# Investigation of Microstructure and Microhardness in Self-Reacting Friction Stir Welded AA2014-T6 and AA2219-T87

Friction stir welding (FSW) is a solid state welding process with potential advantages for aerospace and automotive industries dealing with light alloys. Self-reacting friction stir welding (SR-FSW) is one variation of the FSW process being developed at the National Aeronautics and Space Administration (NASA) for use in the fabrication of propellant tanks. This work reports on the microstructure and microhardness of SR-FSW between two dissimilar aluminum alloys. Specifically, the study examines the cross section of the weld joint formed between an AA2014-T6 plate on the advancing side and an AA2219-T87 plate on the retreating side. The microstructural analysis shows an irregularly displaced weld seam from the advancing side past the thermo-mechanical affected zone (TMAZ) into the weld nugget region. There are sharp variations in the microhardness across the weld. These variations are described in the paper and mechanisms for their formation are discussed.