18th May 2024

Handling Editor

Journal of Materials Research and Technology

Dear Sir,

We would like to submit the manuscript, “Influence of Melt Parameters on the Microstructure of Electron Beam Melted Ti-6Al-4V” by Davies, Lancaster, Thomas *et al.*, for consideration for publication in the Journal of Materials Research and Technology. All authors have read the manuscript and agree to its originality.

In this study, Electron Beam Melted (EBM) specimens of the titanium alloy, Ti-6Al-4V, have been produced using a process window determined through a normalised energy density method. Two batches were manufactured and compared using identical energy density values with differing beam current, power, and beam velocity. A stable process window has been demonstrated with a Vickers hardness range of 360-395 VHN resulting from alpha-lath coarsening from 0.7 µm up to 3 µm. A range of macro morphologies have been reported and relate to the hatch overlap and beam velocity parameters. Base plate position does not appear to influence microstructure or micro-hardness. Prior-beta columnar and colony size increases with alpha-lath width resulting from increased energy input; however, each grain type appears to respond differently to either beam velocity or hatch space variation. Average alpha-lath width values show greater correlation to energy density, which demonstrates the dependence of grain formation on hatch overlap.

We believe that the submission conforms to all the necessary format requirements for the Journal of Materials Research and Technology. The word count of this manuscript is approximately 4,900 words (including references, front matter, tables and captions).

Yours sincerely,

Dr Meurig Thomas MIMMM (Corresponding Author).

Meurig.Thomas@sheffield.ac.uk

Interdisciplinary Programmes in Engineering, The University of Sheffield