Introduction

This volume is a collection of 21 peer-reviewed papers obtained from presentations made at the International Symposium on Adhesively Bonded Joints: Testing, Analysis, and Design held in Baltimore, Maryland, on 10–12 September 1986. The symposium was sponsored by ASTM Committee D-14 on Adhesives.

The main purpose of the symposium was to provide a forum for presentation and discussion on the state of the art of testing, analysis, and design of adhesively bonded joints. While the understanding of adhesive failure processes and the ability to analyze them have increased significantly over the past 15 years, the current standard testing procedures, in many cases, do not reflect current knowledge and capabilities. (Indeed, the last symposium sponsored by Committee D-14, entitled *Durability of Adhesive Joints* [*STP 401*], was published in 1965.) It is hoped that this publication will serve as a catalyst for developing new test standards for assessing adhesive bond strength and durability.

By far, the largest volume of adhesives are used in the packaging and forestry industries where adhesive durability is important but the strength required is not very high. The focus of the papers presented herein is for aircraft and naval applications, which are primarily concerned with bonding composite and/or metallic components. While the amount of adhesives used in these applications represents a small percentage of the total adhesive market, these adhesives are faced with very severe environmental conditions in applications where the stress levels are often very high, and where joint failure could result in the loss of a multi-million dollar vehicle, not to mention potential loss of human life. Thus a detailed understanding of adhesive properties and a sophisticated design approach that would never be considered for gluing a cereal box top may now be warranted.

The symposium was truly international. This volume includes papers from the United States, Sweden, Israel, France, and the Netherlands. These papers are divided into four sections:

- *Mechanical Testing*—This section contains papers that discuss some of the latest test techniques and specimen designs for determining tensile, shear, and mixed-mode properties of adhesives.
- *Stress Analysis*—This section presents papers that discuss analytical and experimental methods used to analyze the stress state in an adhesively bonded joint.
- *Failure Mechanisms*—Examples of failure mechanisms in bonded joints are presented in this section for several different types of adherends and specimen geometries.
- *Design and Durability*—Papers in this section deal with design considerations or durability (environmental effects) of bonded joints.

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