

Overview

The Symposium on Environmentally Assisted Cracking: Science and Engineering was organized to assess progress in the understanding and control of this phenomenon, recognized as one of the most serious causes of structural failure over a broad range of industrial application. This mode of failure continues to pose a long-term concern for the use of metallic materials in applications involving aggressive liquid and gaseous environments throughout the range of service temperatures. Research into environmentally assisted cracking has continued to progress in recent years. ASTM has previously held a series of symposia on various aspects of this phenomenon, most recently in April 1982 (see ASTM STP 821). With the continuing research on this important cause of metal failure and new service applications placing increasing demands on metallic structures, the organizers from ASTM Committees G-1, E-24, and E-9 recognized the need for another broad-based symposium addressing both the science and the engineering aspects of the subject. The resulting symposium was held 9–11 November 1987 in Bal Harbour, Florida.

Papers were solicited on a range of topics that included phenomena, basic mechanisms, modeling, test methodologies, materials performance, engineering applications, and service experience and failures. This volume reflects the current emphasis with regard to material/environment systems, research community addressing the topic, and specific technical interest. The content suggests that the subject continues to cover the broad spectrum of structural alloys and environments as well as numerous test methods and approaches.

As a result of the invited presentations, the symposium was organized into six sessions, including sessions addressing mechanisms, modeling and analysis, and test methods; and three sessions addressing material performance to specific service environments. It is anticipated that a greater appreciation of all aspects of this complex phenomenon, mechanical as well as chemical and electrochemical and their interaction, will be derived from the information presented; and that no single preferred test technique or concept will likely emerge in the future but that all will contribute to a better understanding of materials behavior.

The editors would like to acknowledge other members of the symposium Organizing Committee who contributed to the content of the symposium as well as this publication and who served as chairmen of various symposium sessions. They include: D. O. Sprowls, Committee G-1; R. P. Gangloff, Committee E-24; and C. Q. Bowles, Committee E-9. We would also like to extend sincere appreciation to the ASTM staff, both technical and editorial, for their diligent efforts in the conduct of the symposium and the preparation of this publication.

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