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Study on the combination of cobalt-based superalloy and ferrous alloys by bimetal-layer surfacing technology in refabrication of large hot forging dies

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Abstract

Bimetal-layer surfacing intensifying the working area of die by welding materials with gradient mechanical properties is an effective fabrication and refabrication technology for hot forging dies with low cost and a short cycle. Owing to the extremely high operating temperature and large stress of large hot forging dies, the selection of welding materials is quite important,. In consideration of the excellent high-temperature performance of cobalt-based superalloy, a cobalt-based superalloy welding material, Co03 was designed in this study to be combined with ferrous alloys with outstanding low-temperature mechanical properties and low price to realized effective refabrication of large hot forging dies by bimetal-layer surfacing. Refabrication of dies and subsequent hot forging processes were simulated physically by bimetal-layer welding conducted on 5CrNiMo blocks and heat treatments.