World Academy of Science, Engineering and Technology
International Journal of Mechanical and Industrial Engineering
Vol:9, No:02, 2015

Prediction and Reduction of Cracking Issue in Precision Forging of Engine Valves Using Finite Element Method

Authors : Xi Yang, Bulent Chavdar, Alan Vonseggern, Taylan Altan

Abstract : Fracture in hot precision forging of engine valves was investigated in this paper. The entire valve forging procedure was described and the possible cause of the fracture was proposed. Finite Element simulation was conducted for the forging process, with commercial Finite Element code DEFORMTM. The effects of material properties, the effect of strain rate and temperature were considered in the FE simulation. Two fracture criteria were discussed and compared, based on the accuracy and reliability of the FE simulation results. The selected criterion predicted the fracture location and shows the trend of damage increasing with good accuracy, which matches the experimental observation. Additional modification of the punch shapes was proposed to further reduce the tendency of fracture in forging. Finite Element comparison shows a great potential of such application in the mass production.

Keywords : hotforging, engine valve, fracture, tooling
Conference Title : ICMEM 2015 : International Conference on Mechanical Engineering and Manufacturing
Conference Location : Istanbul, Türkiye
Conference Dates : February 16-17, 2015