THE EFFECT OF MIXED METAL POWDERS ON COLD SPRAYABILITY

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Abstract

Cold spray is a method of powder consolidation in which powders are sprayed onto a substrate at supersonic speeds, bonding onto the substrate and between particles, on impact. The technique is often regarded as belonging to the thermal spray family of technologies. As well, because it is a means to consolidate powder, it also falls within the additive manufacturing suite of processes. However, the key difference between cold spray and all these other processes is that cold spray is a solid state process, whereas all other thermal spray and additive manufacturing technologies involve melting the powder. Because cold spray is performed in the solid state, i.e. at relatively low temperatures, the negative effects of high temperature, such as oxidation, thermal stresses and grain coarsening, can be avoided. Cold spray is currently gaining ground as a repair technique and is being considered for the bond coat in thermal barrier coatings as well as a means to coat CFRPs with metal for lightning strike protection. This paper will briefly overview cold spray and then describe work at McGill that explores the effect of mixing metal powders on the cold sprayability metrics of deposition efficiency and porosity.

Biography of Prof. Stephen Yue

Professor Stephen Yue, who was selected as the inaugural holder of the **Lorne Trottier Chair in Aerospace Engineering** (2009), obtained a B.Sc. and Ph.D. in Metallurgy at Leeds University in England in the mid-seventies. He became Assistant Professor at McGill University in 1989, and was promoted to full Professor, in the Department of Mining, Metals and Materials Engineering, in 2003. He was Associate Dean of Academic Affairs for the Faculty of Engineering from 2005 to 2007 and Chairman of the Department of Mining and Materials Engineering from 2007 to 2015. He is currently the Director of the McGill Institute for Aerospace Engineering.

His research interests revolve around the use of high temperature deformation processing to control the final microstructure and mechanical properties of titanium alloys, superalloys, steels, metal-matrix composites, biomaterials and magnesium alloys. With the award, in 2004, of a $3 million CFI in aerospace materials and manufacturing processes, he has been developing research in the areas of cold spray and electron beam powder bed fusion. He has published over 200 technical papers in journals and refereed conference proceedings, and holds four patents.

Awards and distinctions include:

2005 ASM International Fellow “in recognition of distinguished contributions to the field of materials science and materials engineering”.

2004 CIM Fellowship “recognizes members of the CIM who have distinguished themselves through outstanding contributions to the mining, metallurgical and petroleum industries, to CIM and to Canada”.