

Effect of brazing current on microstructure and mechanical behavior of WC-Co/AISI 1020 steel TIG brazed joint

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Abstract: In this work, the WC-Co carbide/1020 steel brazed joints which were prepared by Tungsten Inert Gas (TIG) process using different brazing currents have been studied. The peak temperature reached by increasing the brazing current caused remarkable inter-diffusion of Ni, Mn, Cu and Co elements between the braze and the base materials. The higher the brazing current was, the larger the diffusion extent of these elements became and the greater the WC rearrangement occurred. As the diffusion rate of Ni towards the WC-Co was enhanced through increasing brazing current, a short range diffusion of Co element towards the braze was recorded. A Special Shear Test (SST) conducted at room temperature revealed the best bonding strength for the current of 80A. Besides, hardness (HIT) and elastic modulus (EIT) values of the interfaces were situated between those of the braze and the base materials.

Keywords : WC-Co cemented carbide, TIG brazing, inter-diffusion, Interface, Nano-indentation