

OR1404

DLC coating on low temperature plasma nitrided or carburized austenitic stainless steel

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The friction and wear of DLC coated S phase surface of austenitic stainless steel was investigated. S phase treatment of the austenitic stainless steel is effective treatment for wear resistance without deterioration of anti-corrosion nature of the steels. However, the friction coefficient of the surface is as same level as the stainless steel substrate. DLC is very useful for reducing the friction force, but due to its thin nature make it difficult to apply to austenitic stainless steels because of the softness as substrate for loaded friction. The application of DLC on the surface of S phase hardened austenitic stainless is the candidate for such applications.

Direct current plasma apparatus processed low temperature nitriding and carburizing. The diffusion treated samples were DLC coated after Cr ion bombardment by the arc discharge ion plating process. The DLC coated specimens had three different substrates as following; nitrided S phase, carburized S phase or untreated austenitic stainless steel.

Single pass friction of pin on the disc type friction tests with increasing loading during friction revealed the low friction coefficient values of around 0.15 for DLC coated surfaces, and S phase treated substrates for DLC coating indicated higher critical load for fracture of coating than that of untreated substrate. The pin on the disc type reciprocated friction tests of 7200 strokes at constant loads showed the effect of the presence of S phase as supporting structure for thin DLC coating.

Keywords

austenitic stainless steel

S phase

carburizing

nitriding

DLC