INTRODUCTION

This publication is a concrete example of the cooperation that exists between technical societies – in this instance, the American Society for Metals and the American Society for Testing and Materials. Subcommittee 6 of ASTM Committee G-1 on Corrosion of Metals presented a symposium on stress corrosion at the Fall 1971 meeting of the ASM in Detroit, Michigan. These papers are based on the talks given at that time. The objective was to present a timely report on the state of stress corrosion from a practical, engineering standpoint.

The excellent attendance at this symposium was mute testimony to the widespread nature of the problem of stress corrosion cracking. Project managers, designers, metallurgists, metallurgical engineers, each is concerned with this problem. Unexpected failure of metal parts has plagued the defense, chemical, petroleum, and other industries. However, analysis of each stress corrosion failure is seldom surprising – usually one or more caveats have been violated through ignorance, accident, or lack of precaution. Many of us, active in the field of stress corrosion, have come to the conclusion that the educational part of our work is the most significant, from the standpoint of prevention of failures.

Thus, experts from all phases of the metals industry, from government laboratories, research institutes and from universities gathered together to present the best, current thinking about the problems and the solutions to the use of high strength materials which may be susceptible to stress corrosion cracking.

In this volume information will be found on steels, including the new, high strength steels as well as the stainless and mild steels. Aluminum alloys are discussed with emphasis on the newer versions of high strength alloys and tempers specifically designed for stress corrosion resistance. Other engineering metals and their alloys are covered, including copper, titanium, and nickel.

These materials are discussed in relation to the newer testing methods that have evolved during the past decade. Several authors develop the concepts of linear elastic fracture mechanics as they are applied to specimen design and the interpretation of data. However, the older, time tested methods are not overlooked, as one author details the efforts of ASTM to standardize specimens and solutions used in stress corrosion testing.

This volume is presented to increase the understanding of the interested person who has a need to deal with stress corrosion cracking, either in the design of structures, the selection of materials, the specification of fabrication or maintenance procedures, or regretfully, in failure analysis. Each author was encouraged to deal with his subject using a practical, engineering approach. In

addition, I encourage anyone who has an interest or a problem dealing with stress corrosion, to become affiliated with Subcommittee 6 of Committee G-1 on Stress Corrosion Cracking and Corrosion Fatigue, and work with us in the development of standard test methods that will be used to help select materials and thereby minimize failures from stress corrosion cracking.

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