

Potentiodynamic Corrosion Behavior of Wire Arc Additive Manufactured Single Phase Titanium for Marine Applications

Katrina Rodriguez, Blanca Palacios, Tony Thomas, and Arvind Agarwal

Cold Spray and Rapid Deposition Laboratory (CoRAD), Department of Mechanical and Materials Engineering, Florida International University, [10555 West Flagler Street, Miami, FL 33174](#), United States

Wire Arc Additive Manufactured (WAAM) commercially pure titanium has significant potential to manufacture large structural components for marine applications. However, the absence of understanding of the electrochemical behavior of this component is a major impediment to its successful implementation. This study investigated the corrosion response of monolithic WAAM-ed Ti as a function of deposition directions, namely longitudinal, transverse, and normal to the arc motion. Specimens from each direction were subjected to potentiodynamic tests to enumerate the open circuit potential and hence evaluate corrosion resistance in systematically aggressive (1 – 6 N) aqueous solutions of hydrochloric acid. Microstructural mapping across the entire surface, before and after corrosion, was conducted with the help of panoramic optical imaging. This understanding of the effect of acidic media on the component performance advances the state-of-the-art WAAM-ed Ti bulk structures for marine applications.

Keywords: Corrosion; Potentiodynamic; Open Circuit Potential; Microstructure

Word Count: 136