

## عنوان مقاله:

Analysis of Material Flow and Phase Transformation in Friction Hydro-Pillar Processing of 1045 Steel

## محل انتشار:

مجله بین المللی طراحی پیشرفته و تکنولوژی ساخت, دوره 13, شماره 4 (سال: 1399)

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## نویسندگان:

Moosa Sajed - *Department of Mechanical Engineering, University of Birjand, Iran*

S. M. Hossein Seyedkashi - *Department of Mechanical Engineering, University of Birjand, Iran*

## خلاصه مقاله:

In the present study, a 3D finite element model was developed using DEFORM commercial software to analyse the material flow and phase transformation, as two key phenomena affecting the joint properties in friction hydro-pillar processing of 1045 steel alloy. The microstructure changes significantly due to the high temperature and strain rate. The final microstructure was intergranular pearlite and grain boundary allotriomorphic ferrite. Pearlite was the dominant phase at the final microstructure; thus, its volume fraction was used to validate the model where a good agreement was obtained with the experiment. According to the model, the pearlite volume fraction varies from 100% to 70% moving from the bottom of the stud to the top. The model suggests an inverse relation between the strain rate and pearlite volume fraction. The highest temperature which was experienced in the welding step was 1490 °C while it dropped to 890 °C in the forging step. Downward and then radial material flow was detected in the welding step while upward extrusion of material was the dominant material flow pattern during the forging step. Flash was formed mainly .in the forging step from stud side material

## کلمات کلیدی:

Friction Hydro-Pillar Processing, Material Flow, 1045 Steel, Solid-State Processing, Phase transformation

## لینک ثابت مقاله در پایگاه سیویلیکا:

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