

Overview

In recognition of the considerable interest in advanced thermoplastic composites in the aerospace area, Committee ASTM D30 on High Modulus Fibers and Their Composites organized the symposium on Advances in Thermoplastic Matrix Composite Materials held in Bal Harbour, Florida 19-20 Oct. 1987.

Thermoplastic composites are known to provide high impact toughness, delamination fracture energy, and environmental resistance. These qualities are complemented by the flexibility in processing and unlimited shelf life of the composites. However, the materials are relatively more expensive and the knowledge base is just beginning to develop. The symposium was organized to provide a forum to discuss the advantages and disadvantages of these materials in the context of processing and material response. Design and analysis were not emphasized, primarily because the application of these materials for advanced aircraft is just evolving. Currently, major efforts are underway in materials development, processing, and characterization of advanced thermoplastic composites. The symposium captured many of these issues and had a large audience from industry, government, and universities. The program was broad enough to incorporate a few papers on short-fiber reinforced thermoplastic composites for nonaerospace applications, although the emphasis of the symposium was on continuous fiber structural composites.

The papers presented in the symposium can be divided into three major technical areas: processing, thermal and mechanical behavior, and delamination. They are similarly grouped in this special technical publication. The papers related to processing are concerned with process modeling, influence of processing on interfacial strength development, and on coating of carbon fibers for application in thermoplastic composites. Papers on thermal and mechanical behavior address experimental aspects, mechanical properties, thermal characteristics, failure mechanisms, effect of adverse environment, and fatigue. Papers on delamination discuss delamination toughness characterization and delamination growth modeling. A few new concepts are forwarded in this area. Also discussed are morphological issues as they relate to delamination.

In all, a broad overview of state-of-the art research in advanced thermoplastic composites is well represented in this book. The purpose of this publication was not only to inform the technical community of some recent accomplishments in the field, but also to raise questions which will form the basis for future investigations. This discussion and consideration of unresolved issues is expected to advance the thermoplastic matrix composite technology, however small the effort of the ASTM symposium may seem.

I would like to thank the ASTM staff for their dedication to make the symposium a success and to bring out the technical publication in a timely manner. Also, I would like to acknowledge Dr. Clarence Wolf of the McDonnell-Douglas Research Laboratories, Professor Thomas Hahn of the Pennsylvania State University, Dr. Jeffrey Hinkley of NASA-Langley, and Dr. George Sendeckyj of the Air Force Wright Aeronautical Laboratories for their assistance in conducting the sessions. Much thanks to all the reviewers who contributed their valuable time to review the papers. Finally, the authors are congratulated for their contributions to this volume.

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