

Microstructural development in Al 7075 /TiC composites processed through friction stir processing

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Abstract

Al 7075 Aluminum alloy of 6.35mm thick plate in T651 condition was used for the present study. TiC particle of 3.5 μm in 2, 4, and 6 vol. % was used as a reinforcement. H13 tool steel in hardened and tempered condition was used as the tool material. FSP process was carried out at 1200 rpm and travel speed of 30 mm/min. Optical microscope and SEM were used to observe the microstructural developments.

The effect of TiC and its volume fraction on microstructural developments and hardness was studied. In the nugget zone grains were found to be non-uniform in size and shape and grains were mostly of 2 to 5 μm . Hardly few particles were seen inside the grains as well as along the grain boundaries. On increasing volume fraction of TiC from 2% to 6% the hardness of composite increased irrespective of the zone. The XRD pattern was indicating the presence of MgZn₂ and AlTi phases formed during friction stir processing.

Key Words: Aluminum alloy 7075, TiC, FSP, microstructure, hardness