Numerical-Stochastic Modeling and Simulation of Deep Drawing Tinplate Rings

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Abstract. Deep drawing process, although deceptively simple, involves a complex interplay between material properties, die geometry, process variables and also friction (lubrication) conditions. Numerical and stochastic modeling and simulation of this process means defining the correlation among the variables of the process in order to improve the existing processes. Using the Box-Wilson′s multi factorial experimental design the stochastic, numerical and experimental investigations on the thinwalled tinplate rings (material: TS 260, TS 275, TH 415, TH 435, TH 520 according to the European Standard EN 10202) were performed. The FEM analysis applying ABAQUS Explicit code as well as stochastic analysis have been used in order to predict the influences of wall thickness and lubrication on reducing drawing force and estimate its influence on process consumed energy. The accuracy of the numerical and stochastic results is confirmed through the comparison with the experimental results.