عنوان مقاله:

Numerical Simulation and evaluation of effective parameters during cold drawing of ۴۱۰ stainless steel tubes

نویسندگان:

M.M. Niazi – Department of Material Engineering, Malek Ashtar University of Technology, Isfahan, Shahinshahr, Iran

R. Vafaei – Department of Material Engineering, Malek Ashtar University of Technology, Isfahan, Shahinshahr, Iran

E. Sharifi – Department of Material Engineering, Malek Ashtar University of Technology, Isfahan, Shahinshahr, Iran

Ashgahr Mahdian – Department of Mechanic, University of Malek Ashtar, Isfahan, Iran

خلاصه مقاله:

In this study, the effects of changing die angle on drawing force during cold drawing of a ۴۱۰ stainless steel tube is evaluated. For this purpose, simulation of the process by Abaqus software was performed and the results were compared with the experimental findings. By applying Johnson and Cook's equation the flow behavior of the steel was also assessed during cold drawing., Ring compression tests were performed to determine the coefficient of friction at die-tube and tube-plug interfaces. Furthermore, strain distribution during the process was considered to evaluate the mechanical behavior of the steel. An essential aspect of the work was to estimate the required drawing force, by lower and upper-bound theories. It is illustrated that the lowest drawing force is obtained at the half die angle of ۱۶°. At this angle drawing force of ۱۶۴.۶ KN was estimated by simulation. Experimental results at half die angle of ۱۶° indicated a drawing force of ۱۷۵.۱ KN which illustrates about ۵% discrepancy with simulated results. Also, the radial strains at this die angle had the highest value in comparison with other half die angles of ۱۲ and ۱۴ degrees. The highest amount of strain was observed in axial direction of the drawing process at the half die angle of ۱۶°. Lowest values of residual stresses were developed at this die angle.

کلمات کلیدی:

Simulation, ۴۱۰ stainless steel, drawing force, friction, die angle

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