Abstract

The main objective of the present work is the study of the effect of residual stresses due to the cold working process in the fatigue lives of structural engineering components, in this particular case specimens of simple geometry which are often used in the study of aircraft structures. This method introduces a compressive stress field around the hole reducing the tendency for fatigue cracks to initiate and grow under cyclic mechanical loading. As it is well known, for the accurate assessment of fatigue lifetimes a detailed knowledge of the residual stress profile is required. Powerful experimental and numerical tools are nowadays available for that purpose. In the present work both types of tools were used: X-rays measurements and 2D and 3D FEA analyses are used in order to evaluate the residual stress profile. The study of fracture surfaces was carried out in order to decode the information of the failure process. This fractography work was performed using SEM. Fatigue striations spacing were measured. CGR and fractographic reconstitution of fatigue crack history were performed based on these measurements. The statistical analysis of the fatigue tests is presented and discussed.