Introduction

The Symposium on Chevron-Notched Specimens: Testing and Stress Analysis was held at the Galt House, Louisville, Kentucky, 21 Apr 1983, as part of the Spring meetings of ASTM Committee E-24 on Fracture Testing. Chevron-notched testing and analysis has been a topic of considerable interest to ASTM Committee E-24. The work at NASA Lewis Research Center and Terra Tek Systems, which made up much of the initial chevron-notched work, has been presented often at E-24 subcommittee and task group meetings. Mr. David P. Wilhem, while chairman of ASTM Subcommittee E24.01 on Fracture Mechanics Test Methods, proposed this symposium to bring together the most up-to-date investigations on chevron-notched testing. The current focus is on cooperative, comparative test and analysis programs, and a proposed standard test method, coordinated by task groups of Subcommittee E24.01 and Subcommittee E24.07 on Fracture Mechanics of Brittle Materials.

The most important advantage in using chevron-notched specimens for fracture testing is that a precrack can be produced in a single load application, with the precrack self-initiating at the tip of the chevron. The sometimes difficult, and always time consuming, fatigue precracking operation can be eliminated. One important purpose of the work described in this publication, given the precracking and other differences in chevron-notched testing compared with existing tests, is to identify the conditions which will yield reproducible results. These conditions involve specimen material, specimen size and geometry, test procedures, and the stress analysis procedures used to evaluate results. Once consistent results are obtained, then detailed comparisons of test data obtained by chevron-notched techniques can be made with results from standard tests.

The papers in the volume are presented in three sections:

1. *Stress Analysis,* including primarily finite element stress analysis of several chevron-notched geometries, but also encompassing boundary integral, photoelastic, and analytical and experimental compliance methods of stress analysis.

2. *Test Method Development,* both experimental and analytical investigations of key concerns with chevron-notched testing, such as specimen size effects, different material behavior including metals and nonmetals, and various methods for measuring crack growth.

3. *Fracture Toughness Measurements,* with primary emphasis on chevron-notched measurement of fracture toughness of structural materials, including

aluminum alloys and a variety of hard/brittle materials such as oxides and carbides.

This publication is the first collection of information on chevron-notched testing, and it should provide a resource for the development and use of this type of specimen for fracture testing. The symposium chairmen/editors are pleased to acknowledge the help of the ASTM editorial staff listed herein and Committee E-24 staff manager, Matt Lieff. Each of us also acknowledges the support of his respective laboratory and support staff.

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