**Developing of Chromium-Carbide/ Nickel-Chromium Coatings for Steel Structure Repairs by Cold Spray Technology**

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Metal matrix composite (MMCs) coatings have the potential to improve the mechanical properties, wear, and corrosion resistance of steel in high-load-bearing applications. In this work, the application of MMC coatings using cold spray (CS) technology is explored for repairing railroad components. While CS offers many advantages, such as minimal thermal input and the ability to produce dense coatings, it may also lead to reduced ductility in the coatings. To investigate the effect of various factors on the performance of CS MMC coatings, chromium carbide/nickel-chromium (CrC-NiCr) was selected as the composite material combination and deposited via cold-spray onto steel substrates. Specifically, the effects of the matrix-to-ceramic ratio, the type of ceramic material, and the post-process heat treatment on deposition efficiency, ceramic retention, strength, ductility, and durability were examined. Dry sliding wear tests were carried out at three different normal loads to evaluate the influence of ceramic ratio and metallic phase on wear performance. Results indicate that as the volume fraction of ceramic particles increased, the deposition efficiency decreased, but the overall mechanical properties improved. Additionally, post-spray annealing of the deposits resulted in enhancements in ultimate tensile strength, elongation, and adhesion shear strength; however, it adversely affected the bulk hardness.