

INTISARI

Penelitian ini bertujuan untuk menganalisis pengaruh perlakuan permukaan *shot peening* terhadap sifat mekanis sambungan las *friction stir welding* (FSW) pada paduan magnesium AZ31B-H24. Material magnesium dipilih karena sifatnya yang ringan dan memiliki potensi aplikasi tinggi dalam industri otomotif dan dirgantara. Metode FSW digunakan sebagai teknik pengelasan *solid-state* yang menghasilkan sambungan berkualitas tanpa melelehkan material dasar, sedangkan perlakuan *shot peening* diterapkan untuk meningkatkan kekuatan permukaan dan ketahanan terhadap retak melalui pembentukan tegangan sisa tekan.

Dalam penelitian ini, spesimen sambungan las FSW dikenai perlakuan *shot peening* dengan intensitas tembakan 0,06 A dan dibandingkan dengan spesimen sambungan las FSW tanpa perlakuan. Pengujian meliputi uji tarik, uji laju perambatan retak fatik, uji korosi, uji kekerasan mikro Vickers, pengamatan mikrostruktur, serta pengamatan makrostruktur patahan pada zona las untuk mengetahui perubahan mikrostruktur dan sifat-sifat mekanis akibat perlakuan tersebut.

Hasil pengujian menunjukkan bahwa perlakuan *shot peening* mampu meningkatkan nilai kekerasan dan ketahanan laju perambatan retak fatik sebagai akibat terbentuknya tegangan sisa tekan. Selain itu, *shot peening* menyebabkan penghalusan butir pada permukaan dan pepadatan butir. Temuan ini diharapkan dapat berkontribusi dalam optimalisasi perlakuan pasca-las untuk meningkatkan kinerja struktural material magnesium dalam aplikasi teknik.

Kata kunci: *friction stir welding* (FSW), AZ31B-H24, *shot peening*, sifat-sifat mekanis, mikrostruktur

ABSTRACT

This study aims to analyze the effect of surface treatment using shot peening on the mechanical properties of friction stir welding (FSW) joints of AZ31B-H24 magnesium alloy. Magnesium has been selected for the subject of this study due to its lightweight and high potential for applications in the automotive and aerospace industries. The FSW method was utilized as a solid-state welding technique that produces high-quality joints without melting the base material, while shot peening was applied to enhance surface hardness and fatigue crack growth resistance by inducing compressive residual stress.

In this research, FSW-welded AZ31B-H24 plates were subjected to shot peening with Almen intensity of 0.06 A, and the results were compared to untreated FSW joints. The experiments included tensile testing, fatigue crack growth rate testing, corrosion testing, Vickers microhardness measurements, microstructural observations, and macrostructural fracture observations in the weld zone to assess microstructural and mechanical property changes due to the treatment.

The results showed that shot peening increased the surface hardness and fatigue crack growth resistance of the weld joints due to grain refinement, strain hardening, and compressive residual stress. In addition, these findings are expected to contribute to the optimization of post-weld surface treatments to enhance the structural performance of magnesium materials in engineering applications.

Keywords: friction stir welding (FSW), AZ31B-H24, shot peening, mechanical properties, microstructure