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Thermo-mechanical Modeling of Additive Manufacturing provides the background, methodology and description of modeling techniques to enable the reader to perform their own accurate and reliable simulations of any additive process. Part I provides an in depth introduction to the fundamentals of additive manufacturing modeling, a description of adaptive mesh strategies, a thorough description of thermal losses and a discussion of residual stress and distortion. Part II applies the engineering fundamentals to direct energy deposition processes including laser cladding, LENS builds, large electron beam parts and an exploration of residual stress and deformation mitigation strategies. Part III concerns the thermo-mechanical modeling of powder bed processes with a description of the heat input model, classical thermo-mechanical modeling, and part scale modeling. The book serves as an essential reference for engineers and technicians in both industry and academia, performing both research and full-scale production. Additive manufacturing processes are revolutionizing production throughout industry. These technologies enable the cost-effective manufacture of small lot parts, rapid repair of damaged components and construction of previously impossible-to-produce geometries. However, the large thermal gradients inherent in these processes incur large residual stresses and mechanical distortion, which can push the finished component out of engineering tolerance. Costly trial-and-error methods are commonly used for failure mitigation. Finite element modeling provides a compelling alternative, allowing for the prediction of residual stresses and distortion, and thus a tool to investigate methods of failure mitigation prior to building. Provides understanding of important components in the finite element modeling of additive manufacturing processes necessary to obtain accurate results Offers a deeper understanding of how the thermal gradients inherent in additive manufacturing induce distortion and residual stresses, and how to mitigate these undesirable phenomena Includes a set of strategies for the modeler to improve computational efficiency when simulating various additive manufacturing processes Serves as an essential reference for engineers and technicians in both industry and academia The European Conference on Residual Stresses (ECRS) series is the leading European forum for scientific exchange on internal and residual stresses in materials. It addresses both academic and industrial experts and covers a broad gamut of stress-related topics from instrumentation via experimental and modelling methodology up to stress problems in specific processes such as welding or shot-peening, and their impact on materials properties. Chapters: Diffraction Methods; Mechanical Relaxation Methods; Acoustic and Electromagnetic Methods; Composites, Nano and Microstructures; Films, Coatings and Oxides; Cold Working and Machining; Heat Treatments and Phase Transformations; Welding, Fatigue and Fracture: Stresses in Additive Manufacturing.

Academic researchers who are working on the development of composite materials for ballistic protection need a deeper understanding on the theory of material behavior during ballistic impact. Those working in industry also need to select proper composite constituents, to achieve their desired characteristics to make functional products. *Composite Solutions for Ballistics* covers the different aspects of ballistic protection, its different levels and the materials and structures used for this purpose. The emphasis in the book is on the application and use of composite materials for ballistic protection. The chapters provide detailed information on the various types of impact events and the complexity of materials to respond to those events. The characteristics of ballistic composites and modelling and simulation results will enable the reader to better understand impact mechanisms according to the theory of dynamic material behavior. A complete description of testing conditions is also given that includes sensors and high-speed devices to monitor ballistic events. The book includes detailed approaches and schemes that can be implemented in academic research into solutions for ballistic protection in both theoretical and experimental fields, to find solutions for existing and next generation threats. The book will be an essential reference resource for materials scientists and engineers, and academic and industrial researchers working in composite materials and textiles for ballistic protection, as well as postgraduate students on materials science, textiles and mechanical engineering courses. Discusses the fundamentals of impact response mechanisms and related solutions covering advantages and disadvantages for both existing and next generation applications Includes various methods for evaluation of ballistic constituents according to economic and environmental criteria, types of green ballistics are considered to enhance sustainable production of applications as well as hybrid composites from natural wastes Discusses selection methodologies for ballistic applications and detailed information on the use of textiles for reinforcement fabrication

Details the proper methods to assess, prevent, and reduce corrosion in the oil industry using today's most advanced technologies This book discusses upstream operations, with an emphasis on production, and pipelines, which are closely tied to upstream operations. It also examines protective coatings, alloy selection, chemical treatments, and cathodic protection—the main means of corrosion control. The strength and hardness levels of metals is also discussed, as this affects the resistance of metals to hydrogen embrittlement, a major concern for high-strength steels and some other alloys. It is intended for use by personnel with limited backgrounds in chemistry, metallurgy, and corrosion and will give them a general understanding of how and why corrosion occurs and the practical approaches to how the effects of corrosion can be mitigated. *Metallurgy and Corrosion Control in Oil and Gas Production, Second Edition* updates the original chapters while including a new case studies chapter. Beginning with an introduction to oilfield metallurgy and corrosion control, the book provides in-depth coverage of the field with chapters on: chemistry of corrosion; corrosive

environments; materials; forms of corrosion; corrosion control; inspection, monitoring, and testing; and oilfield equipment. Covers all aspects of upstream oil and gas production from downhole drilling to pipelines and tanker terminal operations Offers an introduction to corrosion for entry-level corrosion control specialists Contains detailed photographs to illustrate descriptions in the text Metallurgy and Corrosion Control in Oil and Gas Production, Second Edition is an excellent book for engineers and related professionals in the oil and gas production industries. It will also be an asset to the entry-level corrosion control professional who may have a theoretical background in metallurgy, chemistry, or a related field, but who needs to understand the practical limitations of large-scale industrial operations associated with oil and gas production.

Springer Handbook of Mechanical Engineering Springer Nature

Printbegrænsninger: Der kan printes 10 sider ad gangen og max. 40 sider pr. session

This handbook is an in-depth guide to the practical aspects of materials and corrosion engineering in the energy and chemical industries. The book covers materials, corrosion, welding, heat treatment, coating, test and inspection, and mechanical design and integrity. A central focus is placed on industrial requirements, including codes, standards, regulations, and specifications that practicing material and corrosion engineers and technicians face in all roles and in all areas of responsibility. The comprehensive resource provides expert guidance on general corrosion mechanisms and recommends materials for the control and prevention of corrosion damage, and offers readers industry-tested best practices, rationales, and case studies.

Presenting time-tested standard as well as reliable emerging knowledge on threaded fasteners and joints, this book covers how to select parts and materials, predict behavior, control assembly processes, and solve on-the-job problems. It examines key issues affecting bolting in the automotive, pressure vessel, petrochemical, aerospace, and structural steel industries. The editors have successfully created a useful rather than scholarly handbook with chapters written in a straightforward, how-to-do-it manner. Theory is discussed only when necessary and the handbook's logical organization and thorough index enhances its usefulness.

This is the fourth volume in the well-established series of compendiums devoted to the subject of weld hot cracking. It contains the papers presented at the 4th International Cracking Workshop held in Berlin in April 2014. In the context of this workshop, the term "cracking" refers to hot cracking in the classical and previous sense, but also to cold cracking, stress-corrosion cracking and elevated temp. solid-state cracking. A variety of different cracking subjects are discussed, including test standards, crack prediction, weldability determination, crack mitigation, stress states, numerical modelling, and cracking mechanisms. Likewise, many different alloys were investigated such as aluminum alloys, copper-aluminum dissimilar metal, austenitic stainless steel, nickel base alloys, duplex stainless steel, creep resistant steel, and high strength steel. This Standard specifies the purchasing information, chemical composition, mechanical property, dimensions and allowable deviation, internal and surface mass, sampling, number of testing, sample preparation, test method, inspection, rejection and re-inspection, certificate of quality and marking requirements of NCu30-3-0.5 alloy products. This Standard applies to hot-worked and cold-worked NCu30-3-0.5 alloy bar,

of which the cross section is circular, square, hexagonal and rectangular (hereinafter referred to as round bar, square bar, hexagonal bar and flat bar), forgings, forging stock and cold-worked wire.

Operation, Maintenance, and Repair of Land-Based Gas Turbines provides a toolkit for practitioners seeking to make techno-economic decisions on life extension of power turbine equipment. The work describes essential degradation modes affecting critical components and proven methods of restoration. Sections discuss key elements of life extensions for aging units and components, together with critical reviews of available methodologies. Coverage includes advanced nondestructive testing methods essential for effective life extension programs, including lessons learned from firsthand experience working with multiple machine designs, classes and operating conditions. The final sections cover a body of solutions intended to refocus ORM processes on overcoming the shortfalls caused by volatilities and system restructuring. Reviews best practices for practitioners seeking to make decisions on gas turbine maintenance, repair and operations Analyzes components and major sections in terms of functionality, critical features, residual properties and service caused damages Explains the applicability and limitations of special processes and advanced non-destructive testing methods

Introduces readers to the enlightening world of the modern light microscope There have been rapid advances in science and technology over the last decade, and the light microscope, together with the information that it gives about the image, has changed too. Yet the fundamental principles of setting up and using a microscope rests upon unchanging physical principles that have been understood for years. This informative, practical, full-colour guide fills the gap between specialised edited texts on detailed research topics, and introductory books, which concentrate on an optical approach to the light microscope. It also provides comprehensive coverage of confocal microscopy, which has revolutionised light microscopy over the last few decades. Written to help the reader understand, set up, and use the often very expensive and complex modern research light microscope properly, Understanding Light Microscopy keeps mathematical formulae to a minimum—containing and explaining them within boxes in the text. Chapters provide in-depth coverage of basic microscope optics and design; ergonomics; illumination; diffraction and image formation; reflected-light, polarised-light, and fluorescence microscopy; deconvolution; TIRF microscopy; FRAP & FRET; super-resolution techniques; biological and materials specimen preparation; and more. Gives a didactic introduction to the light microscope Encourages readers to use advanced fluorescence and confocal microscopes within a research institute or core microscopy facility Features full-colour illustrations and workable practical protocols Understanding Light Microscopy is intended for any scientist who wishes to understand and use a modern light microscope. It is also ideal as supporting material for a formal taught course, or for individual students to learn the key aspects of light microscopy

through their own study.

Full coverage of materials and mechanical design in engineering Mechanical Engineers' Handbook, Fourth Edition provides a quick guide to specialized areas you may encounter in your work, giving you access to the basics of each and pointing you toward trusted resources for further reading, if needed. The accessible information inside offers discussions, examples, and analyses of the topics covered. This first volume covers materials and mechanical design, giving you accessible and in-depth access to the most common topics you'll encounter in the discipline: carbon and alloy steels, stainless steels, aluminum alloys, copper and copper alloys, titanium alloys for design, nickel and its alloys, magnesium and its alloys, superalloys for design, composite materials, smart materials, electronic materials, viscosity measurement, and much more. Presents comprehensive coverage of materials and mechanical design Offers the option of being purchased as a four-book set or as single books, depending on your needs Comes in a subscription format through the Wiley Online Library and in electronic and custom formats Engineers at all levels of industry, government, or private consulting practice will find Mechanical Engineers' Handbook, Volume 1 a great resource they'll turn to repeatedly as a reference on the basics of materials and mechanical design.

This resource covers all areas of interest for the practicing engineer as well as for the student at various levels and educational institutions. It features the work of authors from all over the world who have contributed their expertise and support the globally working engineer in finding a solution for today's mechanical engineering problems. Each subject is discussed in detail and supported by numerous figures and tables.

Properties, Specifications and Applications: Covering the subject of steel metallurgy from its applications point of view, this book discusses the applied metallurgical knowledge required for easy-learning about steels, their properties, specifications, heat treatment and applications. : The book is conceptually divided into four parts: •The first part introduces the basic metallurgical facts about steel and its characteristics, covers the most important aspects of steel metallurgy, its applications, and fundamental features of steelmaking and rolling processes, and highlights the different types of properties of steel and the need for testing and evaluation: •Discussing the classifications, specifications and properties of steels in a more quantitative manner (based on popular standards and standard-based data), the second part focuses on different steel grades and their merits and properties for selection and applications •The third part focuses on heat treatment and welding of steels, various heat treatment methods and their purposes, and basic aspects of welding and welding precautions in steels • Dwelling on the application of steels, the fourth part discusses the totality of steel applications from the point of view of reliability and component integrity, the importance of cost and quality optimization in applications, and the criticality of design and manufacturing quality for prevention of failures Steel Metallurgy has

been designed to provide all necessary information and practice-based knowledge about steel characteristics, steel properties, steel grades, and steel applications for selecting, processing and using steels with right understanding and for the right purposes. Highlights of the book: Provides deep theoretical and practice-based knowledge about steels, their properties, specifications, heat treatment and applications Includes large number of examples, illustrations and case studies Includes elaborate Index of contents for cross-referencing, a Bibliography for further reading and reference, and Glossary of Important Metallurgical Terms Simplified and highly illustrated narration ideal for metallurgical students, metallurgists and non-metallurgical engineers The book is intended for both students and practitioners. The book will help students of metallurgy and other engineering disciplines to understand the applied and functional-basics of steels relating to their properties, specifications and applications. Engineers and technical personnel in industries dealing with steel processing and its uses will benefit from the hard look the book takes for the precise selection of steel for the right purposes by providing workable knowledge on steel metallurgy and steel specifications.

"The International Energy Agency's annual detailed reference work on gas supply demand, prices, trade, storage, reserves, and transport covering not only the OECD countries but also the rest of the world."

One of the key challenges current biomaterials researchers face is identifying which of the dizzying number of highly specialized characterization tools can be gainfully applied to different materials and biomedical devices. Since this diverse marketplace of tools and techniques can be used for numerous applications, choosing the proper characterization tool is highly important, saving both time and resources.

Characterization of Biomaterials is a detailed and multidisciplinary discussion of the physical, chemical, mechanical, surface, in vitro and in vivo characterization tools and techniques of increasing importance to fundamental biomaterials research.

Characterization of Biomaterials will serve as a comprehensive resource for biomaterials researchers requiring detailed information on physical, chemical, mechanical, surface, and in vitro or in vivo characterization. The book is designed for materials scientists, bioengineers, biologists, clinicians and biomedical device researchers seeking input on planning on how to test their novel materials, structures or biomedical devices to a specific application. Chapters are developed considering the need for industrial researchers as well as academics. Biomaterials researchers come from a wide variety of disciplines: this book will help them to analyze their materials and devices taking advantage of the multiple experiences on offer. Coverage encompasses a cross-section of the physical sciences, biological sciences, engineering and applied sciences characterization community, providing gainful and cross-cutting insight into this highly multi-disciplinary field. Detailed coverage of important test protocols presents specific examples and standards for applied characterization

The Light Metals symposia at the TMS Annual Meeting & Exhibition present the most recent developments, discoveries, and practices in primary aluminum science and technology. The annual Light Metals volume has become the definitive reference in the field of aluminum production and related light metal technologies. The 2020 collection

includes papers from the following symposia: • Alumina and Bauxite• Aluminum Alloys, Processing and Characterization• Aluminum Reduction Technology• Cast Shop Technology• Cast Shop Technology: Recycling and Sustainability Joint Session• Electrode Technology for Aluminum Production

Two very successful conferences - in Glasgow and Beaune - were held on duplex stainless steels during the first half of the '90s. This book takes keynote papers from each, and develops and expands them to bring the topics right up to date. There is new material to cover grades, specifications and standards, and the book is fully cross-references and indexed. The first reference book to be published on the increasingly popular duplex stainless steels, it will be widely welcomed by metallurgists, design and materials engineers, oil and gas engineers and anyone involved in materials development and properties. The first reference book on this relatively new engineering material Based on keynote papers from major international contributors Covers grades, standards and specifications

The Welding Engineer's Guide to Fracture and Fatigue provides an essential introduction to fracture and fatigue and the assessment of these failure modes, through to the level of knowledge that would be expected of a qualified welding engineer. Part one covers the basic principles of weld fracture and fatigue. It begins with a review of the design of engineered structures, provides descriptions of typical welding defects and how these defects behave in structures undergoing static and cyclical loading, and explains the range of failure modes. Part two then explains how to detect and assess defects using fitness for service assessment procedures. Throughout, the book assumes no prior knowledge and explains concepts from first principles. Covers the basic principles of weld fracture and fatigue. Reviews the design of engineered structures, provides descriptions of typical welding defects and how these defects behave in structures undergoing static and cyclical loading, and explains the range of failure modes. Explains how to detect and assess defects using fitness for service assessment procedures.

Powders and bulk solids, handled widely in the chemical, pharmaceutical, agriculture, smelting, and other industries present unique fire, explosion, and toxicity hazards. Indeed, substances which are practically inert in consolidated form may become quite hazardous when converted to powders and granules. The U.S. Chemical Safety and Hazard Investigation Board is currently investigating dust explosions that occurred in 2003 at WestPharma, CTA Acoustics, and Hayes-Lemmerz, and is likely to recommend that companies that handle powders or whose operations produce dust pay more attention to understanding the hazards that may exist at their facility. This new CCPS guidelines book will discuss the types of hazards that can occur in a wide range of process equipment and with a wide range of substances, and will present measures to address these hazards.

Textile testing is an important field of textile sciences involving experimental evaluation of conventional as well as technical textile products. This book aims to provide technical details, required protocols and procedures for conducting any specific evaluation test along with key parameters. The book covers the topics in two main sections, first one for the conventional textile testing techniques starting

from fiber to final product while the second one focusses on testing of technical textiles. Written with a reader friendly approach, it will cater to graduate students in textile engineering as well as industry personnel, focusing on following key points: Addresses all techniques for testing both conventional and technical textiles. Describes testing techniques compliance with the latest requirements of the updated EN ISO and AATCC standards. Provides detailed description on the testing of technical textiles and their products. Discusses the operations conditions, like atmospheric conditions, and human error with cause and effect diagrams. Covers both destructive and non-destructive testing.

The effect of corrosion in the oil industry leads to the failure of parts. This failure results in shutting down the plant to clean the facility. The annual cost of corrosion to the oil and gas industry in the United States alone is estimated at \$27 billion (According to NACE International)—leading some to estimate the global annual cost to the oil and gas industry as exceeding \$60 billion. In addition, corrosion commonly causes serious environmental problems, such as spills and releases. An essential resource for all those who are involved in the corrosion management of oil and gas infrastructure, *Corrosion Control in the Oil and Gas Industry* provides engineers and designers with the tools and methods to design and implement comprehensive corrosion-management programs for oil and gas infrastructures. The book addresses all segments of the industry, including production, transmission, storage, refining and distribution. Selects cost-effective methods to control corrosion Quantitatively measures and estimates corrosion rates Treats oil and gas infrastructures as systems in order to avoid the impacts that changes to one segment if a corrosion management program may have on others Provides a gateway to more than 1,000 industry best practices and international standards

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