NONDESTRUCTIVE TESTING FOR FINDING OUT THE DISPLACEMENT OF CRACK IN SILICON NITRIDE

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Dedication

This thesis is dedicated all my teachers and professors who have taught me till date. Special mention of Dr. C.Nagaraju who was very supportive and encouraged me to do my Masters after my Bachelors degree. I personally thank Dr. Jenny who was very supportive and helped me learn many things which I was never aware of. Can never forget the unconditional love, guidance and support given by all my family members and friends.

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Abstract

Nondestructive testing (NDT) has become an increasingly vital factor in the effective conduct of research, development, design and manufacturing. Only with the appropriate use of nondestructive testing techniques, the benefits of advanced materials science can be fully realized. NDT has a wide range of industrial applications and various methods and techniques are employed to perform the nondestructive testing. The current work aims to demonstrate the nondestructive testing technique applied to determine the damage in silicon nitride. Ceramics are brittle materials and non destructive evaluation methods are required to assess the quality and reliability of them. A nondestructive evaluation technique has been developed to study the inspection of silicon nitride using the laser scattering method. Failure analysis is done by collecting and analyzing the data to determine the location of the damage. Nondestructive evaluation can detect the damage in the sample and give us information about the nature and the location of it. An important feature in nondestructive evaluation is that it does not cause any further damage to the sample. Failure criteria by fracture mechanics is also discussed by simulating the value of stress intensity factor and comparing it with manual solution. In addition, existing NDT techniques have been reviewed and a flowchart to determine the most suitable evaluation technique based on their working mechanism and applications has been generated.

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