Introduction

The field of fracture mechanics has followed a distinct evolutionary pattern over the past 40 years. The period from the fifties through the sixties was a time of intense basic research from both the mechanics and materials points of view. During the seventies increasing transfer occurred from research into application with a corresponding increase in fracture mechanics based standards and specifications. Today while research into such areas as nonlinear fracture behavior and fracture/fatigue in new materials is still significant, the field of fracture mechanics has matured into a useful tool for engineering structural design, maintenance and inspection, and post failure analysis work.

Ever since the early days of research in fracture, numerous books and journals have been available to document the advances in the basic understanding of fracture and fatigue mechanisms and theory. However, the avenues for widely distributed information on experience gained in applying fracture mechanics to specific problems of hardware design and operation have been sorely lacking. With this in mind, the E-24 Committee on Fracture Testing of ASTM sponsored a Symposium on Case Histories Involving Fatigue and Fracture Mechanics in Charleston, South Carolina, on the 21st and 22nd of March, 1985. The response was extraordinary with over 20 case histories accepted for inclusion in the meeting. Many potentially good papers had to be excluded because of space and time limitations in the program.

The case history format was chosen for the meeting and resulting publication as the ideal medium for documenting experience. Authors were encourage to present clear and detailed examples of how fracture and fatigue concepts and data were applied to actual engineering components and systems. Sufficient information was sought to specify the geometrical, material, loading, environmental, and crack characterizations required to perform each case history investigation.

The results can be found in the case histories of this book. Major areas of application are pressure vessels, power generation equipment, structures, aircraft, manufacturing equipment, and bio-medical devices. In all cases, the authors are relating first hand experience on how they have applied fracture mechanics to engineering components in real life situations and time frames. Keep in mind that, as such, a case history is not put forward as "the best" way to tackle any given situation, but only as "a reasoned" way to accomplish stated objectives. They are to be learned from, built

upon, and modified where necessary to enable the production and operation of safer, more reliable engineering products in the future.

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