INTISARI

Friction stir welding (FSW) merupakan proses pengelasan yang inovatif dikenal sebagai proses pengelasan kondisi padat (solid state). Proses pengelasan FSW ini tidak membutuhkan logam pengisi filler, sehingga komposisi hasil pengelasan yang didapatkan umumnya sama dengan komposisi logam induk, kecuali pengelasan pada logam yang berbeda. Penelitian ini bertujuan untuk mempelajari pengaruh perlakuan *preheating*, *Dynamically Controlled – Low Stress No Distortion* (DC-LSND), dan kombinasi perlakuan DC-LSND + *preheating* terhadap distorsi, dan sifat mekanis, sambungan las FSW.

Bahan yang digunakan untuk pengelasan FSW adalah alumunium paduan seri AA5083-H116 dengan tebal 3 mm. Proses pengelasan dilakukan dengan variasi perlakuan preheating pada temperatur 200º C, DC-LSND, DC-LSND + preheating dan tanpa perlakuan. Kemudian pengujian dan pengamatan yang dilakukan meliputi data termal pengelasan, pengukuran distorsi, struktur mikro dan makro, pengukuran nilai kekerasan mikro Vickers, dan kekuatan tarik.

Hasil penelitian ini menunjukkan bahwa perlakuan DC-LSND menunjukkan distorsi las yang paling kecil dibandingkan perlakuan lain. Hasil kekuatan tarik paling tinggi terdapat pada pengelasan tanpa perlakuan. Perlakuan DC-LSND menunjukkan nilai kekerasan paling tinggi. Perlakuan *preheating* perlu dikoreksi dalam peletakkan *heater* untuk dapat mendapatkan hasil yang lebih baik.

Kata kunci: *Friction Stir Welding* (FSW), AA5083-H116, *preheating*, DC-LSND, distorsi, kekerasan, struktur mikro, kekuatan tarik

ABSTRACT

Friction stir welding (FSW) is an innovative welding process known as a solid state welding process. This FSW welding process does not require filler material, so that the final welding composition obtained is generally the same as the base metal composition, except when welding is carried for joining two different metals. The aim of this study is to observe the effect of preheating treatment, Dynamically Controlled - Low Stress No Distortion (DC-LSND), and the combination of DC-LSND + preheating treatment on distortion, and mechanical properties of FSW welded joints.

The material used in this study was aluminum alloy AA5083-H116 series with a thickness of 3 mm. The welding process was carried out with various treatments including preheating at 200ºC, DC-LSND, DC-LSND + preheating and without treatment. Subsequent experiments were conducted including thermal welding data, measurement of distortion, micro and macro structure, measurement of Vickers micro hardness values, and tensile strength.

This research showed that the DC-LSND treatment showed smallest weld distortion compared to other treatments. The result with highest tensile strength wew found in non-treatment-weld. The DC-LSND treatment showed the highest hardness value. The preheating treatment need to be corrected in location of heater placement for better result.

Keywords: Friction Stir Welding (FSW), AA5083-H116, preheating, DC-LSND, distortion, hardness, microstructures, tensile strength.