ANALYSIS OF THE TEMPERATURE CHANGE ON THE TOOL AND WORK PIECE DURING THE IRONING PROCESS

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Summary: *The purpose of the paper is to investigate the temperature field in the contact between the tool and workpiece in the ironing process of strip, by application of integrated physical modeling and numerical simulation approach. The physical modeling of the ironing process was performed on originally developed strip ironing device, with installed the thermocouples at the position close to the contact surface of the die. Because the laboratory equipment allowed experiments only at lower deformation rates, there was a need for numerical estimations of the temperature fields at higher speeds. Moreover, there were experimental limits in measuring the contact pressures and temperature at high speeds which were eliminated by application of the FE simulations. For this purpose a series of the numerical experiments was conducted. The presented results show good agreement of experimental and numerical results, in the range of low velocities, with tendencies of the temperature increase with increase of speeds. The concluding remarks provide recommendations for successful forming.*
Keywords: *ironing, temperature, physical modeling, numerical simulation, finite element method*

1. INTRODUCTION

During the ironing process an increase of temperature occurs due to material deformation as well as due to the friction at the tool and workpiece interface.

Due to the plastic deformation of material and friction between the ironed material and tool, an increase of temperature occurs, especially at higher deformation speeds. Increased temperature within the interface can significantly influence changes of the lubricant's characteristics, through the change of the lubricant's viscosity. Also, the increased temperature can intensify the tool wear process. In ironing the tin coated thin sheets temperature significantly influence state of the tin coating. From the aforementioned reasons, it is necessary to take into account the generated heat at the

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