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Effect of Plasma Nitriding and Nitrocarburising Process on the Corrosion Resistance of Grade 2205 Duplex Stainless Steel

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Grade 2205 duplex stainless steel is a type of stainless steel possessing a nearly equal amount of the ferrite (α -Fe) and austenite (γ -Fe) phases as a matrix. Since these steels have a relatively low hardness of 256 HV0.1, an attempt has been made to improve their hardness and wear properties without compromising the corrosion resistance by plasma nitriding and nitrocarburising process. Plasma nitriding and plasma nitrocarburising process was performed with 80% nitrogen and 20% hydrogen gas and 78% nitrogen, 20% hydrogen and 2% acetylene gas respectively at 350, 400, 450 and 500 ° C for 4 hours. The temperature played an important role in the distribution of nitrogen and carbon in the original austenite and ferrite phases present in the bulk material. As a result there was an improvement in microhardness and corrosion properties after these treatments. It was observed that plasma nitrocarburising process performed better than plasma nitriding process in improving the corrosion properties due to the presence of carbon.

Keywords

Duplex steel
Plasma Nitriding
Nitrocarburising
Hardness
Corrosion