

VARIABLE TRIBOLOGICAL CONDITIONS ON THE FLANGE AND NONMONOTONOUS FORMING IN DEEP DRAWING OF COATED SHEETS

S. ALEKSANDROVIC^{a*}, M. STEFANOVIC^a, D. ADAMOVIC^a, V. LAZIC^a,
M. BABIC^a, R. NIKOLIC^a, T. VUJINOVIC^b

^a *Faculty of Mechanical Engineering, 34 000 Kragujevac, Serbia*

^b *Machine Factory Jelsingrad, 78 000 Banja Luka, Bosnia and Herzegovina*

E-mail: srba@kg.ac.rs

ABSTRACT

In the paper are presented results of experimental investigation of influences of specific tribological system during the nonmonotonous two-phase process of deep drawing of low carbon electro-galvanised steel sheets. The piece geometry is prismatic, with rectangular cross-section. In the first phase of forming the uni-axial tension is done of the wide stripes, until the elongation is 10%, after that the blank is produced and then deep drawing as the second phase. The flange zone is considered where the friction regimes are created in three ways: dry surfaces, application of the adequate oil, application of the oil and the PET foil. The normal force, i.e. the blank holding force, is being set based on conditions of the constant contact pressure that requires possibility of creating the variable blank holding force with decreasing character, according to the flange decrease during the forming process. The other influences: speed, friction conditions in the other zones outside of the flange, tools, etc., were not varied.

Identification and estimate of the influences of some tribological parameters are done by monitoring the drawing force, the distribution of the main strains in the sheet plane, their relation to the limiting formability curves, as well as the drawing depth.

It was concluded that it is possible to use the concrete nonmonotonousness and the adequate combinations of the piece position, the friction regime and the contact pressure on the flange and in that way to improve the process results.

Keywords: friction on the flange, nonmonotonous forming, coated sheets, deep drawing.

* For correspondence.

