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عنوان مقاله:

Hardness and Wear Characteristics of Laser-Clad WC-۱۷Co Coatings on AISI H۱۳ and AISI ۴۱۴۰ Steel

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خلاصه مقاله:

Elevating component performance through advanced surface coatings finds its epitome in the domain of laser cladding technology. This technique facilitates the precision deposition of metallic, ceramic, or cermet coatings, accentuating their superiority over conventional methods. The application spectrum for laser-clad metallic coatings is extensive, encompassing critical components. Central to the efficacy of laser cladding is the modulation of laser parameters—encompassing power, speed, and gas flow—which decisively influence both process efficiency and coating properties. The meticulous calibration of these parameters holds the key to producing components endowed with refined attributes while ensuring the sustainable continuation of the process. As such, this study embarks on an empirical investigation aimed at transcending existing process limitations. It delves into the characterization of laser-clad WC-۱۷Co coatings on AISI H۱۳ and AISI ۴۱۴۰ steels. The importance of WC-۱۷Co coatings lies in their capacity to enhance wear resistance, extend component life, reduce maintenance costs, and improve the performance of various industrial components across diverse sectors. On the other hand, the substrates have pivotal roles. AISI H۱۳ is lauded for its exceptional hot work capabilities, while AISI ۴۱۴۰ steel is renowned for its robust strength and endurance. Through rigorous evaluation, the resultant deposited coatings offer crucial insights into the efficacy of manufacturing parameters. Employing a comprehensive suite of analytical techniques including laser confocal microscopy, Vickers microhardness assessment, and micro-adhesive wear testing, the study thoroughly characterizes the samples. The outcomes underscore the achievement of homogenous coatings marked by elevated hardness and exceptional wear resistance, thereby signifying a substantial enhancement over the substrate materials.

کلمات کلیدی:

laser cladding, AISI H۱۳, AISI ۴۱۴۰, WC-۱۷Co, coatings

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