

عنوان مقاله:

Investigation of simple shear extrusion steel mold and mechanical properties of nanostructured extruded samples of Al₆₀₆₁

محل انتشار:

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خلاصه مقاله:

The extrusion is used to produce samples with irregular cross-sections. In this process, the material is pressed along a straight extrusion channel using a special design. Simple shear extrusion steel mold was designed by Catia software. AISI ۴۱۴۰ and AISI D۳ steel were used to make this mold and mandrel, respectively. The material of the mold and mandrel was selected based on the mechanical properties of steels and their application in industry. It is a new Sever Plastic Deformation (SPD) process to produce nanostructured material which is used to produce high strength material. The specimen dimensions remain unchanged. Results revealed that Simple Shear Extrusion (SSE) is superior compared to equal channel angular pressing (ECAP) in term of scrap material. They also concluded that strain and pressure distribution is more symmetric in specimen cross-section, in this method, which is an important advantage of SSE compared to other SPD processes. In this study, first, a SSE mold with specified form and dimensions, was fabricated. The cross-section of samples was square and the material was Al₆₀₆₁. After processing, the microstructure and mechanical properties of specimens, which were processed using different pass numbers, were investigated using tensile and impact tests, hardness evaluation, metallography. The results presented an improvement in the mechanical properties and microstructure. Due to finer grains, ductility of specimens was also improved in addition to an improvement in strength.

کلمات کلیدی:

AISI ۴۱۴۰ steel mold, AISI D۳ steel mandrel, sever plastic deformation, simple shear extrusion process, Microstructure, mechanical property

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