



Friction-stir processing of a cold sprayed AA7075 coating layer on the AZ31B substrate: Structural homogeneity, microstructures and hardness



F. Khodabakhshi^{a,*}, B. Marzbanrad^b, L.H. Shah^{b,c}, H. Jahed^b, A.P. Gerlich^b

^a School of Metallurgical and Materials Engineering, College of Engineering, University of Tehran, P.O. Box: 11155-4563, Tehran, Iran

^b Department of Mechanical and Mechatronics Engineering, University of Waterloo, Waterloo, ON, Canada

^c Faculty of Mechanical Engineering, Universiti Malaysia Pahang, Pahang, Malaysia

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ABSTRACT

In this study, the cold gas dynamic spraying (CGDS) process was employed to modify the surface of AZ31B magnesium alloy with an aluminum-zinc alloy (AA7075). Friction-stir processing (FSP) was subsequently applied as a solid-state localized surface modification technique to improve the structure and integrity of the cold sprayed layer, by enhancing densification, homogeneity, and microstructural features of the as-deposited material. The structure of precipitates and grains were also refined due to the applied severe plastic deformation during FSP, which ultimately affects the indentation hardness resistance of the processed AZ31B-AA7075 bi-metallic structure. Microscopy indicated slight grain coarsening within the AZ31B substrate occurred simultaneously with refinement of the AA7075 coating, along with significant hardness improvements of ~80% and 30% respectively for each region in terms of Vickers hardness after FSP.

* Corresponding author.

E-mail addresses: farzadkhodabakhshi83@gmail.com, fkhodaba@uwaterloo.ca (F. Khodabakhshi).