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Author: Aman Kaur Colin Ribton W. Balachandaran

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Electron beam characterisation methods and devices for welding equipment

Aman Kaur[a,b], Colin Ribton[b] and W. Balachandaran[a]

[a] College of Engineering Design and Physical Sciences, Brunel University, Uxbridge, Middlesex UB8 3PH, UK

[b] TWI Ltd, Granta Park, Cambridge, CB21 6AL, UK

Corresponding author: Tel.: +447506807199, E-mail address: aman.kaur@brunel.ac.uk

Abstract

The aerospace industry has high quality requirements for fabrication, and critically monitors manufacturing processes as well as inspecting components and assemblies. Electron beam welding is used in an increasing number of quality critical applications because of its inherent advantages over other processes especially for Titanium. Ensuring the beam quality is maintained for such applications requires probing of the electron beam itself, and not just monitoring of process parameters. This paper gives an overview of the development of a novel two-slit beam probing system that is simpler in design and can be used for high power welding applications. It has been found that within the EB gun itself, small changes can produce large enough variations in beam characteristics to give unpredictable welding or processing performance. Precise monitoring of these beam qualities is required to improve quality assurance, enable the transfer of processing between EB machines and to ensure accurate assessment of new production equipment.

Keywords: Electron beam welding, probing, sharp focus, quality assurance