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Digitisation of metal AM for part microstructure and property control

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Registration link, in advance for this meeting:
https://videoconf-colibri.zoom.us/meeting/register/tZUpde-tpzkrG9evKAVNtofQSht-Ip4UJtph

Abstract
Metal additive manufacturing, which uses a layer-by-layer approach to fabricate parts, has many potential advantages over conventional techniques, including the ability to produced complex geometries, fast new design part production, personalised production, have lower cost and produce less material waste. While these advantages make AM an attractive option for industry, determining process parameters which result in specific properties, such as the level of porosity and tensile strength, can be a long and costly endeavour. In this review, the state-of-the-art in the control of part properties in AM is examined, including the effect of microstructure on part properties. The simulation of microstructure formation via numerical simulation and machine learning is examined which can provide process quality control and has the potential to aid in rapid process optimisation via closed loop control. In-situ monitoring of the AM process, is also discussed as a route to enable first time right production in the AM process, along with the hybrid approach of AM fabrication with post-processing steps such as shock peening, heat treatment and rolling. At the end of the paper, an outlook is presented with a view towards potential avenues for further research required in the field of metal AM.

Biography

Prob. Brabazon holds a Full Professorship at Dublin City University (DCU) and has 27 years' experience in materials science and engineering, with a research focus including developments in Additive Manufacturing, Near Net Shape Forming, and Laser Processing. Since 2012, he is Director of the Advanced Processing Technology Research Centre; was co-founder in 2017 and is Deputy Director of the I-Form, Advanced Manufacturing Research Centre; and established in 2019 and is Director (RoI) of the Advanced Metallic Systems-Centre for Doctoral Training. He has supervised 40 postgraduate and 30 postdoctoral researchers to successful project completion.