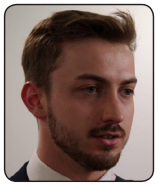
European Journal of
Applied Engineering and Scientific Research

Abstract



Process control, optimization and parameter characterization of mild steel single and multi-layer deposits using Wire + Arc Additive Manufacturing

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Abstract:

Wire + Arc Additive Manufacturing (WAAM) is a promising technology for the manufacturing industry due its capacity to reduce material waste by up to 90% in certain applications whilst also providing a means of production for large-scale (<1m) metal structures with high deposition rates of up to 4kg/hr [1]. These comparatively higher rates of deposition and large build volumes allow WAAM to fulfil manufacturing roles which its counterpart technologies such as Powder Bed Fusion would struggle to perform in an economical manner [1], [2]. The Automotive and Aerospace sectors are looking into WAAM as a prospective solution to fabricate large scale, medium complexity components with additional time and cost savings when compared to current subtractive and formative manufacturing methods [3]. Due to the energy sources employed, WAAM suffers from similar defects observed in welding such as porosity, distortion, residual stresses, hot cracking etc. [4], [5]. This research will investigate the parameter settings and process controls (e.g. travel speeds and cooling rates) of WAAM Via Cold Metal Transfer (CMT) which can improve the mechanical properties, microstructure and geometrical quality of WAAM Mild Steel single and multilayer specimens whilst minimising the presence of aforementioned defects. Testing will evaluate the tensile and flexural strength of machined specimens, fatigue life and microhardness throughout the multilayer deposits to characterise the effects of varying heat, current and voltage inputs, deposition strategies, inter-layer cooling rates and travel speeds.

Biography:

Harley Stinson is a PhD researcher with the University of Ulster CERE researching Wire Arc Additive Manufacturing

via Cold Metal Transfer.

Publication of speakers:

1. Stinson et al; Prenatal Exposure to Organophosphorous Pesticides and Fetal Growth: Pooled Results from Four Longitudinal Birth Cohort Studies, 2016 Jul; 12
2. Harley Stinson et al; Locus Coeruleus Optogenetic Light Activation Induces Long-Term Potentiation of Perforant Path Population Spike Amplitude in Rat Dentate Gyrus, 2019 Jan.
3. Harley Stinson et al; No Longer an Island: A Social Network Intervention Engaging Black Men Through CBPR, 2020 Mar 14.
4. Harley Stinson et al; Nonstandard Finite Difference Method Applied to a Linear Pharmacokinetics Model, 2017 Jun; 4.
5. Harley Stinson et al; Learning modulation of odor representations: new findings from Arc-indexed networks, 2014 Dec 19

3rd International Conference on 3D Printing and Additive manufacturing; May 22-23, 2020; Paris, France

Citation: Harley Stinson ; Process control, optimization and parameter characterization of mild steel single and multi-layer deposits using Wire + Arc Additive Manufacturing; 3D Printing 2020; May 22-23, 2020; Paris, France