# Finite Element Analysis of Ti-Alloy Fracture Behavior and Experimental Validation

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## ABSTRACT

Ti-6Al-3Mo-2Cr titanium alloy that finds applications as components of the aircraft engine. Analysis of crack growth in engine compressor disks made of this material has been carried out. It has been observed that there is a general trend of increasing stress intensity factor with increasing applied tensile load. It can also be observed that the stress intensity factor increases with increasing crack size and width of the flat specimen. Microstructure analysis of the specimen (tested under σ = 1100 MPa) has revealed quasi-cleavage fracture with small symptoms of plastic shearing in the early part of cracking.

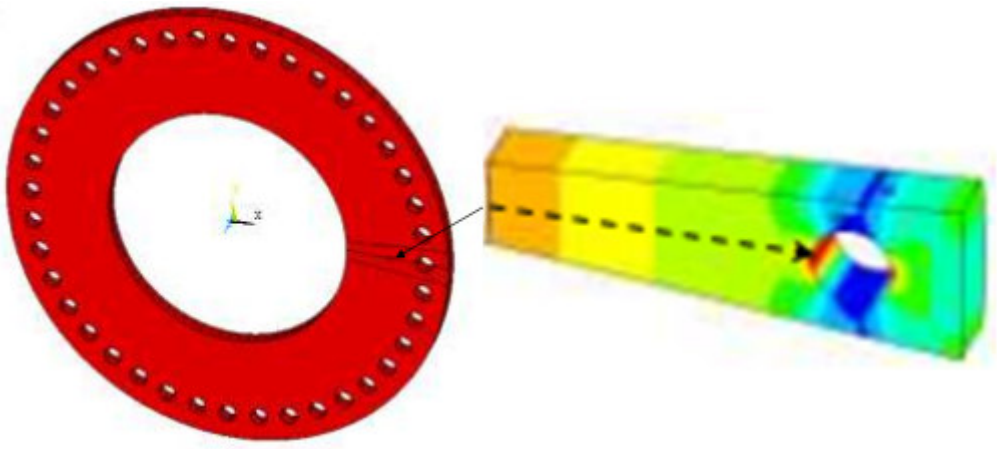


Figure 1: Geometric model and FE model along with the crack tip.

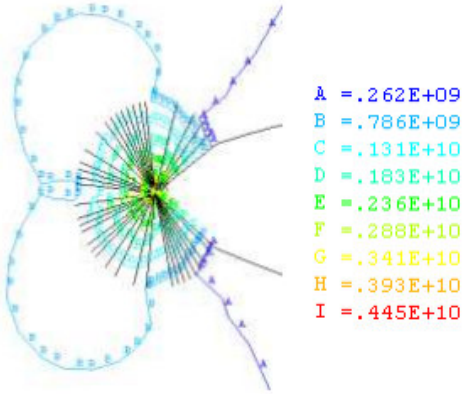



Figure 2: Fringe plot of the crack.

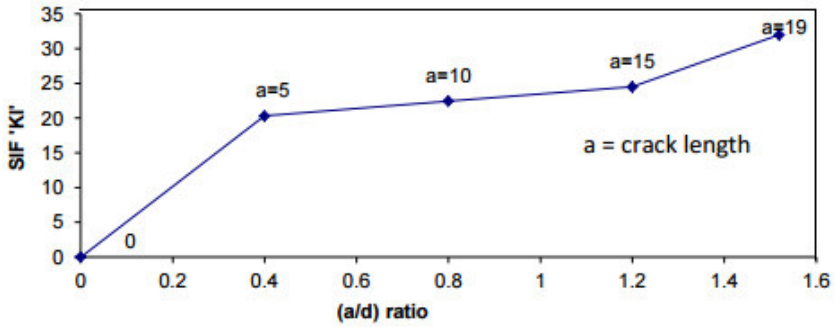
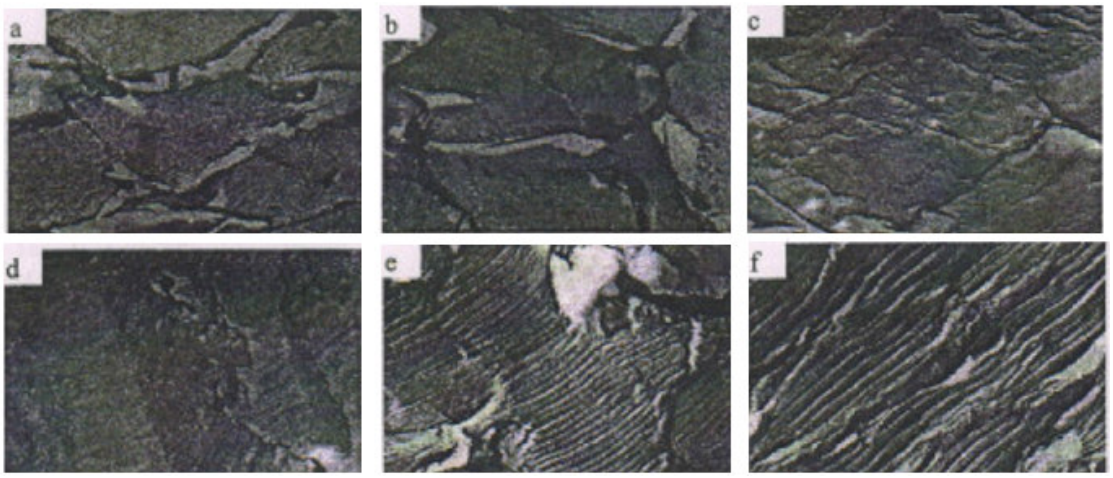



Figure 3: Stress Intensity factor plot for varying (a/d) ratio.




(a) Figure 4: Microstructure of fractured specimens for test conditions: (a) Specimen width = 25 mm, crack length = 2.5 mm, Load = 900 MPa; (b) Specimen width = 50 mm, crack length = 5.0 mm, Load = 900 MPa; (c) Specimen width = 25 mm, crack length = 2.5 mm, Load = 1000 MPa; (d) Specimen width = 50 mm, crack length = 5.0 mm, Load = 1000 MPa; (e) Specimen width = 25 mm, crack length = 2.5 mm, Load = 1100 MPa; (f) Specimen width = 50 mm, crack length = 5.0 mm, Load = 1100 MPa

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