In The News

New Literature

Corrosion: Fundamentals, Testing, and Protection, Volume 13A, ASM Handbook

S.D. Cramer and B.S. Covino, Jr., Ed. ASM International. 2003. Approx 1050 pages. ISBN 0-87170-705-5. $189. ASM members: $152.

Every article from the 1987 edition has been reviewed, revised, expanded, or updated.

The purpose of *ASM Handbook*, Volume 13A, *Corrosion: Fundamentals, Testing, and Protection* is to help engineers and designers understand corrosion so that they can solve existing corrosion problems and prevent future ones. The coverage of the volume has been completely revised to ensure that it is the most comprehensive, practical, and up-to-date resource available. Each article is indexed to other appropriate sections of the Handbook, and each provides a road map to the thousands of individual bibliographical references that were used to compile the information.

The editors have assembled more than 120 leading authorities in the field of corrosion to review, revise, and contribute new articles to this Volume.

This volume replaces the landmark 1987 *Metals Handbook* volume on corrosion. In developing this new edition, the coverage of many of the topics has been greatly expanded. To provide complete coverage of all aspects of corrosion, ASM International plans to publish a companion handbook, *ASM Handbook*, Volume 13B, *Corrosion: Materials, Environments, and Industries* in 2005.

The Volume has six major sections.

Fundamentals of Corrosion covers the theory of aqueous and gaseous corrosion from the thermodynamic and kinetic perspectives. It presents the principles of electrochemistry, the mechanisms of corrosion processes, and the methods for measuring corrosion rates in aqueous, molten salt, liquid metals, and gaseous environments. An entirely new article introduces geochemical modeling as a means for characterizing and understanding corrosion in complex environments. While corrosion is usually associated with the environmental degradation of a material, this section also has new articles on electrochemical machining and refining, batteries, and fuel cells—these articles describe ways in which corrosion processes can be applied for beneficial purposes.

Forms of Corrosion describes how to recognize the different types of corrosion and the forces that influence them. Revised and expanded articles address uniform corrosion, localized corrosion, metallurgically influenced corrosion, mechanically assisted corrosion, environmentally induced cracking, and microbiologically influenced corrosion. The section introduces the complex processes of wear-corrosion interactions that accelerate material deterioration at rates greater than those resulting from wear processes or corrosion processes alone.

Corrosion Testing and Evaluation describes the planning of corrosion tests, evaluation of test results, the latest in laboratory corrosion testing and equipment, simulated service testing, and in-service techniques for damage detection and monitoring.

Methods of Corrosion Protection begins by discussing as a baseline the corrosion resistance of bulk materials. The section continues with methods of corrosion protection, including surface treatments and conversion coatings, ceramic, glass and oxide coatings, metal coatings, coatings and linings, electrochemical corrosion control methods, and corrosion inhibitors.

Designing for Corrosion Control and Prevention addresses the topic from the perspective of materials selection and equipment design. Corrosion control is an economic process as well as a technical process, and this section discusses corrosion economic calculations, predictive modeling for structure service life, and a review of corrosion costs in the United States.

Tools for the Corrosionist is an entirely new section that covers conventions in corrosion and oxidation, applications of modern analytical instruments in corrosion, materials science, statistics, and information sources and databases.

Contact: Customer Service Center, ASM International; tel: 800/336-5152; fax: 440/338-4634; Web: www.asminternational.org.

Thermal Spray 2003: Advancing the Science and Applying the Technology

Proceedings of the International Thermal Spray Conference 2003. B.R. Marple and C. Moreau, Ed. ASM International. 2003. Vol 1, 845 pages; Vol 2, 864 pages. ISBN: 0-87170-785-3. $275. ASM members: $220.

More than 240 papers covering the full spectrum of topics on the science and technology of thermal spray are presented in this book. The contributions highlight a number of areas, including recent advances in the basic science of spraying, diagnostics, process control, particle impact, microstructure, and properties; results on degradation mechanisms, testing and performance evaluation; and developments in new materials, processes,

equipment, and applications. In short, this collection of papers presents a snapshot of the current state of advancement of the thermal spray field.

Contents: *Volume 1:* Cold Spray (16 papers), Applications (15 papers), Corrosion and Wear Protective Coatings (46 papers), Equipment and Processes (17 papers), Feedstocks and Novel Materials (15 papers), High-Velocity (HVOF) Spraying (14 papers); *Volume 2:* Science and Applications of Thermal Spray (34 papers), Sensors and Controls (26 papers), Testing and Characterization (24 papers), Thermal and Environmental Barrier Coatings (26 papers), Thermal Spraying of Polymers (10 papers).

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Chrome Plating Alternatives

Cost of this report is $4800.

Used in a wide range of industries—aerospace, heavy equipment, automotive, papermaking, and others—chrome plating has become increasingly difficult in recent years. Regulations designed to protect against the safety and environmental hazards of hexavalent chrome have increased the cost of chrome plating and burdened facilities performing plating services.

Several alternatives to chrome plating are available. High-velocity oxyfuel (HVOF) is often favored due to its high performance, relatively low cost, and fast turnaround time. In fact, HVOF will dominate most chrome substitutions. However, several interesting new technologies may establish their own markets within a few years. These include electroless nickel composite plating, which can deposit diamond-composite coatings and is not restricted to line-of-sight geometries. Other emerging techniques include explosive bonding, which allows stainless-steel coatings, and electrodeposited nanocrystalline cobalt-phosphorus alloys specifically targeted at inner diameters.

Although many predicted that industry would make a sudden changeover from chrome plating to one of these new technologies, that has failed to happen. Yet some market sectors have made—or are beginning to make—the switch.

While industry downsizing and consolidation has led to the closure or offshore relocation of as many as half of the chrome plating shops in North America, the chrome plating market today is fairly stable.

- Many chrome plating shops are now thriving.
- Many customers have little or no interest in giving up on chrome.
- The legislative push toward alternatives has stabilized in North America.
- Europe is ambivalent and Asia is largely unconcerned with regulating chrome plating.

Suppliers of alternative coating/plating technologies are facing highly segmented markets where chrome plating users are resistant to making large capital investments.

Success for chrome plating alternatives will depend almost completely on economic competitiveness. At a time of tremendous flux and instability—within the supplier and user communities and the economy at large—the course of chrome alternatives in this decade is by no means clear. The success of chrome alternatives will depend on many factors and ultimately will come down to individual decisions based on economics. Thintri's market study "Chrome Plating Alternatives" examines each alternative technology in detail: its capabilities, its limitations, and its applications. It also explores the potential in each industry and forecasts market growth to 2011.

Contact: J. Scott Moore, Ph.D., President, Thintri, Inc., 25-107 Barker St., Mount Kisco, NY 10549; tel: 914/242-4615; fax: 914/666-4114; Web: http://www.thintri.com/chrome-plating-report.htm.

Wear Analysis for Engineers

Raymond G. Bayer. HNB Publishing. 2002. 360 pages. ISBN: 0-9664286-5-X. $72 (hardcover).

"Compressed product-development cycles and tight budgets often prohibit extensive life testing. Herein lies the value of Raymond Bayer's concise *Wear Analysis for Engineers,* which provides a methodology for effective use of equations and models to evaluate wear behavior. Bayer's years of experience are revealed in the way he guides the reader through the process of identifying the key factors for different wear scenarios . . . Plenty of figures, tables, and optical micrographs are provided, which makes for an interesting and easy-to-follow text . . . *Wear Analysis for Engineers* is a useful tool for anyone attempting to resolve wear problems."—*Tribology Letters.*

"While the author's approach shares many key attributes with others, it represents a unique perspective gained after 40 years of experience in the field of tribology. The approach he provides is sufficiently general to cover a wide range of wear problems . . . A useful book . . . The author has considerable wisdom to share, and if one devotes sufficient time to studying the examples in this book, he or she will gain valuable, practical tools for solving real wear problems."—*Journal of Testing and Evaluation,* Vol 30 (No. 5), Sept 2002.

"This is a highly recommended work, as a very useful volume not only for tribologists who are actually preoccupied with responses to wear problems, but also for engineers working on machine design, and students who study mechanical or materials engineering."—*Journal of Japanese Society of Tribologists.*

Contact: HNB Publishing, 250 W. 78th St., No. 3FF New York, NY 10024; tel/fax: 212/496-9244; www.hnbpub.com/5-X-TOC.html or www.hnbpub.com/sales@hnbpub.com.

Introduction to High Temperature Oxidation and Corrosion

A.S. Khanna. ASM International. 2002. 324 pages. ISBN: 0-87170-762-4. $109. ASM members: $88.

This book explains the fundamentals of high-temperature corrosion and oxidation. It will enable engineers and other technical personnel to understand how quickly different metals react with different environments at high temperatures, how to control reactions, or how to select

the best materials for specific high-temperature applications.

This book is an asset for workers in the chemical, petrochemical, electric power generation, and related industries. It is also an excellent textbook for graduate and postgraduate courses on high-temperature corrosion.

Contents: High Temperature Corrosion Basics, Defects in Metal Oxides, Diffusion in Oxides, Thin Layer Oxidation, Thick Layer Oxidation: Wagner's Theory, Oxidation of Pure Metals, Oxidation of Alloys, Oxidation in Mixed Environments, Hot Corrosion, Spallation of Oxides, Active Element Effect, High Temperature Coatings, Electron Optical Techniques for Scale Characterization, Application of High Temperature Oxidation, Appendices, Index.

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Manufacturing Processes and Materials

George F. Schrader and Ahmad K. Elshennawy. Society of Manufacturing Engineers. 2000. 850 pages. ISBN: 0-87263-517-1. $111. SME members: $84. Instructor's Guide: $20.

This textbook covers the basic processes and machinery used in the job shop, toolroom, or small manufacturing facility. At the same time, it describes advanced equipment and processes used in larger production environments.

Questions and problems at the end of each chapter can be used as self-tests or assignments. An Instructor's Guide is available to tailor a more structured learning experience. Additional resources from SME, including the Fundamental Manufacturing Processes videotape series (selected by the Wisconsin Manufacturing Curriculum Consortium as "recommended resources" supporting the competency-based objectives of its TECH SPAN curriculum) can also be used to supplement the book's learning objectives.

The book comprises 31 chapters, 45 tables, 586 illustrations, 141 equations, and an extensive index.

Contact: Society of Manufacturing Engineers, Attn. Resource Center, P.O. Box 6028, Dearborn, MI 48121-6028; tel: 800/733-4763; fax: 313/425-3401.

Thermal Spray: Surface Engineering via Applied Research

Proceedings of ITSC 2000. C.C. Berndt, Ed. ASM International. 2000. 1410 pages. ISBN: 0-87170-680-6.

Contents: Diagnostics and Torch Design; Modeling and Simulation; Structure and Properties; Residual Stress; Microstructure; High-Velocity Oxygen-Fuel Coatings; Unique Coatings; Electric-Arc Processes and Applications; Formation, Impact, and Solidification of Droplets; Nonmetallic Materials; Process Techniques; Wear and Corrosion; Porosity; Applications; Thermal-Barrier and High-Temperature Coatings; Quality, Standards, and Testing.

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Corrosion of Aluminum and Aluminum Alloys

J.R. Davis, Ed. ASM International. 1999. 313 pages. ISBN: 0-87170-629-6. $164. ASM members: $132.

This new handbook presents comprehensive coverage of the corrosion behavior of aluminum and aluminum alloys, with emphasis on practical information about how to select and process these materials in order to prevent corrosion attack. Described are the characteristics of these materials and the influences of composition, mechanical working, heat treatment, joining methods, microstructure, and environmental variables on their corrosion.

Contents: Types of Aluminum Corrosion, including: Pitting, Crevice, and Filiform; Intergranular and Exfoliation; Galvanic, Deposition, and Stray-Current; Erosion, Cavitation, Impingement, and Fretting; Environmentally Assisted Cracking; Types of Environments; Corrosion of Welded, Soldered, and Adhesive-Bonded Joints and Metal-Matrix Composites; Corrosion Testing and Prevention.

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Coating and Coating Processes for Metals

J.H. Lindsay, Ed. ASM International. 1998. 353 pages. ISBN: 087170-613-X. $179. ASM members: $144.

This authoritative work contains coatings data in an easy-to-use format. Coatings are arranged alphabetically by tradename with data for more than 1000 coatings from more than 200 companies. Each listing includes manufacturer, process type, coating type, substrate type, coating properties, applications, and coating description. Cross references also are included where available. The main section contains an alphabetical listing of tradenames and commercial names of coatings and processes; manufacturer contact information including address, telephone and fax numbers, e-mail address, and internet website. Data format is similar to the alloy listings in the popular *Woldman's Engineering Alloys.*

Listings include: Plating; Electroplating; Selective Plating; Nonelectrolytic Deposition; Anodizing; Dip, Barrier, and Chemical Conversion Coatings.

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Lasers in Surface Engineering

N.B. Dahotre, Volume Editor; T.S. Sudarshan, Series Editor. ASM International. 1998. 599 pages. ISBN: 1-87170-665-2. $149. ASM members: $120.

Contents: Types and Fundamentals; Surface Processing, Texturing and Heat Treatment; Lasers for Metallic Coatings; Deposition of Ceramic and Polymeric Coatings; Synthesis and Processing of Superhard Coatings and High-Temperature Superconductors; Surface Modification of Metals; Corrosion and Oxidation Behavior of Laser-Treated Surfaces; Laser Surface Cleaning; Laser Engineered Manufacturing/Fabrication.

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Aerospace/Airlines Plating & Finishing Forum

29 March-1 April 2004. Tulsa, Oklahoma

The forum has a keen interest in all types of aerospace coatings, including thermal spray, and there are usually several excellent thermal spray papers presented.

Contact: Bruce Dulin, Osram Sylvania; tel: 570/268-5271; e-mail: Bruce.Dulin@SYLVANIA.com; Web: http://www.aesf.org/conferences/aerospace.html.

Multifunctional and Functionally Graded Materials (FGM2004)

11-14 July 2004. Leuven, Belgium

Multifunctional materials are composite systems that exhibit useful responses to electrical, optical, magnetic, and/or mechanical stimuli. They allow the compact and economic integration of two or more functions of a mechanical, biological, acoustical, thermal, electrical, magnetic, optical, sensory, or actoric nature.

These types of composite materials are presently in the forefront of materials research receiving worldwide attention. This international symposium intends to provide a forum to present the latest advances in this field through invited lectures on the topics listed below, oral contributions, and poster presentations.

Functionally graded materials (FGMs) are also multifunctional materials that contain spatial variations in composition and/or microstructure for the specific purpose of controlling variations in thermal, structural, or functional properties. Despite large differences in the types and size scales of FGMs, many commonalities exist, thereby providing a rationale for treating FGMs as a class of materials.

This International Symposium continues the series of previous international symposia on FGMs held in Sendai (1990), San Francisco (1992), Lausanne (1994), Tsukuba (1996), Dresden (1998), Estes Park (U.S., 2000), and Beijing (2002). These relatively small-scale meetings have been characterized by their truly interdisciplinary presentations and discussions, and it is hoped to continue this tradition in Leuven.

Topics: Structural Applications, Materials for Information Technology, Energy Conversion Materials and Devices, Biomedical Materials and their Applications, Multifunctional Materials for Sensors and Actuators, Eco-Materials, Biomimetic Materials, Surfaces and Interfaces, Thin Films and Coatings, Nano-FGMs, Modeling and Simulations, Testing and Characterization, Industrial Applications and Commercialization.

Contact: FGM2004, c/o Technologisch Instituut—K VIV, Ingenieurshuis, Desguinlei 214, Be—2018 Antwerpen (Belgium); Web: www.fgm2004.com.

High-Temperature Materials, Processes, and Diagnostics

1-6 August 2004. Colby College, Waterville, Maine

Chair: Klaus Hilpert (Research Centre Juelich, Germany), **Vice Chair:** Brian W Sheldon (Brown University)

There is a call for papers for the upcoming Gordon Research Conference on "High-Temperature Materials, Processes, and Diagnostics." In addition to the oral presentations, a poster session will be organized for presentations of current research by interested attendees. Posters are solicited in all areas of high-temperature science such as molecules and clusters, synthesis, properties and application of advanced materials, corrosion, oxidation, diffusion, as well as thermodynamic measurements. Students will have the opportunity to briefly introduce their poster orally. Limited travel and conference fee support is available.

The aim of the conference is to provide an up-to-date forum for the latest science and technology for advanced inorganic materials (e.g., ceramics, metals, salts) used or prepared at high temperatures. The scope of the conference ranges from experimental observations to predicting behavior, from scientific principles to engineering design, from atomic scale models to performance of components in service.

Areas to be covered include for example:

- Gas phase chemistry, molecules, clusters, and vaporization;
- Interface processes (e.g., corrosion, oxidation): solid/gas, solid/liquid, solid/solid;
- Application, properties, and synthesis of advanced high-temperature materials, composites, coatings and films;
- Nanocrystalline to single crystalline structures;
- High-temperature devices (e.g., light sources, SOFC/MCFC, combustion/gasification, hot gas cleaning);
- Thermodynamic and kinetic measurements (e.g., phase equilibria, thermodynamic data, diffusion coefficients); and
- Thermodynamic databases and their use in materials and process modeling.

Suggestions for other related topics are welcomed.

Contact: Klaus Hilpert, Research Centre, Juelich German; e-mail: k.hilpert@fz-juelich.de; Web: http://www.fz-juelich.de/iwv/iwv2/TThermo/.

11th International Conference on Fracture (ICF 11)

20-25 March 2005, Turin, Italy

The International Conference on Fracture was founded in 1965. It is the premier organization for promotion cooperation among scientists and engineers worldwide in mechanics and mechanisms of fracture, fatigue and strength of solids. Over the years, ICF has made considerable progress in providing an international forum for highlighting individual and national accomplishments in the field of fracture mechanics.

Papers for oral presentation will be welcome in all aspects of fracture. Aspects that will be of special relevance for the thermal spray community include:

- High-temperature fracture;
- Fatigue and fracture;
- Creep and corrosion fracture;
- Brittle fracture;
- Ductile fracture;
- Dynamic, high-strain rate, or impact fracture;
- Damage mechanics;
- Failure analysis;

- Nonlinear fracture mechanics;
- Computational fracture mechanics;
- Debonding of coatings or interfaces;
- Structural integrity;
- Experimental fracture mechanics;
- Nondestructive examination; and
- Metallic materials.

Additional fundamental issues and more advanced topics will be also considered. Special Sessions or Mini-Symposia will be organized. They may involve:

- Scaling laws and size-effects;
- Nano-, micro-, or meso-scale fracture mechanics;
- MEMS;
- Physical models of fracture;
- Electric and electronic materials; and
- Safety limits and fracture mechanics.

Contact: Professor Alberto Carpinteri ICF11 Chairman, c/o Centro Congressi Internazionale s.r.l., Via Cervino, 60-10155 Torino, Italy, tel: + 39 011 2446911; fax + 39 011 2446900; e-mail: info@congressiefiere.com. Web: http://www.icf11.com.

Web Sources and Resources

ASTM International Launches Online Journal

Beginning 1 Jan 2004, original research findings and technical articles will be published online in *Journal of ASTM International* (JAI). JAI will provide the international scientific and engineering community a new opportunity for online peer review. Coupled with ASTM's publishing experience and advanced document delivery process, JAI promises to become well read, referenced, and respected.

Leading the editorial process of the journal is Sheldon W. Dean, Ph.D., President of Dean Corrosion Technology, Inc. He has gained worldwide recognition for his publications in corrosion technology and standardization and his contribution to the development of voluntary consensus standards. Dean explains, "JAI is a 21st Century concept that will allow researchers to publish their results more rapidly in a prestigious journal. Its scope will cover the entire range of ASTM International's technical interests. JAI will offer all of the publication options found in other journals including research papers, technical review papers, technical notes, and discussions . . ." Along with Dean, seven associate editors will represent various technical areas:

- Materials Performance and Characterization;
- Nuclear Science and Technology;
- Civil Engineering and Building Materials;
- Petroleum and Chemical Engineering;
- Environmental Science and Technology;
- General Methods and Instrumentation; and
- Medical, Health, and Safety.

These topics coincide with the science and research that establish the foundation for standards development within ASTM International.

The journal will contain qualifying, solicited and unsolicited technical papers as well as qualified papers presented at ASTM symposia and workshops. Authors who publish in JAI will benefit from:

- Rapid online publication as soon as papers are peer-reviewed and edited;
- The opportunity to be cited by major abstracting and indexing services;
- A well-respected, credible peer-review process that will ensure quality content;
- Broad online access to and awareness of technical work in a prestigious venue;
- Annual archival CD-ROMs that preserve and document all issues of JAI; and
- The ability to publish frequently through 10 issues a year.

With an online journal, convenient and thorough search capabilities are offered through ASTM's advanced website, ensuring broad distribution and awareness. Electronic access is available for individual subscriptions (via password) and institutional subscriptions (via IP address). All papers will be available in PDF format and can be individually downloaded.

Contact: Roberta Storer, ASTM; tel: 610/832-9637; fax: 610/832-9635; e-mail: restorer@astm.org; or Christina Painton, ASTM; tel: 610/832-9658; fax: 610/832-9635; e-mail: cpainton@astm.org; Web: www.astm.org/JAI.

Free CD on Physical Simulation and Gleeble Systems Available from DSI

A free CD containing a library of information about physical simulation and Gleeble dynamic thermomechanical simulation systems is available upon request.

The CD contains four major sections. The first is a nine-minute video introducing thermomechanical simulation systems.

The second section contains comprehensive product information about DSI's products, such as the Gleeble 3500 and 3800, Hot Torsion system, and MAX-Strain research system for making ultrafine-grain and nanomaterials. Brochures, specifications, and site preparation requirements are included.

The third section is a complete collection of technical application notes related to using DSI's systems, from "Axisymmetric Uniaxial Compression Testing Using ISO-T Anvils" to "Advanced QuikSim Configuration Techniques."

The fourth section covers the economics of Gleeble ownership and includes a wealth of information such as Gleeble application stories from more than two dozen of the world's leading industrial and academic research centers as well as white papers on "Why Physical Simulation?" and "Economic Justification of Gleeble Ownership."

Also included on the CD is a comprehensive bibliography of more than 400 scientific and technical papers involving research conducted using Gleeble systems.

Contact: DSI, P.O. Box 1234, Rte 355, Poestenkill, NY 12140; tel: 518/283-5350; fax: 518/283-3160; e-mail: info@gleeble.com.