fasa yang hadir pada hasil pengelasan adalah fasa pearlite dan cementite, dimana persentase fasa pearlitenya sebesar 20,162 % dan fasa cementite yang terbentuk adalah 79,912%. Uji kekerasan mikro St 37 memberikan nilai kekerasan mikro fasa pearlite 91,5 HV dan fasa ferritenya 154 HV. Pada daerah HAZ nilai kekerasan mikro fasa pearlite sebesar 122,3HV dan fasa ferritenya sebesar 227,8HV. Pada welding material didapat nilai kekerasan fasa pearlite 164,9,dan fasa cementite sebesar 317,8 HV.

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

ABSTRACT

Ivan Suvantri Situmorang : *Mechanical characteristic properties of welded LCS St-37product grade 0,05 Wt % C*. **Final Project**. Faculty of Engineering State University of Medan.

Observations have been made to determined the mechanical characteristic properties of low carbon steel St-37 grade 0,05Wt %C after having treatment in welding process with electric arc by using electrode NK 6013 as its filler material. The Methods research on the characteristics welding product of low carbon steel St 37 grade 0,05Wt %C is preliminary done from sample preparation, normalization on temperature of 950ºC, 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 LCS St 37 grade 0,05Wt %C exactly showed that the maximum stess (σ) = 1682,09 Mpa, e = 9,54%, E = 174,67 Gpa before having welded condition. After having process of welding , its showed that the maximum stress (σ) became decreased to nearly 1268.48 Mpa, where the elongation (e) = 2.43%, and the Young Modulus (E) = 523,87 Gpa. For the macro hardness test on material St 37, observation study presented that the makro hardness value in raw region nearly 96.9 HV , on heat affected zone was 219.1 HV, while in the welding region 291.5 HV. 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 4.07% fraction and the ferrite phase is 95.93%. In the HAZ region, it is obtained that percentage of pearlitic phase is about 90.908% and the ferritic phase 9.092%. 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 20.162% and the cementite phase is formed empirically 79.912%. The micro hardness examination on phases for its raw condition showned that the pearlitic phase is in the range of 91.5 HV and the ferritic phase approximatelly 154 HV. Its presently increased in the HAZ region that the hardness value for pearlitic phase is 122.3HV and for the ferritic phase is 227.8 HV. Same as in HAZ region, in the product of welding region, it is obtained that the hardness value for pearlitic phase 164.9, and for the cementite phase 317.8 HV.

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