

Comparison in Temperature evolution and Mechanical properties of an aluminium alloy welded by FSW and TIG processes

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Abstract : The purpose of this study is to show the potentiality of Friction Stir Welding (FSW) for joining the 2017A aluminium alloy, which is difficult to be welded by fusion techniques. A comparative study of FSW with a conventional fusion process as Tungsten Inert Gas (TIG) is made. FSW welds are made up using a specific tool mounted on a milling machine, however a single pass welding was applied to obtain a TIG joint. Thereafter, the comparison between the two processes has been made on the mechanical properties and thermal behavior. The results show that the thermal cycle peak induced by FSW process are lower than that induced by TIG process about 25%. Because the FSW does not need to melt the materials during welding. Microstructural examination revealed the grains refinement of the FSW weld joints that induce better mechanical properties (tensile tests and microhardness), higher joint efficiency (more than 80%) and good ductility compared to TIG joint. FSW process currently opens a great opportunity of application in the industrial and transport fields.

Keywords : FSW, TIG, aluminum, Temperature, tensile joint efficiency, Microhardness