

عنوان مقاله:

جوشکاری پرتو الکترونی آلیاژ Ti-۶Al-۴V به فولاد زنگ نزن PH۴-۱۷ با استفاده از لایه میانی مس

محل انتشار:

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خلاصه مقاله:

This study aimed to investigate the effect of electron beam welding parameters on the microstructural characteristics and mechanical properties of the dissimilar joint between 17-4PH stainless steel and Ti6Al4V alloy. For this purpose, the welding of these two alloys was performed with a copper interlayer with a thickness of 1 mm. Two different welding speeds of 0.7 and 0.9 m/min with four levels of beam offset (0, 0.2, 0.4 and 0.6 mm) from the center of the interlayer towards the steel were used to accomplish the experiments. The results show that by using the copper interlayer with thickness of 1 mm, the cracks caused by the formation of intermetallic compounds are removed from the weld pool. At the interface between the titanium and the weld pool, at the beam offset of 0 and 0.2 mm, a solid solution of copper and TiCu₂ intermetallic compounds is formed, while at the beam offset of 0.4 and 0.6 mm, a solid solution of copper and TiCu intermetallic compounds is formed. The weld pool, at the beam offset of 0 and 0.2 mm, consists of TiCr₂+TiFe₂ intermetallic compounds while at the beam offset of 0.4 and 0.6 mm, solid solution of iron (α -Fe), solid solution of copper and TiCu intermetallic compounds are formed. The highest value of hardness is observed at the interface between the weld pool and the titanium alloy, as well as at the interface between the weld pool and the steel, which is due to the presence of intermetallic compounds with high hardness in these regions. By increasing the welding speed and the beam offset, the hardness value decreases, which is due to the reduction of brittle intermetallic compounds in the joint structure. By increasing the beam offset from 0.4 mm to 0.6 mm at the speed of 0.7 m/min, the shear strength increases from 180 MPa to 210 MPa and at the speed of 0.9 m/min, the shear strength raises from 230 MPa to 250 MPa. The welded sample with the welding speed of 0.9 m/min and the beam offset of 0.6 mm has the highest shear strength equal to 250 MPa. The failure in all samples happened at the interface between the weld pool and the titanium alloy, which shows that the weakest region in the joint is this interface.

کلمات کلیدی:

Electron Beam Welding, Ti6Al4V alloy, 17-4PH Steel, Cu interlayer, Microstructure, Mechanical properties
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