

Cambridge University Press

978-0-521-10355-8 - Mechanical Properties, Performance, and Failure Modes of Coatings

Edited by T. Robert Shives and Marshall B. Peterson

Frontmatter

[More information](#)

---

The use of coatings in industry is growing and will continue to grow because of the economic and technical advantages they offer over uncoated materials. Although a wide variety of materials and application techniques are available, much less is known about the properties of specific coatings and their measurement. This volume contains some twenty-six papers that were presented at a symposium organised to explore these questions and they represent state-of-the-art technology. The symposium was divided into five sessions dealing with new coating technologies, measurement of coating properties, marine coatings, field applied coatings for corrosion control, and tribological coatings.

Cambridge University Press

978-0-521-10355-8 - Mechanical Properties, Performance, and Failure Modes of Coatings

Edited by T. Robert Shives and Marshall B. Peterson

Frontmatter

[More information](#)

---

# **Mechanical Properties, Performance, and Failure Modes of Coatings**

Cambridge University Press

978-0-521-10355-8 - Mechanical Properties, Performance, and Failure Modes of Coatings

Edited by T. Robert Shives and Marshall B. Peterson

Frontmatter

[More information](#)

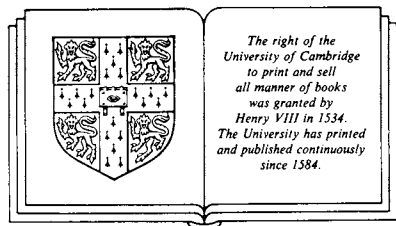
# Mechanical Properties, Performance, and Failure Modes of Coatings

**Proceedings of the 37th Meeting of the  
Mechanical Failures Prevention Group,  
National Bureau of Standards,  
Gaithersburg, Maryland,  
May 10-12, 1983**

**Edited by**

**T. Robert Shives**  
National Bureau of Standards  
Gaithersburg, Maryland

**Marshall B. Peterson**  
Wear Sciences, Incorporated  
Arnold, Maryland



**CAMBRIDGE UNIVERSITY PRESS**

**Cambridge**

**London ■ New York ■ New Rochelle ■ Melbourne ■ Sydney**

Cambridge University Press

978-0-521-10355-8 - Mechanical Properties, Performance, and Failure Modes of Coatings

Edited by T. Robert Shives and Marshall B. Peterson

Frontmatter

[More information](#)

CAMBRIDGE UNIVERSITY PRESS

Cambridge, New York, Melbourne, Madrid, Cape Town, Singapore, São Paulo, Delhi

Cambridge University Press

The Edinburgh Building, Cambridge CB2 8RU, UK

Published in the United States of America by Cambridge University Press, New York

[www.cambridge.org](http://www.cambridge.org)

Information on this title: [www.cambridge.org/9780521103558](http://www.cambridge.org/9780521103558)

© Cambridge University Press 1984

This publication is in copyright. Subject to statutory exception and to the provisions of relevant collective licensing agreements, no reproduction of any part may take place without the written permission of Cambridge University Press.

First published 1984

This digitally printed version 2009

*A catalogue record for this publication is available from the British Library*

*Library of Congress Cataloguing in Publication data*

Mechanical Failures Prevention Group. Meeting (37th :  
1983 : National Bureau of Standards)

Mechanical properties, performance, and failure modes  
of coatings.

1. Coatings--Congresses. I. Shives, T. R.

II. Peterson, M. B. (Marshall B.) III. Title.

TA418.9.C57M43 1983 667'.9 83-26136

ISBN 978-0-521-26420-4 hardback

ISBN 978-0-521-10355-8 paperback

Cambridge University Press

978-0-521-10355-8 - Mechanical Properties, Performance, and Failure Modes of Coatings

Edited by T. Robert Shives and Marshall B. Peterson

Frontmatter

[More information](#)

## Table of Contents

Preface	IX
SESSION I: NEW COATING TECHNOLOGIES	
1. A Review of Coating Technology <i>S. Ramalingam</i>	3
2. Tool-Life of High-Speed Steel Tools Coated with Titanium Nitride by Physical Vapor Deposition <i>W. E. Henderer, G. Thomas and B. F. von Turkovich</i>	18
3. Arc Coating Processes (abstract only) <i>A. Lefkow and W. M. Mularie</i>	26
4. State of the Art in Composite Electroless Coating <i>N. Feldstein and T. Lancsek</i>	27
5. Electrodeposition of Nickel-Chromium Alloys <i>D. S. Lashmore and Ilan Weisshaus</i>	39
SESSION II: MEASUREMENT OF COATING PROPERTIES	
1. Methods for (1) Testing Adhesion, (2) Measuring Thickness, and (3) Measuring Crack and Pore Content of Coatings (abstract only) <i>H. Hintermann</i>	51
2. Measurement of Residual Stresses in Thin Film Coatings <i>C. C. Goldsmith and G. A. Walker</i>	52
3. Prediction of Salt Spray Results from Paint Properties (abstract only) <i>F. Louis Floyd</i>	54
4. Electroformed Microhardness Standards <i>D. R. Kelley, D. S. Lashmore and C. E. Johnson</i>	55
5. Application of the Charge Decay NDE Technique to Surface Coatings (abstract only) <i>B. T. Allison, M. K. Tse, J. F. Ramos and N. P. Suh</i>	59
SESSION III: MARINE COATINGS	
1. Organic Coatings Evaluation and Performance Prediction: An Overview <i>H. S. Pretser and E. H. Halpern</i>	63
2. Low Friction Hull Coatings for Ships <i>Kai Tuukkanen and Tapio Viljava</i>	72

Cambridge University Press

978-0-521-10355-8 - Mechanical Properties, Performance, and Failure Modes of Coatings

Edited by T. Robert Shives and Marshall B. Peterson

Frontmatter

[More information](#)

3. Thermal-Sprayed Coatings for Corrosion Control (abstract only) <i>H. Herman and H. Bhat</i>	81
4. Coatings for Corrosion Control of Navy Ships <i>Vincent J. Lanza</i>	82
5. Measurement of Cavitation Resistance of Organic Marine Coatings <i>S. Basu, A. M. Sinnar and G. S. Bohlander</i>	85
SESSION IV: FIELD APPLIED COATINGS FOR CORROSION CONTROL	
1. The Displacement of Water from a Steel Surface (abstract only) <i>Charles R. Hegedus</i>	101
2. Elastomeric Coating Systems for Naval Aircraft (abstract only) <i>D. Pulley</i>	102
3. Evaluation of Over-Rust Primers <i>S. J. Calabrese, F. F. Ling and S. F. Murray</i>	103
4. Corrosion Prevention for Tactical Vehicles <i>M. J. Devine, D. V. Minuti and M. B. Peterson</i>	111
5. Corrosion Tests of Electrodeposited Coatings in Boiling 100 Percent Phosphoric Acid <i>C. E. Johnson, J. L. Mullen and D. S. Lashmore</i>	124
SESSION V: TRIBOLOGICAL COATINGS	
1. A Strategy for Selection of Tribological Coatings <i>M. B. Peterson and A. W. Ruff</i>	137
2. Coatings for Erosion Resistance <i>George F. Schmitt, Jr</i>	148
3. Slurry Abrasion/Erosion Behavior of Metal-Ceramic Coatings <i>Alberto A. Sagüés, Gordon A. Sargent and Diane K. Spencer</i>	165
4. Tribological Properties of Magnetron Sputtered Titanium Nitride <i>S. Ramalingam and Ward O. Winer</i>	177
5. Polishing Wear Studies of Coating Materials <i>Robert N. Bolster and Irwin L. Singer</i>	201
6. Solid Lubrication of Steel by SbSbS <sub>4</sub> <i>L. K. Ives and M. B. Peterson</i>	208

APPENDIX

Cambridge University Press

978-0-521-10355-8 - Mechanical Properties, Performance, and Failure Modes of Coatings

Edited by T. Robert Shives and Marshall B. Peterson

Frontmatter

[More information](#)

---

## PREFACE

The 35th Meeting of the Mechanical Failures Prevention Group (MFPG) was held May 10-12, 1983, at the National Bureau of Standards in Gaithersburg, Maryland. The program, which focused on the mechanical properties of coatings and their measurement, was organized by the MFPG Materials Durability Evaluation Committee under the chairmanship of Marshall Peterson of Wear Sciences, Inc. Appreciation is expressed to the committee, the session chairman, and the contributors for an excellent program. Appreciation is also expressed to the National Bureau of Standards, the Office of Naval Research, and the Naval Air Systems Command for financial support.

Special thanks are due to Sara R. Torrence of the NBS Public Information Division for the meeting, hotel, and social function arrangements, and to Kathy C. Stang for handling financial matters.

The Mechanical Failures Prevention Group (MFPG) was organized in 1967 to stimulate cooperation among various segments of the engineering and scientific communities in an effort to reduce the incidence of mechanical failures and to develop methods to predict mechanical failures. The MFPG is an interdisciplinary group with a strong application orientation. The membership includes professional personnel representing a wide variety of scientific and engineering disciplines. Individual members are associated with government agencies, industry, universities and research institutes. The MFPG also cooperates with appropriate committees or units of professional societies.

Typically, there are two MFPG symposia each year. Responsibility for the technical program for these symposia rotates among the four MFPG technical committees: 1) Mechanisms of Failure, 2) Machinery Durability, 3) Detection, Diagnosis and Prognosis, and 4) Materials Durability Evaluation.

T. Robert Shives  
Executive Secretary, MFPG