

AN OVERVIEW OF WELDING IN SOLID STATE

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ABSTRACT

The importance of the Solid State Processes (SSP) has increased in the last decade due to the industry demands of improved properties of joined/surfaced materials, combined with cost reduction and energy saving. New and/or micro-scale solid state processed materials are used by aerospace, automotive and electrotechnics industry. Nowadays, classic SSP are mainly applied to light materials, but progresses were also reported in steels. In this field, the tools design, the technology and practical techniques surpassed the fundamental approach of the materials solid state processing. The SSP parameters evaluation is based on different experiments, approaching the material flow in the large plastic deformation domain. The paper approaches the solid state welding/joining and surface processing. The envisaged SSP are solid state joining processes as Cold Welding (butt and spot welding), Friction Stir Welding – FSW, and surface processing, Friction Stir Processing - FSP. Therefore, the investigation targeted the deformation and flow pattern of the parent metal in case of cold welding and FSW/FSP, processes parameters evaluation and correlation, local analysis of the material structural transformations, and material hardening.

KEYWORDS: solid state processes, microstructure, hardening, material flow

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