

# Fatigue and Fracture Testing of WELDMENTS

McHenry/Potter  
editors



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# ***Fatigue and Fracture Testing of Weldments***

*McHenry/Potter, editors*



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## Foreword

The symposium on Fatigue and Fracture Testing of Weldments was held on 25 April 1988 in Sparks, Nevada. The event was sponsored by ASTM Committees E-9 on Fatigue and E-24 on Fracture Testing. The symposium chairmen were John M. Potter, U.S. Air Force, and Harry I. McHenry, National Institute of Standards and Technology, both of whom also served as editors of this publication.

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# Overview

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The symposium on Fatigue and Fracture Testing of Weldments was organized to define the state of the art in weldments and welded structures and to give direction to future standards activities associated with weldments.

Weldments and welded joints are used in a great variety of critical structures, including buildings, machinery, power plants, automobiles, and airframes. Very often, weldments are chosen for joining massive structures, such as offshore oil drilling platforms or oil pipelines, which themselves can be subject to adverse weathering and loading conditions. The weldment and the welded joint together are a major component that is often blamed for causing a structure to be heavier than desired or for being the point at which fatigue or fracture problems initiate and propagate. The study of fatigue and fracture at welded joints, then, is of significance in determining the durability and damage tolerance of the resultant structure.

This volume contains state-of-the-art information on the mechanical performance of weldments. Its usefulness is enhanced by the range of papers presented herein, since they run the gamut from basic research to very applied research. Details of interest within this volume include basic material studies associated with relating the metallurgy and heat treatment condition of the weld material to the growth behavior in a weld-affected area, often including the effects of corrosive media. Also addressed are the residual stress and structural load distributions within the weldment and their effects upon the flaw growth behavior. At the application end of the spectrum are papers concerning the flaw growth behavior within weldments where the sizes of the sub-scale test elements are measured in feet or metres. The broad range of the topics covered in this Special Technical Publication makes it an excellent resource for designers, analysts, students, and users of weldments and welded structures.

This volume is also meant to serve as a means of setting the directions for future efforts in standards development associated with fatigue and fracture testing of weldments. The authors were charged with defining the “holes” or deficiencies in standards associated with fatigue and fracture testing. As such, this volume will be of significance to the standards definition communities within ASTM’s Committees E-9 on Fatigue and E-24 on Fracture Testing, as well as to other relevant industry standards development organizations.

Weldments provide efficient means of ensuring structural integrity in many applications; this type of joining is often used where there is no other competitive, in terms of cost or mechanical strength, approach to getting the job accomplished. The subject of weldments

deserves significant attention in both the technical and the standards communities because of the importance of the structures that are welded and the consequences associated with their failure.

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