

Measurement of coefficient of friction under bulk plastic deformation by using plane strain extrusion apparatus with plane plate tool and taper die

Abstract :

A series of experiment to measure coefficient of friction under bulk plastic deformation in plane strain extrusion was carried out by using the apparatus in which a taper die and a plane plate tool were arranged in facing each other. The plane plate tool had detection part of the normal and frictional forces acting on the tool surface so that coefficient of friction could be measured. Conditions of frictional constraint on the surface of plane plate tool were changed by applying the lubricant with high viscosity or lubricant with low viscosity. While, lubricant applied to the other contact surfaces with billet such as the surfaces of taper die and sidewall was fixed to one kind. Billet was made of Aluminum (A1050-JIS) and the extrusion apparatus was made of SKD-11-JIS. Then, the values of coefficient of friction were measured and surface conditions of a billet were investigated on the plane plate tool side. Differences of the conditions of material flow and effective strain in whole area of deformation zone of a billet, which were affected with different frictional constraint on the surface of plane plate, were also investigated by carrying out the viscoplasticity analysis