Hydromechanical Deep Drawing Simulations: Model Development and Process Parameters Investigation

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Abstract. Numerical simulation conducted by Finite Element Method is one of the most powerful tools for analyzing metal forming processes. Among them, Hydromechanical Deep Drawing (HDD) is, probably, the process which has gained the major interest in industries in the last few years. In this paper a numerical study of HDD of a can box is presented. The influence of geometrical features of a pressure chamber in terms of the gap with the punch is discussed, together with the main process parameters, such as counter-pressure and Blank Holder Force (BHF). The pressure path was found to be the key parameter for a successful HDD. The pressure, in fact, has to be increased very quickly in the first part of the process in order to obtain a minimum friction between the blank and the die entrance radius. The BHF is determined by the pressure path and so a simple way for understanding the correct force was developed. The results are presented in terms of thinning and wrinkles of the final product. Thickness was found to decrease in the first half of the simulation and then it remains constant; wrinkles take place in the last steps of the simulation and they depend on the BHF and on sheet metal anisotropy. The FEM commercial code Pam Stamp 2000 with *Aquadraw* function was utilized.