

Comparative Evaluation of Laser Oscillation Welding applied on different functional alloys

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Current class manufacturing presents oscillation welding with fibre lasers as a viable option for welding of functional components for use in e-mobility battery applications and other high throughput applications. The ease of control of the energy input and the related weld aspect ratio attainable, gives advantages over conventional laser welding approaches. Indeed, this has been the subject of a number of investigations. However, material response to welding with this strategy has been found to vary and process windows have been investigated by various integrators to highlight these variations. This study aims to investigate, using a single mode fibre laser, the relationship between laser beam oscillating parameters and the variation in aspect ratio and the underlying causes due to material physical properties of aluminium, copper and stainless steel. Results from the use of oscillation welding are compared to conventional laser welding at comparable energy and power densities for the subject materials. The suitability of oscillation welding for such applications with different material characteristics and properties are analysed and reported in this study.