عنوان مقاله:

Strain Distribution for CP-Ti in Cyclic Extrusion Compression Angular Pressing by RSM

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خلاصه مقاله:

Cyclic extrusion compression angular pressing (CECAP) is a novel severe plastic deformation (SPD) method applied for improvement of mechanical and metallurgical properties of materials. In this research, finite element analysis and response surface method were considered for CP-Ti in CECAP process. Temperature, input extrusion diameter, exit extrusion angle, shear factor and longitudinal distance of input extrusion to ECAP region were selected as input parameters to study strain distribution on the current process. The analysis of variance (ANOVA) was developed for current work, and the results showed that input parameters of input extrusion diameter and shear factor, and the interaction of the temperature and longitudinal distance of input extrusion to ECAP region, and the shear factor and longitudinal distance of input extrusion to ECAP region considerably affect the strain distribution. The hardness measurement in the section A at the points near to center and outer surfaces of sample showed the hardness of ۲۱ and ۲۴ HRC respectively, where, the maximum difference for hardness was achieved about ۱۲% throughout the cross section which is in suitable agreement with the strain distribution model. Moreover, optical microscope (OM) both current CDECAP and conventional CECAP showed that the majority of deformed grains were enlarged. The average deformed grain size for current CECAP was reduced to ۱۰۰ nm, which is considerably smaller than for conventional CECAP with average grain size of ۳۰۰ nm. Furthermore, the load-stroke diagram was achieved by experimental test and compared by the results achieved from numerical model, and the results showed a good agreement between them.

کلمات کلیدی:

Strain distribution, CECAP process, Response surface Method, Finite Element Analysis, CP-Ti

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