

COMPOSITE MATERIALS: *QUALITY ASSURANCE AND PROCESSING*

C. E. Browning, *editor*



COMPOSITE MATERIALS: QUALITY ASSURANCE AND PROCESSING

A symposium
sponsored by ASTM
Committee D-30 on
High Modulus Fibers and Their Composites
St. Louis, Mo., 20 October 1981

ASTM SPECIAL TECHNICAL PUBLICATION 797
C. E. Browning, Air Force Wright Aeronautical
Laboratories, editor

ASTM Publication Code Number (PCN)
04-797000-30



1916 Race Street, Philadelphia, Pa. 19103

Copyright © by AMERICAN SOCIETY FOR TESTING AND MATERIALS 1983
Library of Congress Catalog Card Number: 82-72889

NOTE

The Society is not responsible, as a body,
for the statements and opinions
advanced in this publication.

Printed in Baltimore, Md. (a)
February 1983

Foreword

The Symposium on Producibility and Quality Assurance of Composite Materials was held in St. Louis, Missouri, on 20 October 1981. ASTM Committee D-30 on High Modulus Fibers and Their Composites was sponsor. C. E. Browning, Air Force Wright Aeronautical Laboratories, served as symposium chairman and has also edited this publication. The title of this volume differs slightly from that of the symposium.

Related ASTM Publications

Composite Materials: Testing and Design (Sixth Conference), STP 787
(1982), 04-787000-33

Damage in Composite Materials, STP 775 (1982), 04-775000-30

Short Fiber Reinforced Composite Materials, STP 772 (1982), 04-772000-30

Composites for Extreme Environments, STP 768 (1982), 04-768000-33

Joining of Composite Materials, STP 749 (1981), 04-749000-33

Test Methods and Design Allowables for Fibrous Composites, STP 734
(1981), 04-734000-33

Commercial Opportunities for Advanced Composites, STP 704 (1980),
04-704000-33

Nondestructive Evaluation and Flaw Criticality for Composite Materials,
STP 696 (1979), 04-696000-33

Composite Materials: Testing and Design (Fifth Conference), STP 674 (1979),
04-674000-33

A Note of Appreciation to Reviewers

The quality of the papers that appear in this publication reflects not only the obvious efforts of the authors but also the unheralded, though essential, work of the reviewers. On behalf of ASTM we acknowledge with appreciation their dedication to high professional standards and their sacrifice of time and effort.

ASTM Committee on Publications

ASTM Editorial Staff

Janet R. Schroeder
Kathleen A. Greene
Rosemary Horstman
Helen M. Hoersch
Helen P. Mahy
Allan S. Kleinberg
Virginia M. Barishek

Contents

Introduction	1
Quality Assurance of Graphite/Epoxy by High-Performance Liquid Chromatography—T. A. SEWELL	3
The Development of a Material Specification for 177°C (350°F) Curing Graphite/Epoxy Composites—A. K. ROGERS, Y. A. TAJIMA, AND R. C. YOUNG	15
Control of Composite Cure Processes—R. J. HINRICHS	29
Chemorheological Characterization of B-Stage Printed Wiring Board Resins—C. M. TUNG AND P. J. DYNES	38
A Four-Point Shear Test for Graphite/Epoxy Composites—C. E. BROWNING, F. L. ABRAMS, AND J. M. WHITNEY	54
Nondestructive Evaluation of Composite Materials: A Philosophy, An Approach, and An Example—J. C. DUKE, JR.	75
Void Formation and Transport During Composite Laminate Processing: An Initial Model Framework—J. L. KARDOS, M. P. DUDUKOVIĆ, E. L. MCKAGUE, AND M. W. LEHMAN	96
Calculation of Cure Process Variables During Cure of Graphite/Epoxy Composites—A. C. LOOS AND G. S. SPRINGER	110
Characterization of Some Solvent-Resistant Thermoplastic Matrix Composites—A. O. KAYS AND J. D. HUNTER	119
Effect of Microstructure on the Mechanical Behavior of Sheet Molding Compound Composites—R. A. KLINE	133
Characterization of Quick-Cure and Vacuum-Bag Cure Composites—D. J. GLEASON	157
Summary	169
Index	175

