

Study of Microstructure and Mechanical Properties Obtained by FSW of Similar and Dissimilar Non-Ferrous Alloys Used in Aerospace and Automobile Industry

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Abstract : Joining of dissimilar non-ferrous alloys like aluminium and magnesium alloys becomes important in various automobile and aerospace applications due to their low density and good corrosion resistance. Friction Stir Welding (FSW), a solid state joining process, successfully welds difficult to weld similar and dissimilar aluminum and magnesium alloys. Two tool rotation speeds were selected by keeping the transverse speed constant to weld similar and dissimilar alloys. Similar(Al to Al) and Dissimilar(Al to Mg) weld joints were obtained by FSW. SEM scans revealed that higher tool rotation fragments the coarse grains of base material into fine grains in the weld zone. Also, there are less welding defects in weld joints obtained with higher tool rotation speed. The material of dissimilar alloys was mixed with each other forming recrystallised new intermetallics. There was decrease in hardness of similar weld joint however there is significant increase in hardness of weld zone in case of dissimilar weld joints due to stirring action of tool and formation of inter metallics. Tensile tests revealed that there was decrease in percentage elongation in both similar and dissimilar weld joints.

Keywords : aluminum alloys, magnesium alloys, friction stir welding, microstructure, mechanical properties

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