

A NEW PRECRACKING METHOD FOR FRACTURE TOUGHNESS TESTING  
OF CEMENTED CARBIDES

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INTRODUCTION

To measure the valid fracture toughness,  $K_{Ic}$ , of a material, the specimen must have a precrack with sharp, simple geometry and also be free from residual stress to ensure the propagation of the fracture. Fatigue precracking, as shown in the ASTM standard etc., is the most common method to introduce the precrack. But in brittle material, it is very difficult if not impossible to use this method, since the propagation rate of the crack is very high. Therefore, alternative precracking methods are required for a fracture toughness testing of cemented carbides.

Recently, fracture toughness tests of cemented carbides have been examined by various methods such as the indentation method with a Knoop indenter(1), a Vickers and a wedge indenter(2), electro-discharge machining(2-4), work-of-fracture(5), compact tension(6,7) and double torsion(8). In the first three, the state of the precrack and fatigue precrack are not necessarily identical, since the crack tip is affected by mechanical or thermal damage. The other methods probably give valid fracture toughness values, but special equipment and a select specimen are required and the measurement cost is extremely high. Therefore, these methods are not practical in daily work on development of new materials and for quality control of products.

The purpose of the present study is to develop a simple new and valid method for fracture toughness testing of cemented carbides. For this purpose, an indentation method precrack is improved by a two-step preparation process.