

Corrosion Resistance of Welded Structures: Materials Selection and Coating Solutions

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Abstract: This study addresses the critical concern of corrosion resistance within welded structures by exploring the dynamic interplay between distinct materials and coatings. Through a meticulous examination of stainless steel, aluminum, and titanium specimens treated with varying coating types, the research illuminates the intricate relationship connecting corrosion behavior and the collaborative effects of materials and coatings. The outcomes underscore the pivotal significance of custom-tailored materials selection and appropriate coating solutions in elevating corrosion resistance. Particularly noteworthy is the exceptional corrosion resistance observed in titanium specimens coated with advanced composite solutions, alongside the augmented performance of stainless steel specimens with the same treatment. However, the susceptibility of aluminum specimens to corrosion is evident, with some mitigation offered by advanced composite coatings. These revelations furnish tangible direction for sectors such as construction, manufacturing, and infrastructure development, aiding in the formulation of resilient welded structures equipped to surmount corrosive challenges. By advancing the comprehension of corrosion resistance mechanisms, this research contributes to the perpetual advancement of engineering solutions, safeguarding the enduring integrity and dependability of pivotal infrastructure.

Keywords: Corrosion Resistance, Welded Structures, Materials Selection, Coating Solutions

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