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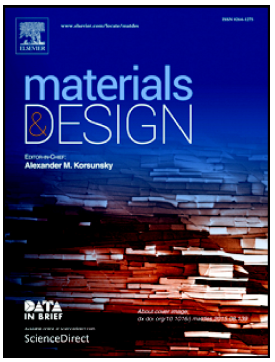

Process window acquisition for impact welding processes

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Process window acquisition for impact welding processes

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Abstract

Joining processes by high speed impacts such as explosion welding and electromagnetic pulse welding offer great advantages compared to conventional joining methods, especially fusion welding. However, a comprehensive understanding of the mechanisms and phenomena does not exist yet and thus process design largely involves empirical data. The established high speed joining technologies have in common that their observability for basic research is limited. It is the aim to provide valid and process independent data on necessary weld conditions which can be transferred to any impact welding process.

A special test rig is used for basic research under reproducible conditions. The impact area is observed with high spatial and temporal resolution. Both the impact angle and the impact velocity can be adjusted individually and are constant during the process: The impact angle can be adjusted and measured with an accuracy of ±0.05°, the normal impact velocity can be set in steps of 0.03 m/s up to 262 m/s. This publication focusses on the acquisition and discussion of a process window for aluminium specimens. Investigations on the joint strength will be carried out. It will be shown that the findings are in good accordance to analytical explanations and earlier works in literature.