

## Concrete 2nd Edition Sidney Mindess

Linking theory to practice, this book provides a better fundamental understanding of Portland cement and hydraulic binders which is necessary to make better concrete. It has been clearly demonstrated that concrete durability is closely linked to its water/binder ratio and proper curing during the first week after casting. In this rigorously presented work, Pierre-Claude Aitcin explains the complexity of the hydration reaction and how to make, use and cure durable and sustainable concrete. This book also details the problems with Portland cement composition at present and outlines the concept of an ideal hydraulic binder which is technically and ecologically efficient, as well as being long-lasting and robust. Binders for Durable and Sustainable Concrete is a practical and innovative reference text which will be particularly relevant to engineers and chemists working in the Portland cement, concrete and admixture industries. This book will also be of interest to academics and graduate-level students in Civil Engineering departments who specialize in Portland cement and concrete technology. This book presents a unified view of concrete behavior in light of a body of chemical and physical principles. It provides the most up-to-date information available on new concrete materials. The most up-to-date information on new concrete materials. SI units used as primary system, keeping readers current to the unit system being adopted in the United States. Latest ASTM specifications are included. Exercises at the end of each chapter. An excellent resource for professionals in this industry.

Concrete text with a materials science orientation. Presents a unified view of concrete behavior in light of underlying chemical and physical principles.

Bringing together in one volume the latest research and information, this book provides a detailed guide to the selection and use of aggregates in concrete. After an introduction defining the purpose and role of aggregates in concrete, the authors present an overview of aggregate sources and production techniques, followed by a detailed study of their physical, mechanical and chemical properties. This knowledge is then applied to the use of aggregates in both plastic and hardened concretes, and in the overall mix design. Special aggregates and their applications are discussed in detail, as are the current main specifications, standards and tests.

Theory and Design

Reinforced Concrete

Durability of Concrete

(for the Architecture and Civil Engineering Students Preparing for Degree, Diploma and Other Competitive Examinations)

Materials Science of Concrete

**Chapter 1: System Studies -- Chapter 2: Drawings and Diagrams -- Chapter 3: Substation Layouts -- Chapter 4: Substation Auxiliary Power Supplies -- Chapter 5: Current and Voltage Transformers -- Chapter 6: Insulators -- Chapter 7: Substation Building Services -- Chapter 8: Earthing and Bonding -- Chapter 9: Insulation Co-ordination -- Chapter 10: Relay Protection -- Chapter 11: Fuses and Miniature Circuit Breakers -- Chapter 12: Cables -- Chapter 13: Switchgear -- Chapter 14: Power Transformers -- Chapter 15: Substation and Overhead Line Foundations -- Chapter 16: Overhead Line Routing -- Chapter 17: Structures, Towers and Poles -- Chapter 18: Overhead Line Conductor and Technical Specifications -- Chapter 19: Testing and Commissioning -- Chapter 20: Electromagnetic Compatibility -- Chapter 21: Supervisory Control and Data Acquisition -- Chapter 22: Project Management -- Chapter 23: Distribution Planning -- Chapter 24: Power Quality- Harmonics in Power Systems -- Chapter 25: Power Qual ...**

*A variety of ceramic materials has been recently shown to exhibit nonlinear stress strain behavior. These materials include transformation-toughened zirconia which undergoes a stress-induced crystallographic transformation in the vicinity of a propagating crack, microcracking ceramics, and ceramic-fiber reinforced ceramic matrices. Since many of these materials are under consideration for structural applications, understanding fracture in these quasi-brittle materials is essential. Portland cement concrete is a relatively brittle material. As a result mechanical behavior of concrete, conventionally reinforced concrete, prestressed concrete and fiber reinforced concrete is critically influenced by crack propagation. Crack propagation in concrete is characterized by a fracture process zone, microcracking, and aggregate bridging. Such phenomena give concrete toughening mechanisms, and as a result, the macroscopic response of concrete can be characterized as that of a quasi-brittle material. To design super high performance cement composites, it is essential to understand the complex fracture processes in concrete. A wide range of concern in design involves fracture in rock masses and rock structures. For example, prediction of the extension or initiation of fracture is important in: 1) the design of caverns (such as underground nuclear waste isolation) subjected to earthquake shaking or explosions, 2) the production of geothermal and petroleum energy, and 3) predicting and monitoring earthquakes. Depending upon the grain size and mineralogical composition, rock may also exhibit characteristics of quasi-brittle materials.*

*This book provides an up-to-date survey of durability issues, with a particular focus on specification and design, and how to achieve durability in actual concrete construction. It is aimed at the practising engineer, but is also a valuable resource for graduate-level programs in universities. Along with background to current philosophies it gathers together in one useful reference a summary of current knowledge on concrete durability, includes information on modern concrete materials, and shows how these materials can be combined to produce durable concrete. The approach is consistent with the increasing focus on sustainability that is being addressed by the concrete industry, with the current emphasis on 'design for durability'.*

**Cementitious materials : historical notes / Waldemar A. Klemm / - Cement production and cement quality / Vagn Johansen / - Phase equilibria and cement hydration / Paul Wencil Brown / - Hydration mechanisms / E.M. Gartner and J.M. Gaidis / - The microstructure of concrete / Karen L. Scrivener / - Interfaces in concrete / S. Mindess / - Modeling of hydration reactions and concrete properties / L.J. Parrott / - Microsilica in concrete / L.R. Roberts / - Fiber-Reinforced cementitious materials / Arnon Bentur / - Mechanisms of corrosion of steel in concrete / Arnold Rosenberg / - Integrated knowledge systems for concrete science and technology / Geoffrey Frohnsdorff.**

**Aggregates in Concrete**

**Sustainability of Concrete**

**Concrete Surface Engineering**

**Applications of Fracture Mechanics to Concrete, Rock and Other Quasi-Brittle Materials**

**Fibre Reinforced Cementitious Composites, Second Edition**

Emphasizing a conceptual understanding of concrete design and analysis, this revised and updated edition builds the student's understanding by presenting design methods in an easy to understand manner supported with the use of numerous examples and problems. Written in intuitive, easy-to-understand language, it includes SI unit examples in all chapters, equivalent conversion factors from US customary to SI throughout the book, and SI unit design tables. In addition, the coverage has been completely updated to reflect the latest ACI 318/11 code. Concrete has clearly emerged as the most economical and durable material for the building of the vast majority of marine structures. Reinforced concrete too has overcome the technological problems making it a suitable material for the construction of advanced marine structures such as offshore drilling platforms, spanspan bridges and undersea tunn

Over the past two decades concrete has enjoyed a renewed level of research and testing, resulting in the development of many new types of concrete. Through the use of various additives, production techniques and chemical processes, there is now a great degree of control over the properties of specific concretes for a wide range of applications. New theories, models and testing techniques have also been developed to push the envelope of concrete as a building material. There is no current textbook which brings all of these advancements together in a single volume. This book aims to bridge the gap between the traditional concrete technologies and the emerging state-of-the-art technologies which are gaining wider use.

Improve the Quality of Concrete, Improve the Quality of Construction Quality measurement is not prevalent in the concrete industry and quality investment is not seen as potentially generating a positive return. Improving Concrete Quality examines how and why concrete quality should be measured, and includes instruction on developing specifications with the aim of improving concrete quality. Reduce Concrete Variability: Reduce Costs and Increase Volume The first part of the book considers the tangible and intangible benefits of improved quality. The later chapters explore concrete strength variability in detail. It provides a greater grasp of the variation in concrete, as well as a deeper understanding of how material variability affects concrete performance. The author discusses the components of variability (material, manufacturing, testing) and provides steps to measuring and reducing variability to improve the quality of concrete. The text also contains a chapter on data analysis for quality monitoring and test results. Come Away with Practices and Tools That Can Be Applied Immediately: Provides techniques and how specifications can improve concrete quality Offers a clear understanding of the link between the materials (cement, SCM, aggregate, water, air), manufacturing, testing variability, and concrete quality Includes information on analyzing test data to improve quality Improving Concrete Quality quantifies the benefits of improved quality, and introduces novel ways of measuring concrete quality. This text is an ideal resource for quality personnel in the concrete industry. It also benefits architects, engineers, contractors, and researchers.

Mechanics and Design

Waste Materials and By-Products in Concrete

Concrete in the Marine Environment

The Alkali-Silica Reaction in Concrete

Proceedings of an International Conference on Advances in Engineering Structures, Mechanics & Construction, held in Waterloo, Ontario, Canada, May 14-17, 2006

*Concrete is the most used man-made material in the world and is the fundamental physical medium for most of the world's architecture and construction. The character of concrete is largely the product of the rigid moulds that have shaped it since its invention in antiquity. The advent of flexible moulds, however, marks a radical break from conventional practice - and conventional concrete architecture. The Fabric Formwork Book provides the first comprehensive handbook on the emerging technology of flexible moulds for reinforced concrete architecture. Written by the foremost expert in the field, this book takes a comprehensive and generous approach that includes technical, historical and theoretical aspects of the subject. The book: concentrates on simple flat-sheet formworks contains detailed technical descriptions of how to construct a wide range of formworks for various applications features case studies from around the world critiques the difficulties and advantages in each case it covers provides instruction and guidance on how to model and design fabric-formed structures includes the most comprehensive history of fabric formwork yet published features essays from guest expert authors, which explore the theoretical, historical, and poetic significance of flexibly formed architecture and structures discusses fabric formwork as an exemplary approach to sustainable construction through its simplicity and efficiency. Beautifully designed and illustrated with a superb range of images, diagrams and technical drawings, the book both informs and inspires. Speaking directly and plainly to professionals, students and academics, the language used is both clear and precise, and care is taken to avoid opaque technical or academic jargon. Technical terms, when used, are clearly described and a special glossary is included to make the book as widely accessible as possible.*

*Based on the 1995 edition of the American Concrete Institute Building Code, this text explains the theory and practice of reinforced concrete design in a systematic and clear fashion, with an abundance of step-by-step worked examples, illustrations, and photographs. The focus is on preparing students to make the many judgment decisions required in reinforced concrete design, and reflects the author's experience as both a teacher of reinforced concrete design and as a member of various code committees. This edition provides new, revised and expanded coverage of the following topics: core testing and durability; shrinkage and creep; bases the maximum steel ratio and the value of the factor on Appendix B of ACI318-95; composite concrete beams; strut-and-tie models; dapped ends and T-beam flanges. It also expands the discussion of STMs and adds new examples in SI units.*

*This work has been selected by scholars as being culturally important and is part of the knowledge base of civilization as we know it. This work is in the public domain in the United States of America, and possibly other nations. Within the United States, you may freely copy and distribute this work, as no entity (individual or corporate) has a copyright on the body of the work. Scholars believe, and we concur, that this work is important enough to be preserved, reproduced, and made generally available to the public. To ensure a quality reading experience, this work has been proofread and republished using a format that seamlessly blends the original graphical elements with text in an easy-to-read typeface. We appreciate your support of the preservation process, and thank you for being an important part of keeping this knowledge alive and relevant.*

*Fracture and Size Effect in Concrete and Other Quasibrittle Materials is the first in-depth text on the application of fracture mechanics to the analysis of failure in concrete structures. The book synthesizes a vast number of recent research results in the literature to provide a comprehensive treatment of the topic that does not give merely the facts - it provides true understanding. The many recent results on quasibrittle fracture and size effect, which were scattered throughout many periodicals, are compiled here in a single volume. This book presents a well-rounded discussion of the theory of size effect and scaling of failure loads in structures. The size effect, which is the most important practical manifestation of fracture behavior, has become a hot topic. It has gained prominence in current research on concrete and quasibrittle materials. The treatment of every subject in Fracture and Size Effect in Concrete and Other Quasibrittle Materials proceeds from simple to complex, from specialized to general, and is as concise as possible using the simplest level of mathematics necessary to treat the subject clearly and accurately. Whether you are an engineering student or a practicing engineer, this book provides you with a clear presentation, including full derivations and examples, from which you can gain real understanding of fracture and size effect in concrete and other quasibrittle materials.*

Design and Construction

Mix Design and Test Methods, Second Edition

Engineering Materials

Properties of Fresh and Hardened Concrete Containing Supplementary Cementitious Materials

Concrete Construction Engineering Handbook

The amount and variety of waste that humanity dumps in landfill sites is nothing short of a scandal, believes Rafat Siddique, of Deemed University in Patiala, India. Instead, we ought to be building new homes out of it!

Siddique shows in this important book that many non-hazardous waste materials and by-products (which are landfilled, can in fact be used in making concrete and similar construction materials.

Advanced cementitious composites can be designed to have outstanding combinations of strength (five to ten times that of conventional concrete) and energy absorption capacity (up to 1000 times that of plain concrete). This second edition brings together in one volume the latest research developments in this rapidly expanding area. The book is split into two parts. The first part is concerned with the mechanics of fibre reinforced brittle matrices and the implications for cementitious systems. In the second part the authors describe the various types of fibre-cement composites, discussing production processes, mechanical and physical properties, durability and applications. Two new chapters have been added, covering fibre specification and structural applications. Fibre Reinforced Cementitious Composites will be of great interest to practitioners involved in modern concrete technology and will also be of use to academics, researchers and graduate students.

Developments in the Formulation and Reinforcement of Concrete, Second Edition, presents the latest developments on topics covered in the first edition. In addition, it includes new chapters on supplementary cementitious materials, mass concrete, the sustainably of concrete, service life prediction, limestone cements, the corrosion of steel in concrete, alkali-aggregate reactions, and concrete as a multiscale material. The book's chapters introduce the reader to some of the most important issues facing today's concrete industry. With its distinguished editor and international team of contributors, users will find this to be a must-have reference for civil and structural engineers. Summarizes a wealth of recent research on structural concrete, including material microstructure, concrete types, and variation and construction techniques Emphasizes concrete mixture design and applications in civil and structural engineering Reviews modern concrete materials and novel construction systems, such as the precast industry and structures requiring high-performance concrete

This volume represents the current knowledge on the effect of SCMs (slag, fly ash, silica fume, limestone powder, metakaolin, natural pozzolans, rice husk ash, special SCMs, ternary blends) on the properties of fresh and hardened concrete (e.g. early strength development, workability, shrinkage) and curing requirements. Other topics treated in the book are postblending vs preblending, implications of SCM variability, interaction between SCM and commonly used admixtures (e.g. superplasticizers, air entrainers).

Canadian Symposium on Cement and Concrete, 2nd, Vancouver, 24-26 July 1991

Advances in Construction Materials 2007

Developments in the Formulation and Reinforcement of Concrete

Fracture and Size Effect in Concrete and Other Quasibrittle Materials

Production of Portland cement is responsible for about seven percent of the world's greenhouse gas emissions. The pressure to make the production of concrete more sustainable, or "greener",

is considerable and increasing. This requires a wholesale shift in processes, materials and methods in the concrete industry. Pure Portland cement will need to be replaced by more complex binary, tertiary or even quaternary binders, including other types of cementitious materials. We can expect an increasing use of high performance concrete, primarily because of its high sustainability and durability. Much more attention will have to be paid to the proper curing of the concrete if we want to improve its life expectancy. Presenting the latest advances in the science of concrete this book focuses particularly on sustainability, durability, and economy. It explores the potential for increased sustainability in concrete from the initial mixing right through to its behaviour in complex structures exposed to different types of loads and aggressive environments.

Shotcrete: Materials, Performance and Use is a comprehensive textbook covering the current state-of-the-art shotcrete technology. It provides an overview of the many and various uses of shotcrete. Shotcrete is well suited for construction of curvilinear structures (domes, shells, bobsleigh/luge tracks, etc.) and overhead shotcrete applications (seismic retrofit, repairs, ground support, etc.) that could not be constructed technically and/or economically using conventional formed, cast-in-place concrete construction methods. It contains chapters on history, shotcrete materials and mixture proportioning, performance, shotcrete research, equipment and shotcrete application. It is also comprised of shotcrete case history examples including buildings and structures, infrastructure repair and rehabilitation, ground support and shoring, underground support in tunnels and mines, swimming pools and spas, and, finally, architectural shotcrete. This text should be of interest to design engineers and architects considering the use of the technology, as well as academics. It serves as a useful guide to contractors using shotcrete in one or more of its many and various applications.

This book is the most comprehensive and flexible theory of chloride ingress in concrete to date. Based on test results and field observations, the book demonstrates the easy application of this theory to practice. The information is presented in a clear style with each chapter containing an introduction, technical applications and examples, and a f

ConcretePearson College Division

Standard Practice for Concrete

The Fabric Formwork Book

Strut-and-Tie Models for Unified Design

Eleventh International Conference on the Bearing Capacity of Roads, Railways and Airfields

Structural Concrete

Innovations in Road, Railway and Airfield Bearing Capacity - Volume 1 comprises the first part of contributions to the 11th International Conference on Bearing Capacity of Roads, Railways and Airfields (2022). In anticipation of the event, it unveils state-of-the-art information and research on the latest policies, traffic loading measurements, in-situ measurements and condition surveys, functional testing, deflection measurement evaluation, structural performance prediction for pavements and tracks, new construction and rehabilitation design systems, frost affected areas, drainage and environmental effects, reinforcement, traditional and recycled

materials, full scale testing and on case histories of road, railways and airfields. This edited work is intended for a global audience of road, railway and airfield engineers, researchers and consultants, as well as building and maintenance companies looking to further upgrade their practices in the field.

This book presents the proceedings of an International Conference on Advances in Engineering Structures, Mechanics & Construction, held in Waterloo, Ontario, Canada, May 14-17, 2006. The contents include contains the texts of all three plenary presentations and all seventy-three technical papers by more than 153 authors, presenting the latest advances in engineering structures, mechanics and construction research and practice.

**FRACTURE MECHANICS OF CONCRETE AND ROCK** This book offers engineers a unique opportunity to learn, from internationally recognized leaders in their field, about the latest theoretical advances in fracture mechanics in concrete, reinforced concrete structures, and rock. At the same time, it functions as a superb, graduate-level introduction to fracture mechanics concepts and analytical techniques. Reviews, in depth, the basic theory behind fracture mechanics \* Covers the application of fracture mechanics to compression failure, creep, fatigue, torsion, and other advanced topics \* Extremely well researched, applies experimental evidence of damage to a wide range of design cases \* Supplies all relevant formulas for stress intensity \* Covers state-of-the-art linear elastic fracture mechanics (LEFM) techniques for analyzing deformations and cracking \* Describes nonlinear fracture mechanics (NLFM) and the latest RILEM modeling techniques for testing nonlinear quasi-brittle materials \* And much more Over the past few years, researchers employing techniques borrowed from fracture mechanics have made many groundbreaking discoveries concerning the causes and effects of cracking, damage, and fractures of plain and reinforced concrete structures and rock. This, in turn, has resulted in the further development and refinement of fracture mechanics concepts and tools. Yet, despite the field's growth and the growing conviction that fracture mechanics is indispensable to an understanding of material and structural failure, there continues to be a surprising shortage of textbooks and professional references on the subject. Written by two of the foremost names in the field, *Fracture Mechanics of Concrete* fills that gap. The most comprehensive book ever written on the subject, it consolidates the latest theoretical research from around the world in a single reference that can be used by students and professionals alike. *Fracture Mechanics of Concrete* is divided into two sections. In the first, the authors lay the necessary groundwork with an in-depth review of fundamental principles. In the second section, the authors vividly demonstrate how fracture mechanics has been successfully applied to failures occurring in a wide array of design cases. Key topics covered in these sections include: \* State-of-the-art linear elastic fracture mechanics (LEFM) techniques for analyzing deformations and cracking \* Nonlinear fracture mechanics (NLFM) and the latest RILEM modeling techniques for testing nonlinear quasi-brittle materials \* The use of R-Curves to describe cracking and fracture in quasi-brittle materials \* The application of fracture mechanics to compression failure, creep, fatigue, torsion, and other advanced topics The most timely, comprehensive, and authoritative book on the subject currently available, *Fracture Mechanics of Concrete* is both a complete instructional tool for academics and students in structural and geotechnical engineering courses, and an indispensable working resource for practicing engineers. As every civil engineer knows, Portland Cement is the most versatile and important material of construction, and will probably remain so far into the future. Yet few books, if any, exist that offer an in-depth analysis of the mixing and testing methods of this vital hydraulic cement. This statement, written about the first edition of *Engineering Significance of Tests and Properties of Concrete and Concrete-making Materials*

**Handbook on Nondestructive Testing of Concrete**

**Concrete Materials, Performance and Use Engineered Concrete**

The book is a compilation of recent research results on building construction materials. Civil Engineers and Materials Scientists from all over the world present their ideas for further material developments, the testing of structures and of the innovations, composites and the design of existing material mixes, especially for concrete, are discussed.

This book examines the application of strut-and-tie models (STM) for the design of structural concrete. It presents state-of-the-art information, from fundamental theories to practical engineering applications, and also provides innovative techniques that are not otherwise achievable using the traditional methods.

Precast reinforced and prestressed concrete frames provide a high strength, stable, durable and robust solution for any multi-storey structure, and are widely regarded as a high quality, economic and architecturally versatile technology for buildings. The resulting buildings satisfy a wide range of commercial and industrial needs. Precast concrete buildings behave in a different way to those where the concrete is cast in-situ, with the components subject to different forces and moments. In detail in this second edition of *Multi-Storey Precast Concrete Framed Structures*, providing a detailed understanding of the procedures involved in precast structural design. This new edition has been fully updated to reflect recent developments in design and construction, and includes new design procedures and calculations based on EUROCODE standards. These are shown in parallel with similar calculations based on British Standards to ensure the designer is fully aware of the differences required in designing to EUROCODE standards. Civil and structural engineering students in their final year undergraduate and postgraduate students of civil and structural engineering will all find this book to be a thorough overview of this important construction technology.

Written by international experts in the field, this new edition provides the most comprehensive, up-to-date information available on nondestructive testing (NDT) methods used to evaluate concrete structures. Sixteen chapters give you a detailed look at the tools and techniques used to estimate the in-place strength of concrete and permeation properties that relate to potential durability, and describe methods used to assess the internal condition of concrete and corrosion activity of steel reinforcement. **Theory and Application**

**Shotcrete Binders for Durable and Sustainable Concrete**

**Diffusion of Chloride in Concrete**

**Design and Control of Concrete Mixtures** Applying any material to an existing concrete surface intrinsically entails the development of a bond. Considering the ever increasing importance of concrete repair and protection, which imply the creation of an interface between two materials, an improved knowledge of concrete surface characteristics is paramount. Surface engineering, which has evolved from the world of metallurgy, addresses all surface-related considerations, notably adhesion. It provides a fundamental understanding of what will make the contact between two materials effective or not, allowing for interactions of variable intensity. It also comes with a variety of scientific tools for characterizing the quality of the substrate, the properties of the new material layer and their interface. In the case of concrete surface treatment, this is especially important for achieving lasting results. This book addresses the essentials of concrete surface engineering in view of a wide variety of concrete surface treatments, from protective coatings to repairs. It provides a leading-edge source of information for practicing engineers, architects, repair specialists, and researchers on the following topics: Surface engineering principles applied to concrete Methods and techniques for assessing concrete surface characteristics Fundamentals of adhesion between concrete and surface repairs/treatments Compatibility requirements for concrete surface repairs/treatments Review of surface preparation techniques available for concrete Achievement and appraisal of bond between existing concrete and surface repairs/treatments Benoit Bissonnette is professor of civil engineering at Laval University in Quebec City, Canada. Luc Courard is professor of building materials at the University of Liège in Belgium. Andrzej Garbacz is professor of building materials engineering in the Department of Building Materials Engineering at the Warsaw University of Technology in Poland.

The first edition of this comprehensive work quickly filled the need for an in-depth handbook on concrete construction engineering and technology. Living up to the standard set by its bestselling predecessor, this second edition of the *Concrete Construction Engineering Handbook* covers the entire range of issues pertaining to the construction

This book reviews the fundamental causes and spectrum effects of ASR. It considers the advances that have been made in our understanding of this problem throughout the world.

This book provides an up-to-date survey of durability issues, with a particular focus on specification and design, and how to achieve durability in actual concrete construction. It is aimed at the practising engineer, but is also a valuable resource for graduate-level programs in universities. Along with background to current philosophies it gathers together in one useful reference a summary of current knowledge on concrete durability, includes information on modern concrete materials, and shows how these materials can be combined to produce durable concrete. The approach is consistent with the increasing focus on sustainability that is being addressed by the concrete industry, with the current emphasis on 'design for durability'.

**Multi-Storey Precast Concrete Framed Structures**

**Transmission and Distribution Electrical Engineering**

**Advanced Concrete Technology**

**Improving Concrete Quality**

**Methods for Building New Architectural and Structural Forms in Concrete**