Pengembangan proses micro friction stir welding (mFSW) untuk produk struktur ringan longitudinal square honeycomb corrugated core sandwich panels = Development of micro friction stir welding process for lightweight structure of longitudinal square honeycomb corrugated core sandwich panels

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Abstrak

Teknologi Friction Stir Welding (FSW) sangat cocok untuk diterapkan pada dunia industri untuk menanggulangi kelemahan dari proses pengelasan konvensional. Informasi pengembangan serta aplikasi FSW begitu diminati oleh dunia industri. Pada skripsi ini juga akan menyajikan hasil penelitian terkait teknologi FSW. Skripsi ini menyajikan hasil penelitian pengujian gerakan sumbu prototipe mesin micro Friction Stir Welding (mFSW) dan pengaruh dimensi sel longitudinal square honeycomb corrugated core sandwich panels terhadap kekuatan struktur dan kekuatan las. Struktur ringan longitudinal square honeycomb corrugated core sandwich panels ini terdiri dari 2 bagian utama yaitu face dan core. Penyambungan face dan core struktur ringan ini menggunakan metode micro Friction Stir Spot Welding (mFSSW) dengan tool HSS ; diameter pin 2,5 mm dan diameter shoulder 4 mm. Bahan yang digunakan untuk membuat struktur ringan ini adalah aluminium A1100 dengan ketebalan 0,4 mm. Nilai kekuatan spesimen didapatkan dari pengujian bending dan pengujian geser. Pengujian bending menggunakan 3-point bending standar ASTM C393 dan pengujian geser menggunakan standar ASTM C273. Hasil pengujian prototipe mesin mFSW menunjukkan bahwa performa gerakan sumbu mesin tersebut telah memenuhi spesifikasi yang diinginkan (ketelitian di bawah 100 mikron). Hasil pengujian bending dan geser menerangkan bahwa dimensi sel corrugated core begitu berpengaruh terhadap kekuatan struktur ringan sandwich panels tersebut.

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Friction Stir Welding (FSW) technology is so suitable to be applied in the industrial company to overcome the disadvantages of conventional welding processes. Information as well as the development of FSW applications so attractive. This bachelor thesis will also present the results of research related of FSW technologies. This bachelor thesis presents the testing results of the micro Friction Stir Welding (mFSW) prototype machine axis movement and the effect of cell dimensions longitudinal square honeycomb corrugated core sandwich panels to the structural strength and strength of the welded area. Lightweight structure longitudinal square honeycomb corrugated core sandwich panels consist of two main parts : that is face and core structure. Joining process for face and core using micro Friction Stir Spot Welding (mFSSW) method with the HSS pin diameter 2.5 mm and shoulder diameter 4 mm. The materials used to make lightweight structures are aluminum A1100 with a thickness of 0.4 mm. Ultimate strength values obtained from bending and shear testing. Bending test using 3-point bending ASTM C393 standard and shear strength test using ASTM C273 standard. The test results showed that the prototype machine mFSW axis motion engine performance is good enough. Bending and shear test results explained that the core corrugated cell dimensions so affected the strength of the light structural sandwich panels.