Honeycomb Technology Materials Design Manufacturing Applications And Testing Softcover Reprint Of Edition By Bitzer T N 2012 Paperback

• One of very few books available to cover this subject area. • A practical book with a wealth of detail. This book covers the major manufacturing processes for polymer matrix composites with an emphasis on continuous fibre-reinforced composites. It covers the major fabrication processes in detail. Very few books cover the details of fabrication and assembly processes for composites. This book is intended for the engineer who wants to learn more about composite processing: any one with some experience in composites should be able to read it. The author, who has 34 years experience in the aerospace industry, has intentionally left out mathematical models for processes so the book will be readable by the general engineer. It differs from other books on composites manufacturing in focussing almost solely on manufacturing processes, while not attempting to cover materials, test methods, mechanical properties and other areas of composites.

As the existence of all life forms on our planet is currently in grave danger from the climate emergency caused by Homo sapiens, the words "sustainability" and "eco-responsibility" have entered the daily-use vocabularies of scientists, engineers, economists, business managers, industrialists, capitalists, and policy makers. Normal activities undertaken for the design of products and systems in industrialisms must be revamped. As the bioworld is a great resource for eco-responsible design activities, an overview of biologically inspired design is presented in this book in simple terms for anyone with even high-school education. Beginning with an introduction to the process of design in industry, the book presents the bioworld as a design resource along with the rationale for biologically inspired design. Problem-driven and solution-driven approaches for biologically inspired design are described next. The last chapter is focused on biologically inspired design for environment.

This encyclopedia, written by authoritative experts under the guidance of an international panel of key researchers from academia, national laboratories, and industry, is a comprehensive reference covering all major aspects of metallurgical science and engineering of aluminum and its alloys. Topics covered include extractive metallurgy, powder metallurgy (including processing), physical metallurgy, production engineering, corrosion engineering, thermal processing (processes such as metalworking and welding, heat treatment, rolling, casting, hot and cold forming), surface engineering and structure such as crystallography and metallography.

The 13th International Workshop on Electromagnetic Nondestructive Evaluation (ENDE) was held at the Seoul Education and Culture Center, Korea in June 2008. Electromagnetic Nondestructive Evaluation (XII) contains the proceedings of this workshop. 51 research papers present the latest research in topics ranging from ENDE in nuclear power plants, eddy current testing, modeling, material characterization, to inverse problem and imaging and the application of electromagnetic nondestructive techniques.

The rising demand to reduce fuel consumption and the continuous increase of materials and manufacturing costs has obliged aircraft manufacturers to boost the use of composite materials and to optimise the manufacturing methods. Foam core sandwich structures combine the advantages of high bending properties with low manufacturing costs when liquid composite processes are used. However, the use of foam core sandwich structures is not widespread in aircraft applications due to the better weight-specific performance of honeycomb cores and the susceptibility to impact loading. In this context, pin reinforcements are added to the foam core to improve its mechanical properties and its damage tolerance. This work contributes to the understanding of the mechanical behaviour of pin-reinforced foam core sandwich structures under static and impact loading. Ultrasonic scan and micro-computed tomography are used to identify the different damage modes.

The effect of very low temperature on the damage behaviour under impact loading is investigated. An explicit simulation model to predict the impact response of pin-reinforced foam core sandwich structures is also proposed.

Composite Materials and the First International Symposium on Joining Technologies for Composites, Volume 7: Proceedings of the 2012 Annual Conference on Experimental and Applied Mechanics represents one of seven volumes of technical papers presented at the Society for Experimental Mechanics SEM 12th International Congress & Exposition on Experimental and Applied Mechanics, held at Costa Mesa, California, June 11-14, 2012. The full set of proceedings also includes volumes on Dynamic Behavior of Materials, Challenges in Mechanics of Time -Dependent Materials and Processes in Conventional and Multifunctional Materials, Imaging Methods for Novel Materials and Challenging Applications, Experimental and Applied Mechanics, Mechanics of Biological Systems and Materials and, MEMS and Nanotechnology.

Honeycomb Technology is a guide to honeycomb cores and honeycomb sandwich panels, from the manufacturing methods by which they are produced, to the different types of design, applications for usage and methods of testing the materials. It explains the different types of honeycomb cores available and provides tabulated data of their properties. The author has been involved in the testing and design of honeycomb cores and sandwich panels for nearly 30 years. Honeycomb Technology reflects this by emphasizing a `hands-on' approach and discusses procedures for designing sandwich panels, explaining the necessary equations. Also included is a section on how to design honeycomb energy absorbers and one full chapter discussing honeycomb core and sandwich panel testing. Honeycomb Technology will be of interest to engineers in the aircraft, aerospace and building industries. It will also be of great use to engineering students interested in basic sandwich panel design.

This book addresses conference topics such as information technology in the design and manufacture of engines; information technology in the creation of rocket space systems; aerospace engineering; transport systems and logistics; big data and data science; nano-modeling; artificial intelligence and smart systems; networks and communication; cyber-physical systems and IoE; and software engineering and IT infrastructure. The International Scientific and Technical Conference "Integrated Computer Technologies in Mechanical Engineering" - Synergetic Engineering (ICTM) was formed to bring together outstanding researchers and practitioners in the field of information technology, and whose work involves the design and manufacture of engines, creation of rocket space systems, and aerospace engineering, from all over the world to share their experiences and expertise. It was established by the National Aerospace University "Kharkiv Aviation Institute." The ICTM'2020 conference was held in Kharkiv, Ukraine on October 28-30, 2020. .

Volume is indexed by Thomson Reuters CPCI-S (WoS). The studies presented here cover the topics of product design, manufacturing and analysis, management and production scheduling, supply chains, CAD/CAM/CAE, reliability, fault diagnostics and quality monitoring, measurement techniques, technologies and equipment, dynamic analysis of mechanical systems and mechanical transmissions, fluid power transmission and control, mechatronics, industrial robotics, control technologies and intelligent systems, electronic and microelectronic technology, embedded systems, signal and intelligent information processing, software and computers in research and engineering solutions.

The first International Conference on Engineering Solutions and Sustainable Development which is organized by the University of Miskolc, Hungary is a significant and timely initiative creating the capacity of engineering students, educators, practicing engineers and industries to demonstrate values, problem solving skills, knowledge, and attitude that are required to apply the principles of sustainable development throughout their professional career. The aim of the ICESSD conference was creating an interdisciplinary platform for researchers and

practitioners to present and discuss the most recent innovations, trends, and concerns as well as practical challenges encountered and solutions adopted in the fields of Technical and Environmental Science. The conference covers the following topics: Process Engineering, Modelling and Optimisation Sustainable and Renewable Energy and Energy Engineering Waste Management and Reverse Logistics Environmental Management and Ecodesign Circular Economy and Life Cycle Approaches Smart Manufacturing and Smart Buildings Innovation and Efficiency Earth Science Academics, scientists, researchers and professionals from different countries and continents have contributed to this book.

· Technical explanation of composite materials in vehicle design and manufacture · Covers all phases of composites design, formulation, fabrication, and testing · Features hundreds of case studies and hard-to-find formulas and analytical data · Detailed information on resins, preforms, lightweighting, biobased materials ---------- This technical book provides a comprehensive explanation of how advanced composite materials, including FRPs, reinforced thermoplastics, carbon-based composites and many others are designed, processed and utilized in exterior, interior, under-the-hood, structural, semi-structural and non-structural components in passenger cars, performance cars, trucks, motorbikes, and mass transit vehicles. The book clarifies how the material properties of composites can be optimized to decrease weight, expand design options, improve crashworthiness, and reduce fuel consumption in response to CAFE and other regulations. The many case studies and equation-based analyses in this book are intended to assist engineers and others in the selection of materials and the fabrication of vehicle parts.Table of Contents: CHAPTER 1: INTRODUCTION 1.1 Introduction 1.2 History and Legislative Actions 1.3 The Case for Lightweighting 1.4 Technological Barriers 1.5 Advantages and Opportunities 1.6 Integral Factors 1.7 Summary 1.8 References CHAPTER 2: POLYMER RESINS, ADDITIVES AND SANDWICH CORES FOR AUTOMOTIVE, MASS TRANSIT AND HEAVY TRUCKS 2.1 Introduction 2.2 Polymer Resins: Thermoset and Thermoplastic 2.3 Thermoset Polymer Composites 2.4 Thermoplastic Resins 2.5 Additives 2.6 Structural Foams and Core Materials 2.7 Summary 2.8 References CHAPTER 3: REINFORCEMENTS FOR AUTOMOTIVE AND TRANSPORTATION APPLICATIONS 3.1 Reinforcing Fibers 3.2 Reinforcement Length Scales and Forms 3.3 Glass Fibers 3.4 Carbon or Graphite Fibers 3.5 Aramid (Kevlar") Fibers 3.6 High-Strength Polyolefin Fibers 3.7 Basalt Fibers 3.8 Summary5 3.9 References CHAPTER 4: MATERIAL FORMS FOR AUTOMOTIVE, HEAVY TRUCKS AND MASS TRANSIT 4.1 Need for Intermediate Material Forms 4.2 Preforming 4.3 Intermediate Material Form for Thermoplastic Composites 4.4 Summary 4.5 References CHAPTER 5: DISCONTINUOUS REINFORCEMENT-BASED PROCESSES FOR AUTOMOTIVE AND TRANSPORTATION APPLICATIONS 5.1 Discontinuous Forms 5.2 Glass Mat Thermoplastic Composites (GMT) 5.3 Long Fiber Thermoplastics (LFT) 5.4 Sheet Molding Compound (SMC) 5.5 Compression Molding 5.6 Programmable Powdered Preform Process (P4) 5.7 Structural Foam Molding 5.8 Other Application Case Studies with Discontinuous Fiber Composites 5.9 Exterior 5.10 Interior 5.11 Lightweighting Fuel Cells 5.12 Summary 5.13 References CHAPTER 6: CONTINUOUS FIBER REINFORCEMENT BASED PROCESSES FOR AUTOMOTIVE, HEAVY TRUCKS AND MASS TRANSIT 6.1 Continuous Fiber Composites 6.2 Preforming 6.3 Continuous Fiber Processes for Automotive and Transportation Applications 6.4 Application Case Studies with Continuous Fiber Reinforcements 6.5 Summary 6.6 References CHAPTER 7: MECHANICS AND DESIGN TIPS 7.1 Test Methods and Specific Properties 7.2 Conversion Between Volume and Weight Fractions 7.3 Stiffness and Strength Prediction of Discontinuous and Continuous Fiber Composites 7.4 Stiffness Equivalency 7.5 Sandwich Composites 7.6 Ribbed LFT and Tape Reinforced LFT 7.7 Summary 7.8 References CHAPTER 8: COMPOSITE MANUFACTURING PROCESS ANALYSIS FOR AUTOMOTIVE PARTS 8.1 Background 8.2 Production Requirements 8.3

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The development and management of technologies and operations are key to the success of all types of manufacturing business. This book presents the proceedings of the 17th International Conference on Manufacturing Research (ICMR 2019), held in Belfast, UK, on 10 – 12 September 2019. ICMR has been the UK's main manufacturing research conference for 34 years and an international conference since 2003. It brings together researchers, academics and industrialists to share their vision, knowledge and experience and discuss emerging trends and new challenges in manufacturing research. The conference theme of ICMR2019 was smart manufacturing, and the book includes the 82 papers presented at the conference (representing an acceptance rate of 69%). These have been divided into 13 parts, which cover topics ranging from robot automation and machining processes, additive manufacturing, composite manufacturing, design methods, to information management, quality control, production optimization and product lifecycle management. Providing an overview of current trends and developments, the book will be of interest to researchers and engineers in the relevant area of manufacturing processes, design and production management.

The book considers questions concerning the designing and production of glued and soldered constructions having a honeycomb or cellular filler, used widely in aviation, automotive, ship-building industry and in construction. Information is given about the design and strength of articles with a honeycomb filler made of nonmetallic materials such as aluminum and titanium alloys, and also of stainless steel. Manufacturing technology of honeycomb fillers is given as well as designs on their basis; material and equipment are described for the mechanization and automation of production and control of honeycomb fillers as well as articles with these fillers. (Author).

Designers are becoming more directly involved in the fabrication process from the earliest stages of design. This book showcases the design and research work by some of the leading designers, makers and thinkers today. This highly illustrated text brings together a wealth of information and numerous examples from practice which will appeal to both students and practitioners.

Structural Integrity and Durability of Advanced Composites: Innovative Modelling Methods and Intelligent Design presents scientific and technological research from leading composite materials scientists and engineers that showcase the fundamental issues and practical problems that affect the development and exploitation of large composite structures. As predicting precisely where cracks may develop in materials under stress is an age old mystery in the design and building of large-scale engineering

structures, the burden of testing to provide "fracture safe design" is imperative. Readers will learn to transfer key ideas from research and development to both the design engineer and end-user of composite materials. This comprehensive text provides the information users need to understand deformation and fracture phenomena resulting from impact, fatigue, creep, and stress corrosion cracking and how these phenomena can affect reliability, life expectancy, and the durability of structures. Presents scientific and technological research from leading composite materials scientists and engineers that showcase fundamental issues and practical problems Provides the information users need to understand deformation and fracture phenomena resulting from impact, fatigue, creep, and stress corrosion cracking Enables readers to transfer key ideas from research and development to both the design engineer and end-user of composite materials

Advanced Composite Materials for Aerospace Engineering: Processing, Properties and Applications predominately focuses on the use of advanced composite materials in aerospace engineering. It discusses both the basic and advanced requirements of these materials for various applications in the aerospace sector, and includes discussions on all the main types of commercial composites that are reviewed and compared to those of metals. Various aspects, including the type of fibre, matrix, structure, properties, modeling, and testing are considered, as well as mechanical and structural behavior, along with recent developments. There are several new types of composite materials that have huge potential for various applications in the aerospace sector, including nanocomposites, multiscale and auxetic composites, and self-sensing and self-healing composites, each of which is discussed in detail. The book’s main strength is its coverage of all aspects of the topics, including materials, design, processing, properties, modeling and applications for both existing commercial composites and those currently under research or development. Valuable case studies provide relevant examples of various product designs to enhance learning. Contains contributions from leading experts in the field Provides a comprehensive resource on the use of advanced composite materials in the aerospace industry Discusses both existing commercial composite materials and those currently under research or development

Volume 3: Processing and manufacturing

The rapidly-expanding aerospace industry is a prime developer and user of advanced metallic and composite materials in its many products. This book concentrates on the manufacturing technology necessary to fabricate and assemble these materials into useful and effective structural components. Detailed chapters are dedicated to each key metal or alloy used in the industry, including aluminum, magnesium, beryllium, titanium, high strength steels, and superalloys. In addition the book deals with composites, adhesive bonding and presents the essentials of structural assembly. This book will be an important resource for all those involved in aerospace design and construction, materials science and engineering, as well as for metallurgists and those working in related sectors such as the automotive and mass transport industries. Flake Campbell Jr has over thirty seven years experience in the aerospace industry and is currently Senior Technical Fellow at the Boeing Phantom Works in Missouri, USA. * All major aerospace structural materials covered: metals and composites * Focus on details of manufacture and use * Author has

huge experience in aerospace industry * A must-have book for materials engineers, design and structural engineers, metallurgical engineers and manufacturers for the aerospace industry

Comprehensive introduction to composites from natural and recycled biomaterialsCovers fabrication, mechanical analysis and modeling of green compositesNew ideas for cost-effective alternative matrices, fibers and additivesApplications to construction, automotive, and civil engineering An important contribution to the evolution of composites technology, this book is a systematic investigation of how natural biomaterials are used to create cost-effective and environmentally sound composites for commercial use. The book shows how a wide range of plant- and animal-based materials are integrated into the design and fabrication of matrices and reinforcements for polymeric and other types of composites. In addition, a focus is placed on modeling and mechanical analyses of biobased composites, providing valuable data on their performance. Sustainable composites are shown to be viable alternatives for manufactured components in automotive, civil engineering and construction applications.

In the recent decade a quantum leap has been made in production of aluminum alloys and new techniques of casting, forming, welding and surface modification have been evolved to improve the structural integrity of aluminum alloys. This book covers the essential need for the industrial and academic communities for update information. It would also be useful for entrepreneurs technocrats and all those interested in the production and the application of aluminum alloys and strategic structures. It would also help the instructors at senior and graduate level to support their text.

This book offers a unique guide to the three-dimensional (3D) printing of metals. It covers various aspects of additive, subtractive, and joining processes used to form three-dimensional parts with applications ranging from prototyping to production. Examining a variety of manufacturing technologies and their ability to produce both prototypes and functional production-quality parts, the individual chapters address metal components and discuss some of the important research challenges associated with the use of these technologies. As well as exploring the latest technologies currently under development, the book features unique sections on electron beam melting technology, material lifting, and the importance this science has in the engineering context. Presenting unique real-life case studies from industry, this book is also the first to offer the perspective of engineers who work in the field of aerospace and transportation systems, and who design components and manufacturing networks. Written by the leading experts in this field at universities and in industry, it provides a comprehensive textbook for students and an invaluable guide for practitioners

This book presents the proceedings of the third Vehicle and Automotive Engineering conference, reflecting the outcomes of theoretical and practical studies and outlining future development trends in a broad field of automotive research. The conference’s main themes included design, manufacturing, economic and educational topics.

Virtual test methods can contribute to reducing the great effort for physical tests in the development of lightweight products. The present work describes an approach for virtual testing of sandwich panel joints based on the Building Block Approach and the Finite Elements Method. Building on a multitude of physical tests on sandwich materials and joints, adequate sub-models are developed, validated and synthesized to

top-level models. The developed approach is eventually applied for the development of a novel sandwich panel joint.

Sandwich Structural Composites: Theory and Practice offers a comprehensive coverage of sandwich structural composites. It describes the structure, properties, characterization, and testing of raw materials. In addition, it discusses design and process methods, applications and damage assessments of sandwich structural composites. The book: Offers a review of current sandwich composite lamination processes and manufacturing methods Introduces raw materials, including core materials, skin reinforcements, resin substrates and adhesives Discusses sandwich structure characterization, finite element analysis of the structures, and product design and optimization Describes benefits other than structural, including acoustic, thermal, and fire Details applications in various industries, including aerospace, wind energy, marine ships, recreational boats and vehicles, sport equipment, building construction, and extreme temperature applications The book will be of benefit to industrial practitioners, researchers, academic faculty, and advanced students in materials and mechanical engineering and related disciplines looking to advance their understanding of these increasingly important materials.

Insights and Innovations in Structural Engineering, Mechanics and Computation comprises 360 papers that were presented at the Sixth International Conference on Structural Engineering, Mechanics and Computation (SEMC 2016, Cape Town, South Africa, 5-7 September 2016). The papers reflect the broad scope of the SEMC conferences, and cover a wide range of engineering structures (buildings, bridges, towers, roofs, foundations, offshore structures, tunnels, dams, vessels, vehicles and machinery) and engineering materials (steel, aluminium, concrete, masonry, timber, glass, polymers, composites, laminates, smart materials). Some contributions present the latest insights and new understanding on (i) the mechanics of structures and systems (dynamics, vibration, seismic response, instability, buckling, soil-structure interaction), and (ii) the mechanics of materials and fluids (elasticity, plasticity, fluid-structure interaction, flow through porous media, biomechanics, fracture, fatigue, bond, creep, shrinkage). Other contributions report on (iii) recent advances in computational modelling and testing (numerical simulations, finite-element modeling, experimental testing), and (iv) developments and innovations in structural engineering (planning, analysis, design, construction, assembly, maintenance, repair and retrofitting of structures). Insights and Innovations in Structural Engineering, Mechanics and Computation is particularly of interest to civil, structural, mechanical, marine and aerospace engineers. Researchers, developers, practitioners and academics in these disciplines will find the content useful. Short versions of the papers, intended to be concise but self-contained summaries of the full papers, are collected in the book, while the full versions of the papers are on the accompanying CD.

The shock and impact behaviour of structures is a difficult area, not only because of its obvious time-dependent aspects, but also because of the difficulties in specifying the external dynamic loading characteristics and in obtaining the full dynamic properties of materials. This book examines the interaction between blast pressure and surface or underground structures, whether the blast is from civilian, military, dust and natural explosions, or any other source. Including papers from the Ninth International Conference on Structures Under Shock and Impact, the book will be of significant interest to engineers from civil, military, nuclear, offshore, aeronautical, transportation and other backgrounds. Featured topics include: Impact and Blast Loading Characteristics; Protection of Structures from Blast Loads; Missile Penetration and Explosion; Air Craft and Missile Crash Against High-rise Buildings; Seismic Engineering Applications; Energy Absorbing Issues; Fluid Structure Interaction; Behaviour of Structural Concrete; Behaviour of Steel Structures; Structural Behaviour of Composites; Material Response to High Rate Loading; Structural Crashworthiness; Impact Biomechanics; Structural Serviceability under Impact Loading; Microdynamics; Interaction between Computational and Experimental Results; Software for Shock and Impact.

Integrated Design of Multiscale, Multifunctional Materials and Products is the first of its type to consider not only design of materials, but concurrent design of materials and products. In other words, materials are not just selected on the basis of properties, but the composition and/or microstructure iw designed to satisfy specific ranged sets of performance requirements. This book presents the motivation for pursuing concurrent design of materials and products, thoroughly discussing the details of multiscale modeling and multilevel robust design and provides details of the design methods/strategies along with selected examples of designing material attributes for specified system performance. It is intended as a monograph to serve as a foundational reference for instructors of courses at the senior and introductory graduate level in departments of materials science and engineering, mechanical engineering, aerospace engineering and civil engineering who are interested in next generation systems-based design of materials. First of its kind to consider not only design of materials, but concurrent design of materials and products Treatment of uncertainty via robust design of materials Integrates the "materials by design approach" of Olson/Ques Tek LLC with the "materials selection" approach of Ashby/Granta Distinquishes the processes of concurrent design of materials and products as an overall systems design problem from the field of multiscale modeling Systematic mathematical algorithms and methods are introduced for robust design of materials, rather than ad hoc heuristics--it is oriented towards a true systems approach to design of materials and products

Lead-Acid Batteries for Future Automobiles provides an overview on the innovations that were recently introduced in automotive lead-acid batteries and other aspects of current research. Innovative concepts are presented, some of which aim to make lead-acid technology a candidate for higher levels of powertrain hybridization, namely 48-volt mild or high-volt full hybrids. Lead-acid batteries continue to dominate the market as storage devices for automotive starting and power supply systems, but are facing competition from alternative storage technologies and being challenged by new application requirements, particularly related to new electric vehicle functions and powertrain electrification. Presents an overview of development trends for future automobiles and the demands that they place on the battery Describes how to adapt LABs for use in micro and mild hybrid EVs via collector construction and materials, via carbon additives, via new cell construction (bipolar), and via LAB hybrids with Li-ion and supercap systems System integration of LABs into vehicle power-supply and hybridization concepts Short description of competitive battery technologies

Honeycomb TechnologyMaterials, Design, Manufacturing, Applications and TestingSpringer Science & Business Media

Magnetic Particle Imaging (MPI) is a novel imaging modality. In MPI superparamagnetic iron oxide nanoparticles are used as tracer materials. The volume is the proceeding of the 2nd international workshop on magnetic particle imaging (IWMPI). The workshop aims at covering the status and recent developments of both, the instrumentation and the tracer material, as each of them is equally important in designing a well performing MPI. For instance, the current state of the art in magnetic coil design for MPI is discussed. With a new symmetrical arrangement of coils, a field-free line (FFL) can be produced that promises a significantly higher sensitivity compared with the standard arrangement for a FFP. Furthermore, the workshop aims at presenting results from phantom and pre-clinical studies.

Sustainable Development and Innovations in Marine Technologies includes the papers presented at the 18th International Congress of the Maritime Association of the Mediterranean (IMAM 2019, Varna, Bulgaria, 9-11 September

2019). Sustainable Development and Innovations in Marine Technologies includes a wide range of topics: Aquaculture & Fishing; Construction; Defence & Security; Design; Dynamic response of structures; Degradation/ Defects in structures; Electrical equipment of ships; Human factors; Hydrodynamics; Legal/Social aspects; Logistics; Machinery & Control; Marine environmental protection; Materials; Navigation; Noise; Non-linear motions – manoeuvrability; Off-shore and coastal development; Off-shore renewable energy; Port operations; Prime movers; Propulsion; Safety at sea; Safety of Marine Systems; Sea waves; Seakeeping; Shaft & propellers; Ship resistance; Shipyards; Small & pleasure crafts; Stability; Static response of structures; Structures, and Wind loads. The IMAM series of Conferences started in 1978 when the first Congress was organised in Istanbul, Turkey. IMAM 2019 is the eighteenth edition, and in its nearly forty years of history, this biannual event has been organised throughout Europe. Sustainable Development and Innovations in Marine Technologies is essential reading for academics, engineers and all professionals involved in the area of sustainable and innovative marine technologies.