

On the joining of steel and aluminium by means of an innovative process

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A process based on Friction Stir Welding has been developed to weld dissimilar metals, particularly steel and aluminium, in a lap-joint configuration. Steel transient heating resulting from friction leads to the partial melting of the aluminium. Welding then occurs owing to adequate local reactions between the liquid and solid phases. Multiscale characterisation was systematically performed to highlight the influence of the process parameters on the microstructure of the constitutive sheets as well as of the steel-Al interface. Mechanical tests (both uniaxial tension and peel test) were also carried out in order to investigate the strength of the welds as a function of the constitutive elements of the microstructure. These tests showed that the weld can be stronger than the constitutive materials without premature cracking, insuring the reliability of the dissimilar structure.