

Microstructure, Corrosion Response, and Mechanical Behavior of Sacrificial Al-Zn-In Cold Spray Coatings on Aluminum and Steel Substrates

Roy Kesterson¹, Grant Crawford^{1,2}

¹Department of Materials and Metallurgical Engineering, SDSMT

²Arbegast Materials Processing and Joining Laboratory, SDSMT

Aluminum-Zinc-Indium alloys have been of particular interest in use for cathodic protection. However use of this alloy as a sacrificial anode coating deposited via cold spray has not been previously established. This work examines the influence of powder characteristics on the efficacy of cold spray depositions on steel and aluminum substrates for multiple Aluminum-Zinc-Indium powders, and identifies the corrosion behavior of the depositions on both steel and aluminum substrates. Two Aluminum-Zinc-Indium powders were deposited on both aluminum and steel substrates. Powders were characterized using powder size analysis, scanning electron microscopy, and inductively coupled plasma spectroscopy. The depositions were characterized using adhesion testing, microhardness testing, and optical microscopy. Corrosion testing was performed using open-circuit potential, potentiodynamic polarization, zero resistance ammetry, and salt fog environmental testing.