

CHARACTERIZATION OF DISTORTION, RESIDUAL STRESS AND FATIGUE CRACK GROWTH PROPERTIES OF STEEL WELDED JOINTS UNDER DC-LSND TREATMENTS

by Heri Wibowo, M. Noer Ilman, Priyo Tri Iswanto, Rifai Muslih

ABSTRACT

The need for reducing weld distortion and residual stress in welded thin plate structures has led to the development of stress relieving methods. In-process welding technique using dynamically controlled low stress no distortion (DC-LSND) has been increasingly utilized for reducing distortion. The objective of the present investigation is to study effect of DC-LSND on distortion, residual stress, strength and fatigue crack growth behavior in steel weld joints. The DC-LSND treatments were carried out by quenching the weld metal region behind the welding torch using cryogenic liquid nitrogen. A series of tests was performed including: distortion measurement, microstructure examination, hardness test, tensile test, residual stress measurement and fatigue crack growth test combined with SEM examination. Results showed that DC-LSND treatments reduced out of plane distortions accompanied by increasing strength and hardness value of the weld joints and these improved mechanical properties are associated with weld microstructures. Another important finding in this research is that DC-LSND treatments improve fatigue crack growth performance of the weld joints which could be related to weld residual stress.

Kata Kunci: *DC-LSND treatment, Distortion, Residual stress, Fatigue*