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Incorporation of TiC particulates on AISI 4340 low alloy steel surfaces via Tungsten Inert Gas arc melting (Conference Paper)

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Abstract

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Surface cladding utilizes a high energy input to deposit a layer on substrate surfaces providing protection against wear and corrosion. In this work, TiC particulates were incorporated by melting single tracks in powder preplaced onto AISI 4340 low alloy steel surfaces using a Tungsten Inert Gas (TIG) torch with a range of processing conditions. The effects of energy input and powder content on the melt geometry, microstructure and hardness were investigated. The highest energy input (1680 J/mm) under the TIG torch produced deeper (1.0 mm) and wider melt pools, associated with increased dilution, compared to that processed at the lowest energy (1008 J/mm). The melt microstructure contained partially melted TiC particulates associated with dendritic, cubic and globular type carbides precipitated upon solidification of TiC dissolved in the melt; TiC accumulated more near to the melt-matrix interface and at the track edges. Addition of 0.4, 0.5 and 1.0 mg/mm ^{2} TiC gave hardness values in the resolidified melt pools between 750 to over 1100Hv, against a base hardness of 300 Hv; hardness values are higher in tracks processed with a greater TiC addition and reduced energy input. © (2012) Trans Tech Publications.

SciVal Topic Prominence

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Author keywords

Hardness | Low alloy steel | Melt depth | Microstructure | Surface layer | TiC powder | TIG torch

Indexed keywords

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