

عنوان مقاله:

Control of Steel Detachment and Metal Flow on Aluminum-Steel Friction Stir Welding of thin Joints

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خلاصه مقاله:

In the last thirty years, the friction stir welding (FSW) process has achieved significant importance due to the satisfactory results derived from severe deformation and low heat input during the welded joint production. These elements have been considered to implement the FSW in different welded systems, including aluminum-steel joints. In these dissimilar joints, the main interest was to obtain a welded joint with acceptable mechanical behavior. Some papers recently focused on understanding dissimilar joints process, mainly on the metal flow and its response to corrosion. However, in Al-steel joints, the presence of steel particles in the nugget zone is routine, alters both the welded joint's mechanical and chemical behavior. Thus, this work aims to evaluate the mechanisms that govern these particles' generation, the effect of offset on their formation, and estimating the characteristics of the material flow, using the detached fragments as tracers. It was established that the offset controls the metal's fluidity, which allows the accumulation of steel fragments on the advanced side, in addition to reducing its quantity, due to the decrease of irregularities in the Al-steel interface. Likewise, the metal flow was observed on the retreating side, with that mentioned on aluminum joints. In contrast, on the advanced side, there is a shear action, push down, and lateral movement towards the retreating side, driven by the high forging strength of the metal and the restriction imposed by the steel and the backing.

کلمات کلیدی:

Dissimilar Joints, offset effect, steel fragments formation, restriction to metal flow

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