

THE SPRINGBACK ANALYSE AT V-BENDING OPERATION. THE UNIFORMISATION AND DIMINUATION OF SPRINGBACK PHENOMEN.

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Abstract: *This article deals an important aspect of instability phenomenon at sheet metal bending operation, namely the springback (which is a geometric phenomenon that affects accuracy by changing the geometric shape). In this paper it was realized a theoretical and experimental study which highlights how these factors influence the springback at the sheet V bending. A new influence factor was introduced – the temperature. It is analyzed how a few factors (thickness, material, bending force, punch radius and temperature) influencing the springback phenomenon at V bending operation. Using FEM, the authors try an interpretation at springback phenomenon on V-bending operation of the influence factors (bending force, thickness, punch radius and material). To highlight how the deformations evolve during the bending process it is made a simulation with a finite element using the ANSYS programme. The authors observed the tension dispersion, equivalent stress, equivalent plastic strain, bending forces and places where the springback effect is higher. The springback phenomenon can be diminished? The temperature is the answer? They observed too the sheet behaviour during bending operation. The experimental research regarding springback phenomenon is made on CNC bending machine (DURMA AD-R 37175) with three bending punches (at different punch radius: 0.8 mm, 2.0 mm and 5.0 mm). The materials analysed are aluminum and brass at two different thickness: 0.5, 1.0 mm (for almost all influence factors), 0.5, 1.0, 1.5 mm (at aluminum material studying the influence of temperature factor), 0.3, 0.5, 1.5 mm (at brass material studying the influence of temperature factor). In bending process the authors try three bending forces to see the springback progress. After experimental research and FEM simulations it was tried to compare the results and to find few conclusions. In this article it's made a simulation of sheet bending process (shown the evolution of sheet during bending operation, they see too the springback evolution after bending operation).*

Keywords: *V bending operation, sheet, springback, FEM*

1. Introduction

All methods related to the plastic deformation at cold temperatures (in case of metallic and non-metallic sheets) are accompanied by a series of instability phenomena that lead to the diminution of the manufacture precision through the modification of the geometrical form and the aggravation of the processed surfaces. These phenomena may be classified according to two

categories: phenomena that appear during the deformation process and, respectively, phenomena that appear after the deformation process. The elastic rebound / springback is an instability phenomenon that appears after the deformation process. For the bending process to be improved, the springback must diminish. The springback may be measured with the help of the springback angle (that represents the difference between the angle obtained after the proper bending / after relaxation and the