Liquid phase surface alloying of a nickel aluminum bronze alloy with titanium

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Abstract

In this study, liquid phase surface treatment of a nickel-aluminum bronze (NAB) substrate was performed using tungsten inert gas (TIG) surface melting and alloying. The morphology, microstructure, microhardness, and wear behavior of the surface treated layers were studied. The hardness values of the surface-melted and titanium-alloyed specimens were respectively 1.5 and 3 times higher than that of the untreated NAB substrate. The wear rates of the surface-melted and titanium-alloyed specimens were also reduced respectively by 25% and 65% as compared with that of the untreated NAB substrate. The enhancement in microhardness and wear resistance of the alloyed layer was found to be due to solid solution hardening and formation of intermetallic compounds, including Cu_4Ti_3 and $AlTi_3$.

Keywords: nickel aluminum bronze; surface melting; surface alloying; wear

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