

## Superplastic Forming Of Advanced Metallic Materials Methods And Applications Woodhead Publishing Series In Metals And Surface Engineering

Mechanics of Materials in Modern Manufacturing Methods and Processing Techniques provides a detailed overview of the latest developments in the mechanics of modern metal forming manufacturing. Focused on mechanics as opposed to process, it looks at the mechanical behavior of materials exposed to loading and environmental conditions related to modern manufacturing processes, covering deformation as well as damage and fracture processes. The book progresses from forming to machining and surface-treatment processes, and concludes with a series of chapters looking at recent and emerging technologies. Other topics covered include simulations in autofrettage processes, modeling strategies related to cutting simulations, residual stress caused by high thermomechanical gradients and pultrusion, as well as the mechanics of the curing process, forging, and cold spraying, among others. Some non-metallic materials, such as ceramics and composites, are covered as well. Synthesizes the latest research in the mechanics of modern metal forming processes Suggests theoretical models and numerical codes to predict mechanical responses Covers mechanics of shot peening, pultrusion, hydroforming, magnetic pulse forming Considers applicability of different materials and processes for optimum performance

Research into the manufacture of lightweight automobiles is driven by the need to reduce fuel consumption to preserve dwindling hydrocarbon resources without compromising other attributes such as safety, performance, recyclability and cost. Materials, design and manufacturing for lightweight vehicles will make it easier for engineers to not only learn about the materials being considered for lightweight automobiles, but also to compare their characteristics and properties. Part one discusses materials for lightweight automotive structures with chapters on advanced steels for lightweight automotive structures, aluminium alloys, magnesium alloys for lightweight powertrains and automotive structures, thermoplastics and thermoplastic matrix composites and thermoset matrix composites for lightweight automotive structures. Part two reviews manufacturing and design of lightweight automotive structures covering topics such as manufacturing processes for light alloys, joining for lightweight vehicles, recycling and lifecycle issues and crashworthiness design for lightweight vehicles. With its distinguished editor and renowned team of contributors, Materials, design and manufacturing for lightweight vehicles is a standard reference for practicing engineers involved in the design and material selection for motor vehicle bodies and components as well as material scientists, environmental scientists, policy makers, car companies and automotive component manufacturers. Provides a comprehensive analysis of the materials being used for the manufacture of lightweight vehicles whilst comparing characteristics and properties Examines crashworthiness design issues for lightweight vehicles and further emphasises the development of lightweight vehicles without compromising safety considerations and performance Explores the manufacturing process for light alloys including metal forming processes for automotive applications

This book provides a comprehensive introduction to the unique theory developed over years of research on materials and process modelling and its application in metal forming technologies. It starts with the introduction of fundamental theories on the mechanics of materials, computational mechanics and the formulation of unified constitutive equations. Particular attention is paid to elastic–plastic formulations for cold metal forming and unified elastic–viscoplastic constitutive equations for warm/hot metals processing. Damage in metal forming and numerical techniques to solve and determine the unified constitutive equations are also detailed. Examples are given for the application of the unified theories to solve practical problems encountered in metal forming processes. This is particularly useful to predict microstructure evolution in warm/hot metal forming processes. Crystal plasticity theories and modelling techniques with their applications in micro-forming are also introduced in the book. The book is self-contained and unified in presentation. The explanations are highlighted to capture the interest of curious readers and complete enough to provide the necessary background material to further explore/develop new theories and applications.

Future Development of Thermal Spray Coatings discusses the latest developments and research trends in the thermal spray industry. The book presents a timely guide to new applications and techniques. After an introduction to thermal spray coatings by the editor, Part One covers new types and properties of thermal spray coatings. Chapters look at feedstock suspensions and solutions, the application of solution precursor spray techniques to obtain ceramic films and coatings, cold spray techniques and warm spray technology amongst others. Part Two of the book moves on to discuss new applications for thermal spray coatings such as the use of thermal spray coatings in environmental barrier coatings, thermal spray coatings in renewable energy applications and manufacturing engineering in thermal spray technologies by advanced robot systems and process kinematics. Timely guide on the current advancements and research trends in thermal spray technology Reviews different types of thermal spray coatings Presents a wide variety of applications for this emerging technology

In order to achieve the Army's envisioned Objective Force related to deployability, transportability, and mobility, the Committee on Lightweight Materials for the 21st Century Army Trucks was asked to identify research and technology development opportunities related to the introduction of new lightweight structural materials for light medium and heavy Army trucks.

Ultra fine-grained metals can show exceptional ductility, known as superplasticity, during sheet forming. The higher ductility of superplastic metals makes it possible to form large and complex components in a single operation without joints or rivets. The result is less waste, lower weight and manufacturing costs, high precision and lack of residual stress associated with welding which makes components ideal for aerospace, automotive and other applications. Superplastic forming of advanced metallic materials summarises key recent research on this important process. Part one reviews types of superplastic metals, standards for superplastic forming, processes and equipment. Part two discusses ways of modelling superplastic forming processes whilst the final part of the book considers applications, including superplastic forming of titanium, aluminium and magnesium alloys. With its distinguished editor and international team of contributors, Superplastic forming of advanced metallic materials is a valuable reference for metallurgists and engineers in such sectors as aerospace and automotive engineering. Note: The Publishers wish to point out an error in the authorship of Chapter 3 which was originally listed as: G. Bernhart, Clément Ader Institute, France. The correct authorship is: G Bernhart, P. Lours, T. Cutard, V. Velay, Ecole des Mines Albi, France and F. Nazaret, Aurock, France. The Publishers apologise to the authors for this error. Reviews types of superplastic metals and standards for superplastic forming Discusses the modelling of superplastic forming, including mathematical and finite element modelling Examines various applications, including superplastic forming of titanium, aluminium and magnesium alloys Superplastic Forming of Advanced Metallic Materials Methods and Applications Elsevier

This book presents a collection of the latest studies on and applications for the sustainable development of urban energy systems. Based on the 20th International Scientific Conference on Energy Management of Municipal Facilities and Sustainable Energy Technologies, held in Voronezh and Samara, Russia from 10 to 13 December 2018, it addresses a range of aspects including energy modelling, materials and applications in buildings; heating, ventilation and air conditioning systems; renewable energy technologies (photovoltaic, biomass, and wind energy); electrical energy storage; energy management; and life cycle assessment in urban systems and transportation. The book is intended for a broad readership: from policymakers tasked with evaluating and promoting key enabling technologies, efficiency policies and sustainable energy practices, to researchers and engineers involved in the design and analysis of complex systems.

**Modern Manufacturing Technology: Spotlight on Future** summarizes the emergence and development of modern manufacturing techniques (MMTs) with a focus on metallic and advanced material-based additive manufacturing technologies and their potential applications. Further, it explores advanced machining techniques for production of novel nanomaterials. The book also covers modern sophisticated techniques for the fabrication of ultrafine electronic devices such as micro-electromechanical systems (MEMS), nano-electromechanical systems (NEMS), semiconductors, and optical systems. A dedicated chapter on manufacturing technology for Industry 4.0 is included. Features: Describes the background of manufacturing techniques in brief including the advent of and introduction to MMTs Reviews various types of MMTs established in recent years and their accelerated growth and development innovation-driven applications Overviews the physical and chemical techniques used for nanomaterials production Explores the fabrication mechanisms of MEMS, NEMS, semiconductors and optical devices Provides a conceptual overview of additive manufacturing technologies This book is geared to undergraduate and postgraduate students and professionals in mechanical and manufacturing engineering, and the manufacturing industry.

A smart coating is defined as one that changes its properties in response to an environmental stimulus. The **Handbook of Smart Coatings for Materials Protection** reviews the new generation of smart coatings for corrosion and other types of material protection. Part one explores the fundamentals of smart coatings for materials protection including types, materials, design, and processing. Chapters review corrosion processes and strategies for prevention; smart coatings for corrosion protection; techniques for synthesizing and applying smart coatings; multi-functional, self-healing coatings; and current and future trends of protective coatings for automotive, aerospace, and military applications. Chapters in part two focus on smart coatings with self-healing properties for corrosion protection, including self-healing anticorrosion coatings for structural and petrochemical engineering applications; smart self-healing coatings for corrosion protection of aluminum alloys, magnesium alloys and steel; smart nanocoatings for corrosion detection and control; and recent advances in polyaniline-based organic coatings for corrosion protection. Chapters in part three move on to highlight other types of smart coatings, including smart self-cleaning coatings for corrosion protection; smart polymer nanocomposite water- and oil-repellent coatings for aluminum; UV-curable organic polymer coatings for corrosion protection of steel; smart epoxy coatings for early detection of corrosion in steel and aluminum; and structural ceramics with self-healing properties. The **Handbook of Smart Coatings for Materials Protection** is a valuable reference for those concerned with preventing corrosion, particularly of metals, professionals working within the surface coating industries, as well as all those with an academic research interest in the field. Reviews the new generation of smart coatings for corrosion and other types of material protection Explores the fundamentals of smart coatings for materials protection including types, materials, design, and processing Includes a focus on smart coatings with self-healing properties for corrosion protection

Titanium alloys, due to unique physical and chemical properties (mainly high relative strength combined with very good corrosion resistance), are considered as an important structural metallic material used in hi-tech industries (e.g. aerospace, space technology). This book provides information on new manufacturing and processing methods of single- and two-phase titanium alloys. The eight chapters of this book are distributed over four sections. The first section (Introduction) indicates the main factors determining application areas of titanium and its alloys. The second section (Manufacturing, two chapters) concerns modern production methods for titanium and its alloys. The third section (Thermomechanical and surface treatment, three chapters) covers problems of thermomechanical processing and surface treatment used for single- and two-phase titanium alloys. The fourth section (Machining, two chapters) describes the recent results of high speed machining of Ti-6Al-4V alloy and the possibility of application of sustainable machining for titanium alloys.

The miniaturization of industrial products is a global trend. Metal forming technology is not only suitable for mass production and excellent in productivity and cost reduction, but it is also a key processing method that is essential for products that utilize advantage of the mechanical and functional properties of metals. However, it is not easy to realize the processing even if the conventional metal forming technology is directly scaled down. This is because the characteristics of materials, processing methods, die and tools, etc., vary greatly with miniaturization. In metal micro forming technology, the size effect of major issues for micro forming have also been clarified academically. New processing methods for metal micro forming have also been developed by introducing new special processing techniques, and it is a new wave of innovation toward high precision, high degree of processing, and high flexibility. To date, several special issues and books have been published on micro-forming technology. This book contains 11 of the latest research results on metal micro forming technology. The editor believes that it will be very useful for understanding the state-of-the-art of metal micro forming technology and for understanding future trends.

The aim of this collection by results of the 4th International Conference on Advanced Materials Design and Mechanics (ICAMDM2016, August 20-21, 2016, Jeju Island, South Korea) is to present the latest results of research in advanced materials, their application and related technologies. Presented papers will be useful for many scientists and engineers.

**Selected peer-reviewed full text papers from 13th European Conference on Superplastic Forming (EuroSPF 2019)** Selected, peer-reviewed papers from the 13th European Conference on Superplastic Forming (EuroSPF 2019), September 11-13, 2019, Matera, Italy  
Material properties -- Sheet deformation processes -- Deformation of sheet in plane stress -- Simplified stamping analysis -- Load instability and tearing -- Bending of sheet -- Simplified analysis of circular shells -- Cylindrical deep drawing -- Stretching circular shells -- Combined bending and tension of sheet -- Hydroforming.

**Thermo-Mechanical Processing of Metallic Materials** describes the science and technology behind modern thermo-mechanical processing (TMP), including detailed descriptions of successful examples of its application in the industry. This graduate-level introductory resource aims to fill the gap between two scientific approaches and illustrate their successful linkage by the use of suitable modern case studies. The book is divided into three key sections focusing on the basics of metallic materials processing. The first section covers the microstructural science base of the subject, including the microstructure determined mechanical properties of metals. The second section deals with the current mechanical technology of plastic forming of metals. The concluding section demonstrates the interaction of the first two disciplines in a series of case studies of successful current TMP processing and looks ahead to possible new developments in the field. This text is designed for use by graduate students coming into the field, for a graduate course textbook, and for Materials and Mechanical Engineers working in this area in the industry. \* Covers both physical metallurgy and metals processing \* Links basic science to real everyday applications \* Written by four internationally-known experts in the field

This book helps the engineer understand the principles of metal forming and analyze forming problems - both the mechanics of forming processes and how the properties of metals interact with the processes. In this fourth edition, an

entire chapter has been devoted to forming limit diagrams and various aspects of stamping and another on other sheet forming operations. Sheet testing is covered in a separate chapter. Coverage of sheet metal properties has been expanded. Interesting end-of-chapter notes have been added throughout, as well as references. More than 200 end-of-chapter problems are also included.

Advanced Welding and Deforming explains the background theory, working principles, technical specifications, and latest developments on a wide range of advanced welding-joining and deforming techniques. The book's subject matter covers manufacturing, with chapters specifically addressing remanufacturing and 3D printing applications. Drawing on experts in both academia and industry, coverage addresses theoretical developments as well as practical improvements from R&D. By presenting over 35 important processes, from plasma arc welding to nano-joining and hybrid friction stir welding, this is the most complete guide to this field available. This unique guide will allow readers to compare the characteristics of different processes, understand how they work, and create parameters for their effective implementation. As part of a 4 volume set entitled Handbooks in Advanced Manufacturing, this series also includes volumes on Advanced Machining and Finishing, Additive Manufacturing and Surface Treatment, and Sustainable Manufacturing Processes. Provides theory, operational parameters, and the latest developments in over 35 different processes Addresses new welding technologies such as additive manufacturing using wire and arc, as well as the latest developments in more traditional applications Introduces basic concepts in welding, joining and deformation in three introductory chapters, thus helping readers with a range of backgrounds engage with the subject matter

Corrosion inhibitors are an important method for minimizing corrosion; however traditional inhibitors such as chromates pose environmental problems. Rare earth metals provide an important, environmentally-friendly alternative. This book provides a comprehensive review of current research and examines how rare earth metals can be used to prevent corrosion and applied to protect metals in such industries as aerospace and construction. Chapter 1 begins by examining the important need to replace chromate, and then goes on to discuss the chemistry of the rare earth metals and their related compounds. Chapter 2 considers the techniques that can be used to identify corrosion inhibition mechanisms and to test the levels of protection offered to different metals by rare earth compounds. Subsequent chapters consider in more detail how rare earth elements can be used as corrosion inhibitors in different forms and for different metals. This includes discussion on the potential of rare earth elements for self-healing, tunable and multifunctional coatings. Finally, chapter 10 considers the cost and availability of the rare earths and the potential health and environmental risks associated with extracting them. Provides a review of current research and examines how rare earth metals can be used to prevent corrosion and applied to protect metals in such industries as aerospace and construction. Includes discussion on the potential of rare earth elements for self-healing, tunable and multifunctional coatings. Considers the cost and availability of the rare earths and the potential health and environmental risks associated with extracting them.

The annealing of deformed materials is of both technological importance and scientific interest. The phenomena have been most widely studied in metals, although they occur in all crystalline materials such as the natural deformation of rocks and the processing of technical ceramics. Research is mainly driven by the requirements of industry, and where appropriate, the book discusses the extent to which we are able to formulate quantitative, physically-based models which can be applied to metal-forming processes. The subjects treated in this book are all active research areas, and form a major part of at least four regular international conference series. However, there have only been two monographs published in recent times on the subject of recrystallization, the latest nearly 20 years ago. Since that time, considerable advances have been made, both in our understanding of the subject and in the techniques available to the researcher. The book covers recovery, recrystallization and grain growth in depth including specific chapters on ordered materials, two-phase alloys, annealing textures and annealing during and after hot working. Also contained are treatments of the deformed state and the structure and mobility of grain boundaries, technologically important examples and a chapter on computer simulation and modelling. The book provides a scientific treatment of the subject for researchers or students in Materials Science, Metallurgy and related disciplines, who require a more detailed coverage than is found in textbooks on physical metallurgy, and a more coherent treatment than will be found in the many conference proceedings and review articles.

This book presents an up-to-date overview on the main classes of metallic materials currently used in aeronautical structures and propulsion engines and discusses other materials of potential interest for structural aerospace applications. The coverage encompasses light alloys such as aluminum-, magnesium-, and titanium-based alloys, including titanium aluminides; steels; superalloys; oxide dispersion strengthened alloys; refractory alloys; and related systems such as laminate composites. In each chapter, materials properties and relevant technological aspects, including processing, are presented. Individual chapters focus on coatings for gas turbine engines and hot corrosion of alloys and coatings. Readers will also find consideration of applications in aerospace-related fields. The book takes full account of the impact of energy saving and environmental issues on materials development, reflecting the major shifts that have occurred in the motivations guiding research efforts into the development of new materials systems. Aerospace Alloys will be a valuable reference for graduate students on materials science and engineering courses and will also provide useful information for engineers working in the aerospace, metallurgical, and energy production industries.

\* Numerous line drawings with consistent format and units allow easy comparison of the behavior of a very wide range of materials \* Transmission electron micrographs provide a direct insight in the basic microstructure of metals deforming at high temperatures \* Extensive literature review of over 1000 references provide an excellent reference document, and a very balanced discussion Understanding the strength of materials at a range of temperatures is critically important to a huge number of researchers and practitioners from a wide range of fields and industry sectors including metallurgists, industrial designers, aerospace R&D personnel, and structural engineers. The most up-to date and comprehensive book

in the field, Fundamentals of Creep in Metals and Alloys discusses the fundamentals of time-dependent plasticity or creep plasticity in metals, alloys and metallic compounds. This is the first book of its kind that provides broad coverage of a range of materials not just a sub-group such as metallic compounds, superalloys or crystals. As such it presents the most balanced view of creep for all materials scientists. The theory of all of these phenomena are extensively reviewed and analysed in view of an extensive bibliography that includes the most recent publications in the field. All sections of the book have undergone extensive peer review and therefore the reader can be sure they have access to the most up-to-date research, fully interrogated, from the world's leading investigators. · Numerous line drawings with consistent format and units allow easy comparison of the behavior of a very wide range of materials · Transmission electron micrographs provide a direct insight in the basic microstructure of metals deforming at high temperatures · Extensive literature review of over 1000 references provide an excellent reference document, and a very balanced discussion

This book covers the mechanism, salient features, and important aspects of various subtractive, additive, forming and hybrid techniques to manufacture near net-shaped products. The latest research in this area as well as possible future research are also highlighted.

The Finite Element Method for Fluid Dynamics offers a complete introduction the application of the finite element method to fluid mechanics. The book begins with a useful summary of all relevant partial differential equations before moving on to discuss convection stabilization procedures, steady and transient state equations, and numerical solution of fluid dynamic equations. The character-based split (CBS) scheme is introduced and discussed in detail, followed by thorough coverage of incompressible and compressible fluid dynamics, flow through porous media, shallow water flow, and the numerical treatment of long and short waves. Updated throughout, this new edition includes new chapters on: Fluid-structure interaction, including discussion of one-dimensional and multidimensional problems Biofluid dynamics, covering flow throughout the human arterial system Focusing on the core knowledge, mathematical and analytical tools needed for successful computational fluid dynamics (CFD), The Finite Element Method for Fluid Dynamics is the authoritative introduction of choice for graduate level students, researchers and professional engineers. A proven keystone reference in the library of any engineer needing to understand and apply the finite element method to fluid mechanics Founded by an influential pioneer in the field and updated in this seventh edition by leading academics who worked closely with Olgierd C. Zienkiewicz Features new chapters on fluid-structure interaction and biofluid dynamics, including coverage of one-dimensional flow in flexible pipes and challenges in modeling systemic arterial circulation

This book contains high-quality papers presented in the conference Recent Advances in Mechanical Infrastructure (ICRAM 2020) held at IITRAM, Ahmedabad, India, from 21-23 August 2020. The topics covered in this book are recent advances in thermal infrastructure, manufacturing infrastructure and infrastructure planning and design.

The Magnesium Technology Symposium, the event on which this collection is based, is one of the largest yearly gatherings of magnesium specialists in the world. Papers represent all aspects of the field, ranging from primary production to applications to recycling. Moreover, papers explore everything from basic research findings to industrialization. Magnesium Technology 2016 covers a broad spectrum of current topics, including alloys and their properties; cast products and processing; wrought products and processing; forming, joining, and machining; corrosion and surface finishing; ecology; and structural applications. In addition, there is coverage of new and emerging applications. The collection includes more than 50 papers.

Powder metallurgy (PM) is a popular metal forming technology used to produce dense and precision components. Different powder and component forming routes can be used to create an end product with specific properties for a particular application or industry. Advances in powder metallurgy explores a range of materials and techniques used for powder metallurgy and the use of this technology across a variety of application areas. Part one discusses the forming and shaping of metal powders and includes chapters on atomisation techniques, electrolysis and plasma synthesis of metallic nanopowders. Part two goes on to highlight specific materials and their properties including advanced powdered steel alloys, porous metals and titanium alloys. Part three reviews the manufacture and densification of PM components and explores joining techniques, process optimisation in powder component manufacturing and non-destructive evaluation of PM parts. Finally, part four focusses on the applications of PM in the automotive industry and the use of PM in the production of cutting tools and biomaterials. Advances in powder metallurgy is a standard reference for structural engineers and component manufacturers in the metal forming industry, professionals working in industries that use PM components and academics with a research interest in the field. Discusses the forming and shaping of metal powders and includes chapters on atomisation techniques Highlights specific materials and their properties including advanced powdered steel alloys, porous metals and titanium alloys Reviews the manufacture and densification of PM components and explores joining techniques

This book combines the perspectives of materials science of Superplasticity, on the one hand, and those of design and mechanics, on the other, in order to provide a holistic view of materials, design, mechanics and performance which will lead to useful solutions of societal benefits, in addition to providing great intellectual challenges. After considering the experimental evidence for superplasticity in different classes of materials, the book discusses the physics-based models, along with their advantages and limitations. Then, the analyses for superplastic forming available in the framework of continuum mechanics, finite element analysis and numerical simulations are presented. Finally, the authors highlight some successful industrial applications. This book is recommended as a text book for courses on Superplasticity and as supplementary use for courses on Materials Processing, Manufacturing, High Temperature Deformation, Nanotechnology and Mechanical Behavior of Materials. Persons working in Department of Materials Science and Engineering, Physics, Mechanics, Mechanical Engineering, Aerospace Engineering, Metallurgy, Ceramics and Geo-sciences are likely to find the book to be useful. It is also recommended as a reference source for practicing engineers involved in the design, processing and manufacture of industrial components, which exploit the unique properties associated with superplastic materials.

Advances in Science and Technology of  $Mn+1AX_n$  Phases presents a comprehensive review of synthesis, microstructures, properties, ab-initio calculations and applications of  $Mn+1AX_n$  phases and targets the continuing research of advanced materials and ceramics. An overview of the current status, future directions, challenges and opportunities of  $Mn+1AX_n$  phases that exhibit some of the best attributes of metals and ceramics is included. Students of materials science and engineering at postgraduate level will value this book as a reference source at an international level for both teaching and research in materials science and engineering. In addition to students the principal audiences of this book are ceramic researchers, materials scientists and engineers, materials physicists and chemists. The book is also an invaluable reference for the professional materials and ceramics societies. The most up-to-date and comprehensive research data on MAX phases is presented Written by highly knowledgeable and well-respected researchers in the field Discusses new and unusual properties This book is a comprehensive compilation of chapters on materials (both established and evolving) and material technologies that are

important for aerospace systems. It considers aerospace materials in three Parts. Part I covers Metallic Materials (Mg, Al, Al-Li, Ti, aero steels, Ni, intermetallics, bronzes and Nb alloys); Part II deals with Composites (GLARE, PMCs, CMCs and Carbon based CMCs); and Part III considers Special Materials. This compilation has ensured that no important aerospace material system is ignored. Emphasis is laid in each chapter on the underlying scientific principles as well as basic and fundamental mechanisms leading to processing, characterization, property evaluation and applications. This book will be useful to students, researchers and professionals working in the domain of aerospace materials.

This book describes different types of rubber-pad forming processes currently being studied for their experimental and numerical advantages and disadvantages. Rubber forming adopts a rubber pad contained in a rigid box in which one of the tools (die or punch) is replaced by the rubber pad. Up to 60% of all sheet metal parts in aircraft industry such as frames, seat parts, ribs, windows and doors are fabricated using rubber-pad forming processes. Key process parameters such as rubber material, stamping velocity, rubber-pad hardness and thickness and friction conditions are investigated. The potential role of rubber as a flexible punch in metal working processes is to give insight to engineers about different parts that can be produced using this process. The procedure of suitable die design for each process is presented in detail. Full defect analysis is undertaken with a thorough report presented to optimize rubber-pad forming processes.

The major objective of this book was to identify issues related to the introduction of new materials and the effects that advanced materials will have on the durability and technical risk of future civil aircraft throughout their service life. The committee investigated the new materials and structural concepts that are likely to be incorporated into next generation commercial aircraft and the factors influencing application decisions. Based on these predictions, the committee attempted to identify the design, characterization, monitoring, and maintenance issues that are critical for the introduction of advanced materials and structural concepts into future aircraft.

Collection of selected, peer reviewed papers from the 2014 3rd International Conference on Machine Design and Manufacturing Engineering (3rd ICMDME 2014), May 24-25, 2014, Jeju Island, South Korea. Volume is indexed by Thomson Reuters CPCI-S (WoS). The 187 papers are grouped as follows: Chapter 1: Materials Science, Chapter 2: Manufacturing, Forming and Processing Technologies, Chapter 3: Applied Mechanics and Mechanical Engineering: Experiment, Design and Simulation, Chapter 4: Testing, Detection and Monitoring Technologies, Chapter 5: Robotics, Control System and Applications, Chapter 6: Product Design, Computation and Information Technologies

Underground pipelines transporting liquid petroleum products and natural gas are critical components of civil infrastructure, making corrosion prevention an essential part of asset-protection strategy. Underground Pipeline Corrosion provides a basic understanding of the problems associated with corrosion detection and mitigation, and of the state of the art in corrosion prevention. The topics covered in part one include: basic principles for corrosion in underground pipelines, AC-induced corrosion of underground pipelines, significance of corrosion in onshore oil and gas pipelines, numerical simulations for cathodic protection of pipelines, and use of corrosion inhibitors in managing corrosion in underground pipelines. The methods described in part two for detecting corrosion in underground pipelines include: magnetic flux leakage, close interval potential surveys (CIS/CIPS), Pearson surveys, in-line inspection, and use of both electrochemical and optical probes. While the emphasis is on pipelines transporting fossil fuels, the concepts apply as well to metallic pipes for delivery of water and other liquids. Underground Pipeline Corrosion is a comprehensive resource for corrosion, materials, chemical, petroleum, and civil engineers constructing or managing both onshore and offshore pipeline assets; professionals in steel and coating companies; and academic researchers and professors with an interest in corrosion and pipeline engineering. Reviews the causes and considers the detection and prevention of corrosion to underground pipes. Addresses a lack of current, readily available information on the subject. Case studies demonstrate how corrosion is managed in the underground pipeline industry.

This book serves as a comprehensive resource on various traditional, advanced and futuristic material technologies for aerospace applications encompassing nearly 20 major areas. Each of the chapters addresses scientific principles behind processing and production, production details, equipment and facilities for industrial production, and finally aerospace application areas of these material technologies. The chapters are authored by pioneers of industrial aerospace material technologies. This book has a well-planned layout in 4 parts. The first part deals with primary metal and material processing, including nano manufacturing. The second part deals with materials characterization and testing methodologies and technologies. The third part addresses structural design. Finally, several advanced material technologies are covered in the fourth part. Some key advanced topics such as "Structural Design by ASIP", "Damage Mechanics-Based Life Prediction and Extension" and "Principles of Structural Health Monitoring" are dealt with at equal length as the traditional aerospace materials technology topics. This book will be useful to students, researchers and professionals working in the domain of aerospace materials.

Iron Ore: Mineralogy, Processing and Environmental Issues summarizes recent, key research on the characterization of iron ores, including important topics such as beneficiation (separation and refining), agglomeration (e.g., production of pellets or powders), blast furnace technology for smelting, and environmental issues relating to its production. The text is an ideal reference on the topic during a time when iron ore production has increased significantly, driven by increasing demand from countries such as India and China. Provides a comprehensive overview of the global iron ore industry, exploring its characteristics and characterization. Expert analysis of quality requirements for iron production, iron ore agglomeration technologies, environmental issues, and low-emission technologies. Timely text to accompany the increased iron ore production occurring in developing countries like India and China.

The book presents the select proceedings of International Conference on Structural Health Monitoring and Engineering Structures (SHM&ES) 2020. It brings together different applied and technological aspects of structural health monitoring. The main topics covered in this book include damage assessment, structural health monitoring, engineering fracture mechanics, Inverse problem using optimization techniques, machine learning, deep learning, Artificial intelligent and non-destructive evaluation. It will be a reference for professionals and students in the areas of civil engineering, applied natural sciences and engineering management.

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