

## Introduction

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The ASTM Standing Committee on Simulated Service and Performance Testing and the National Materials Advisory Board ad hoc Committee on Testing for Prediction of Material Performance in Components and Structures jointly sponsored a series of four national symposia on predictive testing. There were two objectives of the symposia: (1) to provide a state of the art series of papers on testing aimed at validating design decisions, and (2) to provide a tutorial input to the National Materials Advisory Board ad hoc Committee on Testing for Prediction of Material Performance in Components and Structures. (The report of the Committee was published as NMAB 288 and is available from the National Technical Information Service, Springfield, Va. 22151.)

The papers of the first symposium were published in NBS Special Publication 336 "Space Simulation," U. S. Department of Commerce, National Bureau of Standards, Oct. 1970 (for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402, SD Catalog No. C13.10.336 \$5.25). Of the papers presented at Anaheim, Calif., April 1971 and at Atlantic City, N. J., June 1971, fifteen papers, considered to be of lasting importance and most closely related, are included in this volume. Many of the other papers presented at Anaheim and Atlantic City are being published in one of the Society's periodicals—*Journal of Materials and Materials Research and Standards*. It is obvious that the symposia produced an abundance of riches. The fourth symposium was presented at Los Angeles, Calif., June 1972.

It has become apparent as principles of reliability have been applied to design that teaching how to decide when to test and how to test is a gap in engineering education. A basic lesson which emerged from the symposia is that testing which confirms experience without anomaly is a waste. It is only when design is done outside of the set of conditions under which experience without anomaly resulted that testing is imperative. Proceeding without adequate testing under these circumstances is not taking a calculated risk as is often asserted; it is jumping off the end of the dock blindfolded onto unknown rocks or into unknown depths.

The fifteen predictive testing papers in this volume cover a spectrum

which ranges from theoretical considerations of empirical strength through actual demonstrations of late developments in detection of flaws to achievement of reliability by a well designed testing program. These papers are not substitutes for the definitive textbook on the role of testing in the design process. Rather, it is hoped that this volume will not only instruct but will also stimulate the reader to further consideration of this basic element of the engineer's art.

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