ABSTRACT

This work is dedicated to design and manufacture the mechanical fuse shear pin that used in the rolling machine of the General Company for Copper and Mechanical Industries in Iraq. Finite element analysis that performed by ANSYS software is used to accomplish the numerical part of this study. The maximum principal stress theory is selected as the failure criterion. A gray cast iron material is employed as shear pin's material due to its brittleness, availability and low cost in Iraq. Two numerical patterns of the shear pins are designed with different notch geometries. The effect of notch angle, depth, tip radius and shape on the fracture torque are studied. For shear pin checking purpose, **a complete testing system is designed and manufactured** to simulate the work way of the intended rolling machine. Consequently, **the most suitable specimen is with 90° notch angle, 6 mm notch depth, and 0.5 mm tip radius**. The notch angle is inversely proportioned with fracture stress. The 0.25 mm tip radius is generally produced the minimum value of the fracture torque. A comparison between the numerical and experimental works is shown an acceptable result.