

ANALISIS PENGARUH PARAMETER PROSES PADA KUALITAS LAS SMAW BAJA PADUAN STAINLESS STEEL 304

Nama : Muhammad Siraj Mahfud
Nim : 2204201260
Dosen pembimbing : Bambang Dwi Haripriadi, S.T., M.T.

ABSTRAK

Penelitian ini menganalisis pengaruh variasi parameter proses pengelasan *Shielded Metal Arc Welding (SMAW)* terhadap kualitas sambungan las pada *stainless steel 304* dengan memvariasikan arus (65 A, 75 A, dan 95 A), diameter elektroda (2,0 mm; 2,6 mm; 3,2 mm), dan jenis kampuh (I, V, dan X). Evaluasi dilakukan melalui uji tarik untuk menentukan beban tarik, tegangan, dan regangan, serta uji Non-Destructive Test (NDT) metode dye penetrant untuk mendeteksi cacat permukaan. Desain Taguchi L27 digunakan untuk menganalisis kontribusi setiap parameter terhadap kualitas sambungan. Hasil penelitian menunjukkan bahwa arus merupakan faktor paling berpengaruh terhadap kekuatan tarik, diikuti diameter elektroda dan jenis kampuh. Kombinasi optimal diperoleh pada arus 95 A, elektroda 3,2 mm, dan kampuh X (*double V*), dengan nilai beban tarik rata-rata 87,65 kN, tegangan 730,42 MPa, serta regangan mencapai 100% yang menunjukkan performa mekanis terbaik. Secara keseluruhan, penelitian ini menegaskan bahwa pengaturan parameter pengelasan yang tepat sangat menentukan integritas mekanis dan kualitas sambungan las *stainless steel 304*.

Kata Kunci : SMAW, Stainless Steel 304, Arus Pengelasan, Diameter Elektroda, Jenis Kampuh, Uji Tarik, Regangan, Taguchi L27, Dye Penetrant Test.

Analysis of the Influence of Process Parameters on the Weld Quality of SMAW Stainless Steel 304

Name : Muhammad Siraj Mahfud
Nim : 2204201260
Lecturer : Bambang Dwi Haripriadi, S.T., M.T.

ABSTRACT

The present study investigates the influence of Shielded Metal Arc Welding (SMAW) process parameters on the weld quality of stainless steel 304 by varying welding current (65 A, 75 A, and 95 A), electrode diameter (2.0 mm, 2.6 mm, and 3.2 mm), and groove type (I, V, and X). The evaluation was carried out through tensile testing to determine tensile load, stress, and strain, as well as Non-Destructive Testing (NDT) using the dye penetrant method to identify surface defects. The Taguchi L27 design was employed to analyze the contribution of each parameter to weld quality. The findings show that welding current is the most influential factor affecting tensile strength, followed by electrode diameter and groove type. The optimal combination was obtained at 95 A welding current, 3.2 mm electrode diameter, and X-groove configuration, resulting in an average tensile load of 87.65 kN, tensile stress of 730.42 MPa, and strain reaching 100%, indicating superior mechanical performance. Overall, the study confirms that proper selection of welding parameters plays a crucial role in determining the mechanical integrity and weld quality of stainless steel 304.

Keywords: SMAW, Stainless Steel 304, Welding Current, Electrode Diameter, Groove Type, Tensile Test, Strain, Taguchi L27, Dye Penetrant Test.