

Investigation of microstructure and mechanical properties of friction stir lap welded AA6061-T6 in various welding speeds

ABSTRACT

Friction stir welding of Aluminum alloys has been increasingly used in the industry on the ground of higher welding quality in comparison with conventional methods. However, not enough studies have been done on a lap joint of AA 6061-T6 which widely been used in aerospace industries. In this article, friction stir lap welding of 6061-T6 aluminium alloy with 5 mm thickness was carried out by using various welding speeds. The effect of welding speed on microstructure, lap shear performance, micro hardness, failure mode and effective plate thickness was investigated. Results showed that tensile shear strength of weld increased by the rising welding speed. Rising welding speed caused hooking and thinning approaches to two plate interfaces which in turn concluding in higher tensile shear strength. The fracture surface of welds was analyzed by field emission scanning electron microscopy (FE-SEM). Study of the fracture surface of the nugget zone by EDX indicated the Fe compounds in that region.

Keyword: Alluminium alloy; Friction stir lap welding; Mechanical properties; Effective plate thickness; Hocking.