

Refinement of the Microstructure in Additively Manufactured Alloys

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One of the challenges in Additive Manufacturing is that the microstructure tends to be columnar rather than equiaxed. This can lead to manufacturing defects such as hot tears/cracks and anisotropic properties. The columnar grain morphology is caused by a combination of the processing conditions, particularly the high temperature gradient and cooling rates, the choice of alloy compositions in the alloys that tend to have low solute contents and the lack of the use of grain refiners. This presentation will discuss the approaches that can be taken to generate fine equiaxed grain sizes in additive manufacturing processes. These include the use of grain refiners, modification of alloy composition, and the use of ultrasonic treatment. Furthermore the role of processing parameters will be considered using the Interdependence Model. Examples of fine equiaxed grains in additively manufactured and/or laser processed aluminium alloys, Ti-6Al-4V and other Ti alloys, and magnesium alloys will be shown.

Biography

Prof. Mark Easton is the Associate Dean (Manufacturing, Materials and Mechatronics) with the School of Engineering. His research has been focused around the solidification processing and performance of light alloys with an increasing focus on Additive Manufacturing. He joined RMIT University at the beginning of 2014 from Monash University. With the CAST Co-operative Research Centre, he progressed from a PhD student at the University of Queensland, through research engineer, to student coordinator, to a program manager and finally to CEO before the centre finally closed in 2013. Whilst at Monash, he also regularly lectured and supervised undergraduate projects and was the inaugural cluster manager with the John Monash Innovation Institute. His other experience includes a research position with Comalco, and a stint in Austria with the Leichtmetallkompetenzzentrum, Ranshofen. His research in light metals has won numerous international awards including the Henry Marion Howe award the GKSS Magnesium Award and the TMS Extraction and Processing Division Technology Award. He is also an inventor on patent and received 5 commercialisation awards from the CAST CRC for technologies being licensed to industry. Currently he is a Chief Investigator on centres and grants totaling over \$11M in associated research funding. According to Scopus, he has 188 publications with over 5000 citations with an H-factor of 35.

