World Academy of Science, Engineering and Technology
International Journal of Mechanical and Industrial Engineering
Vol:9, No:03, 2015

Modeling Studies on the Elevated Temperatures Formability of Tube Ends Using RSM

Authors : M. J. Davidson, N. Selvaraj, L. Venugopal

Abstract : The elevated temperature forming studies on the expansion of thin walled tubes have been studied in the present work. The influence of process parameters namely the die angle, the die ratio and the operating temperatures on the expansion of tube ends at elevated temperatures is carried out. The range of operating parameters have been identified by perfoming extensive simulation studies. The hot forming parameters have been evaluated for AA2014 alloy for performing the simulation studies. Experimental matrix has been developed from the feasible range got from the simulation results. The design of experiments is used for the optimization of process parameters. Response Surface Method's (RSM) and Box-Behenken design (BBD) is used for developing the mathematical model for expansion. Analysis of variance (ANOVA) is used to analyze the influence of process parameters on the expansion of tube ends. The effect of various process combinations of expansion are analyzed through graphical representations. The developed model is found to be appropriate as the coefficient of determination value is very high and is equal to 0.9726. The predicted values are found to coincide well with the experimental results, within acceptable error limits.

Keywords : expansion, optimization, Response Surface Method (RSM), ANOVA, bbd, residuals, regression, tube
Conference Title : ICIME 2015 : International Conference on Industrial and Mechanical Engineering
Conference Location : London, United Kingdom
Conference Dates : March 14-15, 2015