

عنوان مقاله:

Size effect in equal channel angular pressing (ECAP) process

محل انتشار:

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نویسندگان:

M. Riazat - *Department of Mechanical Engineering, Faculty of Eng. , University of Tehran, Tehran, Iran*

Ghader Faraji - *Department of Mechanical Engineering, Faculty of Eng. , University of Tehran, Tehran, Iran*

خلاصه مقاله:

The influence of the sample size (diameter while keeping the length constant) in equal channel angular pressing (ECAP) of pure aluminum is examined using finite element method (FEM) and experiment. Different sized aluminum rods were processed via ECAP and the effect of sample size on the strain homogeneity, process load, and the ratio of the friction to the total force were evaluated. The results showed that there is no distinct trend in variation of the strain homogeneity when the sample diameter is changed though largest diameter sample exhibits the best strain homogeneity. It was apparent that an increase in the sample diameter caused to an increase in the total required load. A decrease in the sample size led to a significant increase in the ratio of the friction to the total force. On the other hand, the friction force is more sensitive than the deformation force to the sample size. More precisely, the friction to total load ratio may be related to the ratio of sample length to the sample diameter (l/d). In a constant sample length, friction to total load ratio amplifies significantly with a decrease in the sample diameter. The present study showed some limitation for the scaling up of the ECAP process for the industrial application especially when increase in the sample length. It may be concluded that ECAP processing is not suitable method for producing of long UFG materials.

کلمات کلیدی:

ECAP, size effect, strain homogeneity, total force, friction force

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