

عنوان مقاله:

Simulation and Investigation of Mechanical and Geometrical Properties of St/CP-Titanium Bimetal Sheet during the Single Point Incremental Forming Process

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خلاصه مقاله:

In this study, the incremental forming of explosively welded low carbon steel-commercially pure titanium bilayer sheet has been experimentally and numerically investigated. For this purpose, at first a finite element based analysis was proposed to predict the forming force and thickness distribution to form this material by such process, which showed good agreement with the experimental results. Then, to investigate the effect of vertical step down (ΔZ) parameter on the properties of the workpiece, mechanical tests and microstructural studies were performed on the formed specimens. The results showed that by increasing the vertical step down (ΔZ), hardness and tensile properties of the specimens increased but the thickness reduction in the wall of the pyramidal specimens increased and also the surface quality decreased. In addition, microstructural studies showed that by increasing the vertical step down from 0.1 to 0.3, the grain structure transformed from an equiaxed state to a fibrous state and led to the formation of texture in the microstructure, to which mechanical properties improvements can be attributed. Therefore, if the surface quality of the inside wall of the specimen is not important, with an increase in the amount of ΔZ besides reducing the process time, the mechanical properties of the specimen will be improved.

کلمات کلیدی:

Incremental Forming, Explosive-welded, Bimetals, low carbon steel/CP Titanium

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