# Accuracy of VCCT for Calculating Stress Intensity Factor in Metal Specimens Subjected to Bending Load

**Authors :** Sanjin Kršćanski, Josip Brnić

**Abstract :** Virtual Crack Closure Technique (VCCT) is a method used for calculating stress intensity factor (SIF) of a cracked body that is easily implemented on top of basic finite element (FE) codes and as such can be applied on the various component geometries. It is a relatively simple method that does not require any special finite elements to be used and is usually used for calculating stress intensity factors at the crack tip for components made of brittle materials. This paper studies applicability and accuracy of VCCT applied on standard metal specimens containing trough thickness crack, subjected to an in-plane bending load. Finite element analyses were performed using regular 4-node, regular 8-node and a modified quarter-point 8-node 2D elements. Stress intensity factor was calculated from the FE model results for a given crack length, using data available from FE analysis and a custom programmed algorithm based on virtual crack closure technique. Influence of the finite element size on the accuracy of calculated SIF was also studied. The final part of this paper includes a comparison of calculated stress intensity factors with results obtained from analytical expressions found in available literature and in ASTM standard. Results calculated by this algorithm based on VCCT were found to be in good correlation with results obtained with mentioned analytical expressions.

**Keywords :** VCCT, stress intensity factor, finite element analysis, 2D finite elements, bending