Comportement mécanique et métallurgique des jonctions hétérogènes soudées par friction rotative

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Abstract: Rotational friction welding is a solid state welding process, which has seen spectacular development in various industries. It offers the possibility of producing very high quality solder joints in an extremely short time. The objective of this work is to improve the operating parameters of this process by changing the friction time (periods) and fixing the other parameters namely the speed of rotation [round per minute], the forging time [s], the friction and forging pressure [MPa]. The major problem with the disimmilar assembly of aluminum and stainless steel alloys is the low mechanical strength in the welded joint, due to the formation of certain unwanted inter-metal compounds during welding. An experimental procedure was used to obtain an Al6013-T8 /304L stainless steel welded joint with and without copper insertion. Different characterization methods were used namely x-ray diffraction, optical microscopy, HV microhardness and tensile testing. The Al6013-T8 side microstructure reveals the formation of two zones, the HAZ and the TMAZ at the center of the junction, unlike 304L stainless steel, which has not undergone any mechanical deformation. The microhardness of Al6013-T8 increased in the vicinity of the junction, and tensile testing revealed that the mechanical characteristics of the joints increase with increasing friction time.

Keywords : Rotational friction welding, the speed of rotation, the forging time