

EFFECTS OF COATING ON DIE COMPONENTS DURING ALUMINUM EXTRUSION PROCESS

Tushar Bakhtiani, Jing Zhang, Hazim El-Mounayri

Department of Mechanical Engineering, Indiana University - Purdue University Indianapolis,
Indianapolis, IN 46202, USA

*e-mail: jz29@iupui.edu

In aluminum extrusion the life of the die tooling components are mainly limited by wear and fatigue. Therefore reliable predictions of the amount of wear and its distribution in dies are important factors for the die manufacturer[1]. In this study the stress location and wear depth of the tooling components were calculated with the help of Archards wear model which is implemented into Deform 3D finite element code for large scale plastic deformation. Using Deform 3D a comparative study was conducted on the modular die design mandrel and die plate made out of powder metal (PM) tool steel without coating and Bilayer chemical vapor deposition (CVD) coating of (TiCN + Al₂O₃) to locate to maximum stress locations and to calculate the amount of wear that occurs during hot aluminum extrusion. The results generated from the simulation would help predict the service life of the components, would also help in optimizing the right amount of thickness needed for the coating to improve die life and would also help in understanding the effects of coating on die stress and wear.

1. Lee, G.-A. and Y.-T. Im, *Finite-element investigation of the wear and elastic deformation of dies in metal forming*. Journal of Materials Processing Technology, 1999. **89–90**(0): p. 123-127.