

Ductile material, ductile failure? A look from an IDIC perspective

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ABSTRACT

This paper presents a coupled experimental/numerical procedure to evaluate the constitutive response of Ti 6-4 alloy in a situation representative of those seen in service. From initial calculations on industrial parts it was decided to perform tensile tests on thin and thick notched samples, which allow appropriate ranges of stress triaxiality to be covered. The experimental data sets consist of digital images and corresponding load levels, and a commercial code (Abaqus) is used in an integrated approach to Digital Image Correlation (IDIC) [1].

For the studied material simulations allowed different hardening postulates to be tested up to a local level of equivalent plastic strain equal to 40% for thin samples (which is more than three times higher than those achievable in tensile test on smooth samples) and 15% for thick samples [2]. Then different failure criteria were tested based on the actual fractured surface by post-processing the 3D finite strain simulations of the IDIC framework. It is found that, at a mesoscopic level, Rankine's criterion is well adapted while criteria based on other quantities failed to give consistent results for both thin and thick samples [3].

REFERENCES

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