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Comparative Study on Performance Characteristics of Modified Alloy Steels by TIG and Water Jet Peening Processes

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Abstract

The objective of this work is to compare the available results of peened surfaces by water jet process against the TIG melted track on stainless steel and low alloy steel samples respectively. Surface topographies, size of formed geometries, microstructural features and surface roughness were investigated. Modified steel hardened by the TIG process exhibited the depth and width of the molten pool of 1.5 mm and 3.5 mm respectively which was higher than the waterjet eroded track up to 0.22 mm and 2.4 mm respectively. The localized heat above steel melting temperature gave molten pool with globular structure near the surface. The impacted waterjet pressure modified the surface of the steel associated with a thin deformed layer. The formation of crater on the water jet eroded track resulted surface roughness value near 3.3 micron while that by the TIG due to those rippling marks showed 1.29 micron. Ranges of surface roughness, hardness and geometrical features of alloy steel can be tailored according to special needs of application. in the dentistry, automotive, oil and gas or aerospace by these two techniques. © 2023, The Author(s), under exclusive license to Springer Nature Singapore Pte Ltd.

Author Keywords

Alloy steel; Performance properties; TIG; Water jet

Index Keywords

Jets, Steel metallurgy, Surface roughness; Comparatives studies, Low-alloy steel, Molten pool, Performance characteristics, Performance properties, Stainless steel alloys, Steel samples, TIG, Water jet peening, Waterjets; Alloy steel

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