Abstract

Springback is very important factor to influence quality of sheet metal forming. Accurate prediction and controlling of springback is essential for the design of tools for sheet metal forming, many parameters affect on this phenomenon, we used in this study rolling direction $[0^\circ, 45^\circ, 90^\circ]$, punch speed $[2, 20, 200]$ mm/min and dwell time $[0.0333, 1, 5]$ min.

The main objective of the present work is to find the optimum parameters that reduce the springback by using the commercially [SPSS] program to analysis data and find the best parameters which given lowest springback. A die was designed and constructed in different shape (V-die, V-air die, U-die).

A commercial Aluminum alloy [AL-1050] sheet (0.9 mm) thickness we found that the U-die has lower springback and the V-air die has higher springback and when increase punch speed increase the springback, when direction angle rolling is $90^\circ$. Lower springback, and when increase the dwell time decrease the springback, and the value of parameters predicted from [SPSS] have lower springback this led to reduce the cost and obtain a goal dimension for the products.

Multiple regression models are proposed for each die to predict springback by using (SPSS) model. Punch speed and direction angle rolling and dwell time are used as independent input variables (parameters), while springback as dependent output variable.

The multiple regression model using (SPSS) could predict the spring back with average percentage of Standard Error estimated for springback (SPSS) it is $0.582\%, 0.439\%$ and $0.298\%$ for V- die, V- air die and U-
die respectively, and 0.336%, 0.206% and 0.174% for V-die, V-air die and U-die respectively in springback ratio ($K_s$).