Temperature and Geometry Dependence of Fracture Toughness in "Euro Fracture Dataset"

P. Akbarzadeh[1, a] and S. Hadidi-Moud[1,b]

[1]Mechanical Engineering Department, University Campus, Ferdowsi University of Mashhad, Mashhad, Iran

[a]po_akbarzadeh@yahoo.com , [b]hadidi@um.ac.ir

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Abstract. Reliable prediction of fracture conditions is a major concern in the integrity assessment of structural components. This is specifically critical within the transition regime where there is a significant scatter in fracture test data. In recent years local stress based approaches that use a "Weibull distribution function" have been examined to predict probability of cleavage fracture at lower shelf temperature. Furthermore the role of constraint in toughness prediction has been noted. Extensive experimental programme known as "Euro fracture dataset" conducted to characterise the "Ductile-to-Brittle" transition (DBT) behaviour of ferritic steels were recently used by authors to propose a set of "Global" equations for determination of temperature and thickness dependence of Weibull distribution parameters. In this paper finite element simulations of fracture tests are carried out firstly to verify the experimental findings and secondly to examine and validate the proposed "Global" equations. This objective has been achieved through the comparison between the experimental data, predictions of "Global" curves and the results of performed finite element simulations.