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铝合金LF6与工业纯铜T1的搅拌摩擦焊工艺

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摘要: 利用搅拌摩擦焊技术成功地焊接了防锈铝LF6和工业纯铜T1对接接头, 研究了工艺参数对接头组织与性能的影响。结果表明: 搅拌头旋转速度与焊接速度的比值大小是保证接头致密性和决定组织、性能的关键因素。合适的焊接工艺参数可以获得组织、性能优良的Al/Cu接头。板材厚度较小时, 形成良好焊缝的规范参数范围较宽, 焊接过程中接头内部发生了剧烈的塑性流动。由于摩擦热与变形能的共同作用, 在焊缝内部形成了 $Al_{3.892}Cu_{6.108}$ 型金属间化合物, 使焊缝局部区域硬度升高。

关键词: Al/Cu焊接; 搅拌摩擦焊; 焊接过程

Friction stir welding process of aluminum alloy LF6 with copper T1

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Abstract: The butt joint of dissimilar metals, aluminum alloy LF6 and copper T1, was welded with friction stir welding method. The influence of welding parameters on the microstructure and properties of the joint was investigated. The results show that the ratio of the rotation speed of the welding tool to the welding speed, i.e. ω/v , is the main factor to control the soundness, microstructures and properties of the weld. Suitable welding parameters can obtain the Al/Cu welding joint with good weld microstructures and properties. If the sheet is relatively thin, the range of welding parameters obtained that can get better weld quality is wider. Heavily plastic flow of the weld metal occurs inside the weld during the process. And a kind of intermetallic compound, $Al_{3.892}Cu_{6.108}$, is formed within the weld because of the cooperation effect of the friction heat and plastic deformation energy of the metals, and this compound increases the hardness of the local area in the weld.

Key words: Al/Cu welding; friction stir welding; welding process

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