

Underground Mining Methods Engineering Fundamentals And International Case Studies

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Sampling Approaches to Assess Underground Coal
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Rock FormationsSurface Mining, Second EditionHard
Rock Miner's HandbookLegislation, Technology and
Practice of Mine Land ReclamationMineral Property
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Mining Engineering HandbookSME Mining Engineering
Handbook, Third EditionMining Methods: Engineering
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Mining Methods Practical Rock Mechanics Sensing and
Monitoring Technologies for Mines and Hazardous
Areas Underground Mining Methods Handbook Surface
and Underground Excavations, 2nd Edition Coupled
Processes in Subsurface Deformation, Flow, and
Transport Rockbolting

Subsurface Ventilation and Environmental Engineering

An introductory text and reference on mining engineering highlighting the latest in mining technology Introductory Mining Engineering outlines the role of the mining engineer throughout the life of a mine, including prospecting for the deposit, determining the site's value, developing the mine, extracting the mineral values, and reclaiming the land afterward. This Second Edition is written with a focus on sustainability-managing land to meet the economic and environmental needs of the present while enhancing its ability to also meet the needs of future generations. Coverage includes aboveground and underground methods of mining for a wide range of substances, including metals, nonmetals, and fuels. Completely up to date, this book presents the latest information on such technologies as remote sensing, GPS, geophysical surveying, and mineral deposit evaluation, as well as continuous integrated mining operations and autonomous trucks. Also included is new information on landscape restoration, regional planning, wetlands protection, subsidence mitigation, and much more. New chapters include coverage of: *

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Environmental responsibilities * Regulations * Health and safety issues Generously supplemented with more than 200 photographs, drawings, and tables, Introductory Mining Engineering, Second Edition is an indispensable book for mining engineering students and a comprehensive reference for professionals.

Introductory Mining Engineering

Underground Mining Methods: Engineering Fundamentals and International Case Studies presents the latest principles and techniques in use today. Reflecting the international and diverse nature of the industry, a series of mining case studies is presented covering the commodity range from iron ore to diamonds extracted by operations located in all corners of the world. Industry experts have contributed sections on General Mine Design Considerations; Room-and-Pillar Mining of Hard Rock/Soft Rock; Longwall Mining of Hard Rock; Shrinkage Stoping; Sublevel Stoping; Cut-and-Fill Mining; Sublevel Caving; Panel Caving; Foundations for Design; and Underground Mining Looks to the Future.

Introductory Mining Engineering

Legislation, Technology and Practice of Mine Land Reclamation contains the proceedings of the Beijing International Symposium on Land Reclamation and Ecological Restoration (LRER 2014, Beijing, China, 16-19 October 2014). The contributions cover a wide range of topics: - Monitoring, prediction and

assessment of environmental damage in mining areas
- Subsidence land reclamation and ecological restoration - Soil, vegetation and biological diversity - Mining methods and measures for minimization of land and environmental damage - Solid wastes and AMD treatment - Contaminated land remediation - Land reclamation and ecological restoration policies and management - Surface mined land reclamation and ecological restoration - Case study on mining reclamation and ecological restoration Legislation, Technology and Practice of Mine Land Reclamation will be of interest to engineers, scientists, consultants, government officials and students involved in environmental engineering, soil science, ecology, forestry, mining, and land reclamation and ecological restoration in mining areas.

Rock mechanics and rock engineering

This practical and design-oriented book focuses on ground characterization and structural calculation, as part of the active structural design methodology. With a focus on rock tunnelling it offers a comprehensive rather than a topic-based perspective, deriving sound tunnel design criteria and methods from basic principles. Ground characterization includes excavations, site investigation, and in situ stress determination, culminating in geotechnical classifications. The book then deals with various construction methods and their appropriate calculations, which range from constitutive models for the stress-strain behaviour of an excavation and tunnel support elements to a full stress-strain

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analysis methodology. The heavily practical approach of the book draws on the authors' twenty years of tunnelling experience in Spain and South America. It will help any young or established professional who wants to develop a career in the underground field across both civil engineering and geology. As it incorporates the very fundamentals of tunneling design, it can be used as a support for tunneling courses or as a textbook for master's and PhD courses. Benjamín Celada was Chief Tunnel Engineer at Hunosa and Potasas de Navarra S.A. before founding Geocontrol S.A. He has also worked for twenty years as Professor of Underground Works at the Polytechnic Mining University in Madrid, Spain. Z. T. Bieniawski directed the Rock Mechanics Department of the Council for Scientific and Industrial Research in Pretoria, then taught at the Pennsylvania State University for twenty years.

Water Management at Abandoned Flooded Underground Mines

In a straightforward manner and with plenty of illustrations, this textbook approaches important design issues in rock mechanics from a mechanics of materials foundation. It addresses rock slope stability in surface excavations, shaft and tunnel stability, and entries and pillars. The book also covers three-dimensional caverns with an emphasis of backfill and cable bolting and addresses the geometry and forces of chimney caving. Appendices contain supplementary information about rock, joint, and composite properties, rock mass classification

schemes, and useful formulas. Designed as a course book, it contains numerous exercises and examples to familiarize the reader with practical problems in rock mechanics through various design analysis techniques and their applications. The appendices provide supplementary information about rock, joint, and composite properties, rock mass classification schemes, useful formulas, and an extensive literature list. A solutions manual, containing all worked solutions is also available (ISBN 9780415457255). Intended for rock mechanics courses to undergraduate and first year graduate students in mining and civil engineering; also suited as an introduction to rock mechanics for other engineers.

Rockburst

Rockbolting: Principles and Applications brings current theoretical and practical developments in the most widely used support device for underground rock excavations. Today, one cannot find any rock excavation project that does not use rockbolts for rock support. The worldwide annual assumption of rockbolts is in the billions, with pieces applied to mines, tunnels and other types of geotechnical projects for rock and soil reinforcement. The text is based on over 25 years of experience of the author both as academic and practitioner. The book introduces the principles and background concepts of rock support, and then offers a comprehensive overview of the mechanics of rockbolting, as well as current rock bolt types such as mechanical, grouted, self-drilling, grouted cables, frictional and yield

rockbolts. Installation and performance assessment are covered next including load-displacement curves and energy-absorption capacities. Two chapters on design and quality control, respectively, cover failure mechanics, the selection process and the connections with other supporting devices. On quality control, the author explains the usual tests and displacement measurements. The final chapter brings current case studies that combine the concepts presented in the whole book. The book is a professional reference for engineers in the mining and geotechnical industries and can be used as research material for academics in rock mechanics and stability studies. Offers theoretical knowledge on rock bolts and rockbolting Covers the standard and most recent types of rockbolts Includes information on rockbolting in high stress rock Presents case studies that introduce practical applications in several conditions

Rock Mechanics

Coal

This annual series of books includes scientific papers on mining profiles. This volume presents multiple aspects of mining technology implementation in several aspects: extraction of coal, iron, manganese, uranium and other ores. Capturing and utilization of coalbed methane by various methods including alternative ones, safety measures in mining, ecological aspects, etc. Specific attention is paid to intensification of mineral resources extraction

processes by way of modernizing opening methods, development and mining methods depending on mining-geological conditions. Experimental results of stress-strain state rock massif forecast by means of computational experiments using recursive methods are also discussed. Any mining operations should finally result in adequate recovery of land surface and utilization of mining wastes using various environmentally friendly methods, thus, sufficient attention is paid to this scientific trend. Non-traditional methods of minerals mining are becoming more topical and of higher demand in the modern society. Hence, several papers/chapters are devoted to underground coal gasification and its subsequent processes. In addition, extraction technologies of gas hydrate, as a source of an abundant amount of natural gas, are thoroughly examined in this book, including implementation of gas hydrate technologies for mine methane utilizations with its following transportation in a solid state. Furthermore, attention is given to evaluation of economic efficiency of minerals mining by the proposed methods, their ways of enrichment, ecological aspects and the influence of mining production on the environment, innovational logistic solutions at mining enterprises, and also to perspectives of Ukraine's mining industry integration to the European standards.

Monitoring and Sampling Approaches to Assess Underground Coal Mine Dust Exposures

"Coupled Processes in Subsurface Deformation, Flow,

and Transport presents a rational and unified treatment of coupled processes, with emphasis on the coupling and feedbacks present where solid deformation, fluid flow, and solute transport combine, and in the representation of heterogeneous media through multi-porosity approaches. Analytical and numerical solutions are presented for subsurface systems subjected to varying mechanical, thermal, and chemical disturbances."--BOOK JACKET.

Handbook of Operations Research in Natural Resources

This book addresses the processes related to mine abandonment from a hydrogeological perspective and provides a comprehensive presentation of water management and innovative tracer techniques for flooded mines. After an introduction to the relevant hydrogeochemical processes the book gives detailed information about mine closure procedures. The book also includes case studies and hints, and some new methodologies for conducting tracer tests in flooded mines.

Rock Mechanics

This new edition has been completely revised to reflect the notable innovations in mining engineering and the remarkable developments in the science of rock mechanics and the practice of rock engineering that have taken place over the last two decades. Although "Rock Mechanics for Underground Mining" addresses many of the rock mechanics issues that

arise in underground mining engineering, it is not a text exclusively for mining applications. Based on extensive professional research and teaching experience, this book will provide an authoritative and comprehensive text for final year undergraduates and commencing postgraduate students. For professional practitioners, not only will it be of interests to mining and geological engineers, but also to civil engineers, structural mining geologists and geophysicists as a standard work for professional reference purposes.

Statistics for Mining Engineering

Coal remains one of the principal sources of energy for the United States, and the nation has been a world leader in coal production for more than 100 years. According to U.S. Energy Information Administration projections to 2050, coal is expected to be an important energy resource for the United States. Additionally, metallurgical coal used in steel production remains an important national commodity. However, coal production, like all other conventional mining activities, creates dust in the workplace. Respirable coal mine dust (RCMD) comprises the size fraction of airborne particles in underground mines that can be inhaled by miners and deposited in the distal airways and gas-exchange region of the lung. Occupational exposure to RCMD has long been associated with lung diseases common to the coal mining industry, including coal workers' pneumoconiosis, also known as "black lung disease." Monitoring and Sampling Approaches to Assess

Underground Coal Mine Dust Exposures compares the monitoring technologies and sampling protocols currently used or required by the United States, and in similarly industrialized countries for the control of RCMD exposure in underground coal mines. This report assesses the effects of rock dust mixtures and their application on RCMD measurements, and the efficacy of current monitoring technologies and sampling approaches. It also offers science-based conclusions regarding optimal monitoring and sampling strategies to aid mine operators' decision making related to reducing RCMD exposure to miners in underground coal mines.

Rock Dynamics

This third edition of the SME Mining Engineering Handbook reaffirms its international reputation as "the handbook of choice" for today's practicing mining engineer. It distills the body of knowledge that characterizes mining engineering as a disciplinary field and has subsequently helped to inspire and inform generations of mining professionals. Virtually all of the information is original content, representing the latest information from more than 250 internationally recognized mining industry experts. Within the handbook's 115 thought-provoking chapters are current topics relevant to today's mining professional: Analyzing how the mining and minerals industry will develop over the medium and long term--why such changes are inevitable, what this will mean in terms of challenges, and how they could be managed Explaining the mechanics associated with

the multifaceted world of mine and mineral economics, from the decisions associated with how best to finance a single piece of high-value equipment to the long-term cash-flow issues associated with mine planning at a mature operation Describing the recent and ongoing technical initiatives and engineering developments in relation to robotics, automation, acid rock drainage, block caving optimization, or process dewatering methods Examining in detail the methods and equipment available to achieve efficient, predictable, and safe rock breaking, whether employing a tunnel boring machine for development work, mineral extraction using a mobile miner, or cast blasting at a surface coal operation Identifying the salient points that dictate which is the safest, most efficient, and most versatile extraction method to employ, as well as describing in detail how each alternative is engineered Discussing the impacts that social and environmental issues have on mining from the pre-exploration phase to end-of-mine issues and beyond, and how to manage these two increasingly important factors to the benefit of both the mining companies and other stakeholders

Evolutionary and Revolutionary Technologies for Mining

This SME classic is both a reference book for the working engineer and a textbook for the mining student. This hardcover edition gives a brief history of surface mining and a general overview of the state of surface mining today--topics range from production

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and productivity to technological developments and trends in equipment. This extremely useful text takes the approach that exploration and mining geologists must be expert in a number of fields, including basic finance and economics, logistics, and pragmatic prospecting. Readers will find material on all these topics and more. The book's nine chapters include: Introduction, Exploration and Geology Techniques, Ore Reserve Estimation, Feasibility Studies and Project Financing, Planning and Design of Surface Mines, Mine Operations, Mine Capital and Operating Costs, Management and Organization, and Case Studies. The book is fully indexed.

Rock Engineering Design

Proceedings of the International Symposium on Engineering in Complex Rock Formations

Geotechnical Design for Sublevel Open Stoping

The Office of Industrial Technologies (OIT) of the U. S. Department of Energy commissioned the National Research Council (NRC) to undertake a study on required technologies for the Mining Industries of the Future Program to complement information provided to the program by the National Mining Association. Subsequently, the National Institute for Occupational Safety and Health also became a sponsor of this study, and the Statement of Task was expanded to include health and safety. The overall objectives of this study are: (a) to review available information on

the U.S. mining industry; (b) to identify critical research and development needs related to the exploration, mining, and processing of coal, minerals, and metals; and (c) to examine the federal contribution to research and development in mining processes.

New Developments in Mining Engineering 2015

Rockburst: Mechanisms, Monitoring, Warning and Mitigation invites the most relevant researchers and practitioners worldwide to discuss the rock mechanics phenomenon related to increased stress and energy levels in intact rock introduced by drilling, explosion, blasting and other activities. When critical energy levels are reached, rockbursts can occur causing human and material losses in mining and tunneling environments. This book is the most comprehensive information source in English to cover rockbursts. Comprised of four main parts, the book covers in detail the theoretical concepts related to rockbursts, and introduces the current computational modeling techniques and laboratory tests available. The second part is devoted to case studies in mining (coal and metal) and tunneling environments worldwide. The third part covers the most recent advances in measurement and monitoring. Special focus is given to the interpretation of signals and reliability of systems. The following part addresses warning and risk mitigation through the proposition of a single risk assessment index and a comprehensive warning index to portray the stress status of the rock and a

successful case study. The final part of the book discusses mitigation including best practices for distressing and efficiently supporting rock. Designed to provide the most comprehensive coverage, the book will provide practicing mining and tunneling engineers the theoretical background needed to better cope with the phenomenon, practical advice from case studies and practical mitigation actions and techniques. Academics in rock mechanics will appreciate this complete reference to rockburst, which features how to analyze stress signals and use computational modeling more efficiently. Offers understanding of the fundamental theoretical concepts of rockbursts Explores how to analyze signals from current monitoring systems Shows how to apply mitigating techniques in current work Identifies characteristics that should be measured in order to detect rockburst risk

Seeing Underground

Rock dynamics has become one of the most important topics in the field of rock mechanics and rock engineering. The spectrum of rock dynamics is very wide and it includes the failure of rocks, rock masses and rock engineering structures such as rockbursting, spalling, popping, collapse, toppling, sliding, blasting, non-destructive testing, geophysical explorations, science and engineering of rocks and impacts. The book specifically covers fundamentals of rock dynamics, constitutive models, numerical analysis techniques, dynamic testing procedures, the multi-parameter responses and motions of rocks

during fracturing or slippage in laboratory experiments, earthquakes and their strong motion characteristics and their effect on various rock structures such as foundations, underground structures, slopes, dynamic simulation of loading and excavation, blasting and its positive utilization in rock engineering, the phenomenon of rockburst in rock excavations, non-destructive testing of rockbolts and rock anchors and impacts by meteors or projectiles. The main goal of this book is to present a unified and complete treatise on Rock Dynamics and to represent a milestone in advancing the knowledge in this field and in leading to new techniques for experiments, analytical and numerical modelling as well as monitoring of dynamics of rocks and rock engineering structures.

Proceedings of the International Symposium on Engineering in Complex Rock Formations

Underground Engineering: Planning, Design, Construction and Operation of the Underground Space provides the author's vast experience as both an academic and practitioner. It covers Planning, Design, Construction and the Operation of Underground Structures. Targeted at young professionals, students and researchers new to the field, the book contains examples, illustrations and cases from diverse underground uses, from roads to disposal facilities. Sections cover the history of the field, upcoming challenges, the planning stage of the subsurface use, including financial planning and reliability forecasting,

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site investigation, instrumentation and modeling, construction techniques and challenges, and more. Young professionals in this area will benefit from the updated and complete overview of Underground Engineering. Students will find the examples and cases particularly didactic. Richly illustrated, this book is an excellent resource for all involved in the development of the underground space. Offers a complete introduction to the area, including planning, design, construction and the operation of underground structures Assumes little previous knowledge from readers Presents the most recent techniques and future technical trends Richly illustrated and packed with examples to help readers understand the fundamentals of the area

Surface Mining, Second Edition

This book contains the results of a three-year research programme by a joint team of experts from four different EU countries. The main focus of this research was on investigating the possibility of using abandoned underground mines for the disposal of hazardous chemical waste with negligible pollution of the environment. The contributors address many aspects that are common to underground disposal of nuclear waste, such as: the properties and behaviour of waste-isolating clay materials and practical ways of preparing and applying them, development of tools/software to assess the stability, performance, transport of contaminants inside and outside the repository, and risks associated with different repository concepts considering the long-term safety

of the biosphere. Information is also included on the selection of site location, design and construction of repositories, predicting degrees of contamination of groundwater in the surroundings, estimation of isolating capacity of reference repositories, cost estimation of this approach in comparison with some other approaches, and many other relevant issues. Invaluable to researchers and engineers working in the field of hazardous (chemical) waste disposal, this title will also significantly aid experts dealing with nuclear waste.

Hard Rock Miner's Handbook

Legislation, Technology and Practice of Mine Land Reclamation

Here is the first systematic handbook treatment of quantitative modeling natural resource problems, their allocated efficient use, and societal and economic impact. Andrés Weintraub is the very top person in Natural Resource research. He has selected co-editors who are at the top of the sub-fields in natural resources: agriculture, fisheries, forestry, and mining. The book covers these areas with contributions from researchers on, among others, modeling natural research problems, quantifying data, and developing algorithms.

Mineral Property Evaluation

How developing a visual culture changed the industry

Underground Engineering

“Everything” sums up what must be considered for a properly documented property evaluation. Less than 30% of the projects that are developed in the minerals industry yield the return on investment that was projected from the project feasibility studies. The tools described in this handbook will greatly improve the probability of meeting your projections and minimizing project execution capital cost blowout that has become so prevalent in this industry in recent years. Mineral Property Evaluation provides guidelines to follow in performing mineral property feasibility and evaluation studies and due diligence, and in preparing proper documents for bankable presentations. It highlights the need for a consistent, systematic methodology in performing evaluation and feasibility work. The objective of a feasibility and evaluation study should be to assess the value of the undeveloped or developed mineral property and to convey these findings to the company that is considering applying technical and physical changes to bring the property into production of a mineral product. The analysis needs to determine the net present worth returned to the company for investing in these changes and to reach that decision point as early as possible and with the least amount of money spent on the evaluation study. All resources are not reserves, nor are all minerals an ore. The successful conclusion of any property evaluation depends on the development, work, and conclusions of the project

team. The handbook has a diverse audience: • Professionals in the minerals industry that perform mineral property evaluations. • Companies that have mineral properties and perform mineral property feasibility studies and evaluations or are buying properties based on property evaluation. • Financial institutions, both domestic and overseas, that finance or raise capital for the minerals industry. • Consulting firms and architectural and engineering contractors that utilize mineral property feasibility studies and need standards to follow. • And probably the most important, the mining and geological engineering students and geology and economic geology students that need to learn the standards that they should follow throughout their careers.

Mine Power Systems

Being knowledgeable about rock properties is vital to being effective in the design of blasts in mines, quarries and other construction projects. Without proper knowledge, the energy released during blasting can be underutilized, harm the environment, and may escalate costs. Rock Engineering Design: Properties and Applications of Sound Level aids scientists and practicing engineers in determining rock properties in a quick and precise way. It presents the basic concepts and principles on which sound level can be used in solving rock engineering design problems. Highlighting the importance of sound level in determining rock properties, the book focuses on the indirect method with emphasis on the development of numerical models in rock engineering

design. Discusses determining rock property using sound levels produced during drilling Explores the benefits of effective rock design applications Helps students to develop an interest in using sound level as a tool in rock design applications The book provides a general introduction to noise, its effect, and standards. It discusses the application of noise monitoring for mining equipment, the application of acoustic emission techniques in geotechnical fields, the equipment for drilling, measurement of sound, and the physico-mechanical properties of rocks. It also explores the process involved in the measurement of rock properties and sound level. This book summarizes in tables and figures the statistical values of the rock properties and sound level produced during the drilling of different rocks. It explains developed regression models, procedure, and the results of developed artificial neural network models. Rock Engineering Design: Properties and Applications of Sound Level includes a case study, and offers a summary and suggestions for further work.

Design Analysis in Rock Mechanics

This new edition has been completely revised to reflect the notable innovations in mining engineering and the remarkable developments in the science of rock mechanics and the practice of rock engineering that have taken place over the last two decades. Although "Rock Mechanics for Underground Mining" addresses many of the rock mechanics issues that arise in underground mining engineering, it is not a

text exclusively for mining applications. Based on extensive professional research and teaching experience, this book will provide an authoritative and comprehensive text for final year undergraduates and commencing postgraduate students. For professional practitioners, not only will it be of interests to mining and geological engineers, but also to civil engineers, structural mining geologists and geophysicists as a standard work for professional reference purposes.

SME Mining Engineering Handbook

Coal will continue to provide a major portion of energy requirements in the United States for at least the next several decades. It is imperative that accurate information describing the amount, location, and quality of the coal resources and reserves be available to fulfill energy needs. It is also important that the United States extract its coal resources efficiently, safely, and in an environmentally responsible manner. A renewed focus on federal support for coal-related research, coordinated across agencies and with the active participation of the states and industrial sector, is a critical element for each of these requirements. Coal focuses on the research and development needs and priorities in the areas of coal resource and reserve assessments, coal mining and processing, transportation of coal and coal products, and coal utilization.

SME Mining Engineering Handbook, Third Edition

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This book has been written as a reference and text for engineers, researchers, teachers and students who have an interest in the planning and control of the environment in underground openings. While directed primarily to underground mining operations, the design procedures are also applicable to other complex developments of subsurface space such as nuclear waste repositories, commercial accommodation or vehicular networks. The book will, therefore, be useful for mining, civil, mechanical, and heating, ventilating and air-conditioning engineers involved in such enterprises. The chapters on airborne pollutants highlight means of measurement and control as well as physiological reaction. These topics will be of particular interest to industrial hygienists and students of industrial medicine. One of the first technical applications of digital computers in the world's mining industries was for ventilation network analysis. This occurred during the early 1960s. However, it was not until low cost but powerful personal computers proliferated in engineering offices during the 1980s that the full impact of the computer revolution was realized in the day-to-day work of most mine ventilation engineers. This book reflects the changes in approach and design procedures that have been brought about by that revolution. While the book is organized into six parts, it encompasses three broad areas.

Mining Methods: Engineering Fundamentals

Many areas of mining engineering gather and use

statistical information, provided by observing the actual operation of equipment, their systems, the development of mining works, surface subsidence that accompanies underground mining, displacement of rocks surrounding surface pits and underground drives and longwalls, amongst others. In addition, th

Technology Innovation in Underground Construction

Sensing and Monitoring Technologies for Mines and Hazardous Areas: Monitoring and Prediction Technologies presents the fundamentals of mining related geotechnical risk and how the latest advances in sensing and data communication can be used both to prevent accidents and provide early warnings. Opencast mining operations involve huge quantities of overburden removal, dumping, and backfilling in excavated areas. Substantial increases in the rate of accumulation of waste dumps in recent years has resulted in greater height of dumps and also has given rise to the danger of dump failures as steeper open pit slopes are prone to failure. These failures lead to loss of valuable human lives and damage to mining machinery. This book presents the most recent advances in gas sensors, methane detectors, and power cut-off systems. It also introduces monitoring of the gas strata and environment, and an overview of the use of Internet of Things and cloud computing for mining sensing and surveillance purposes. Targeted at geotechnical and mining engineers, this volume covers the latest findings and technology to prevent mining accidents and mitigate

the inherent risk of the activity. Presents complete details of a real-time slope stability monitoring system using wireless sensor networking and prediction technique based on multivariate statistical analysis of various parameters and analytical hierarchy process methods Discusses innovative ideas and new concepts of sensing technologies, mine transport surveillance, digital mining, and cloud computing to improve safety and productivity in mining industry Includes slope stability prediction software, downloadable through a companion website, which can be used for monitoring, analyzing, and storing different sensors and providing audio-visual, SMS, and email alerts Covers the latest findings and technology to prevent mining accidents and mitigate the inherent risk

Practical Guide to Grouting of Underground Structures

Practical Guide to Grouting of Underground Structures presents a hands-on discussion of grouting fundamentals and provides a foundation for the development of practical specifications and field procedures. Employing a pragmatic approach to the subject of grouting, Raymond W. Henn concentrates on areas such as the types of drilling, mixing and pumping equipment, and their application. The book focuses on how cementitious grouting is used in conjunction with the excavation and lining of tunnels, shafts, and underground caverns in rock. Overviews of cementitious grouting in soils and chemical grouting are also provided. Topics covered range from

record keeping to quality control and testing requirements, field operations, and production rates. Practical Guide to Grouting of Underground Structures is written as a useful handbook for engineers, construction supervisors, inspectors, and other professionals involved in the planning, design, and implementation of underground grouting programs.

Ground Characterization and Structural Analyses for Tunnel Design

This richly-illustrated reference guide presents innovative techniques focused on reducing time, cost and risk in the construction and maintenance of underground facilities: A primary focus of the technological development in underground engineering is to ease the practical execution and to reduce time, cost and risk in the construction and maintenance of underground facilities such as tunnels and caverns. This can be realized by new design tools for designers, by instant data access for engineers, by virtual prototyping and training for manufacturers, and by robotic devices for maintenance and repair for operators and many more advances. This volume presents the latest technological innovations in underground design, construction, and operation, and comprehensively discusses developments in ground improvement, simulation, process integration, safety, monitoring, environmental impact, equipment, boring and cutting, personnel training, materials, robotics and more. These new features are the result of a big research project on underground engineering, which has involved many players in the discipline. Written in

an accessible style and with a focus on applied engineering, this book is aimed at a readership of engineers, consultants, contractors, operators, researchers, manufacturers, suppliers and clients in the underground engineering business. It may moreover be used as educational material for advanced courses in tunnelling and underground construction.

Disposal of Hazardous Waste in Underground Mines

Underground Mining Methods

The extraction of valuable geological materials and minerals from the earth is referred to as mining. These are extracted as ores from an orebody, vein, lode, reef, etc. which are then processed with mechanical and chemical means to recover metals, gemstones, limestone, coal, etc. The extraction of petroleum and natural gas is also encompassed within this field. The techniques used in mining fall under the broad classification of surface mining and underground or sub-surface mining. Heavy machinery is used in mining at various levels. This book is a compilation of chapters that discuss the most vital concepts and methods in the field of mining. Different approaches, evaluations and methodologies have been included herein. Coherent flow of topics, student-friendly language and extensive use of examples make this book an invaluable source of knowledge.

Practical Rock Mechanics

An Ideal Source for Geologists and Others with Little Background in Engineering or Mechanics Practical Rock Mechanics provides an introduction for graduate students as well as a reference guide for practicing engineering geologists and geotechnical engineers. The book considers fundamental geological processes that give rise to the nature of rock masses and control their mechanical behavior. Stresses in the earth's crust are discussed and methods of measurement and prediction explained. Ways to investigate, describe, test, and characterize rocks in the laboratory and at project scale are reviewed. The application of rock mechanics principles to the design of engineering structures including tunnels, foundations, and slopes is addressed. The book is illustrated throughout with simple figures and photographs, and important concepts are illustrated by modern case examples. Mathematical equations are kept to the minimum necessary and are explained fully—the book leans towards practice rather than theory. This text:

- Addresses the principles of rock mechanics as it applies to both structural geology and engineering practice
- Demonstrates the importance of and methods of geological characterisation to rock engineering
- Examines the standard methods of rock mechanics testing and measurement as well as interpretation of data in practice
- Explains connections between main parameters both empirically as well as on the basis of scientific theory
- Provides examples of the practice of rock mechanics to major engineering projects

Practical Rock Mechanics teaches from first

principles and aids readers' understanding of the concepts of stress and stress transformation and the practical application of rock mechanics theory. This text can help ensure that ground models and designs are correct, realistic, and produced cost-effectively.

Sensing and Monitoring Technologies for Mines and Hazardous Areas

An introductory text and reference on mining engineering highlighting the latest in mining technology. Introductory Mining Engineering outlines the role of the mining engineer throughout the life of a mine, including prospecting for the deposit, determining the site's value, developing the mine, extracting the mineral values, and reclaiming the land afterward. This Second Edition is written with a focus on sustainability—managing land to meet the economic and environmental needs of the present while enhancing its ability to also meet the needs of future generations. Coverage includes aboveground and underground methods of mining for a wide range of substances, including metals, nonmetals, and fuels. Completely up to date, this book presents the latest information on such technologies as remote sensing, GPS, geophysical surveying, and mineral deposit evaluation, as well as continuous integrated mining operations and autonomous trucks. Also included is new information on landscape restoration, regional planning, wetlands protection, subsidence mitigation, and much more. New chapters include coverage of: * Environmental responsibilities * Regulations * Health and safety issues. Generously supplemented with

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more than 200 photographs, drawings, and tables, *Introductory Mining Engineering, Second Edition* is an indispensable book for mining engineering students and a comprehensive reference for professionals.

Underground Mining Methods Handbook

The SME all-time bestseller 2-volume set is a classic. This comprehensive reference work distills the entire body of knowledge that characterizes mining engineering as a disciplinary field. While it may serve as a textbook for advanced students, its primary function is to provide professional practitioners with an authoritative reference and design source. To a lesser extent, the book also serves mining nonprofessionals who seek technical knowledge of the industry. The books devote attention to all branches of mining--metal, coal, and nonmetal--and to all locales of mining--surface, underground, and hybrid. Although the main emphasis is US mining, numerous references are made to international practice. More than 250 experts contributed to this text. The books contain 25 sections followed by a complete index.

Surface and Underground Excavations, 2nd Edition

The first comprehensive work on one of the most important underground mining methods worldwide, *Geotechnical Design for Sublevel Open Stoping* presents topics according to the conventional sublevel stoping process used by most mining houses, in which a sublevel stoping geometry is chosen for a

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particular mining method, equipment availability, and work force experience. Summarizing state-of-the-art practices encountered during his 25+ years of experience at industry-leading underground mines, the author: Covers the design and operation of sublevel open stoping, including variants such as bench stoping Discusses increases in sublevel spacing due to advances in the drilling of longer and accurate production holes, as well as advances in explosive types, charges, and initiation systems Considers improvements in slot rising through vertical crater retreat, inverse drop rise, and raise boring Devotes a chapter to rock mass characterization, since increases in sublevel spacing have meant that larger, unsupported stope walls must stand without collapsing Describes methodologies to design optimum open spans and pillars, rock reinforcement of development access and stope walls, and fill masses to support the resulting stope voids Reviews the sequencing of stoping blocks to minimize in situ stress concentrations Examines dilution control action plans and techniques to back-analyze and optimize stope wall performance Featuring numerous case studies from the world-renowned Mount Isa Mines and examples from underground mines in Western Australia, Geotechnical Design for Sublevel Open Stoping is both a practical reference for industry and a specialized textbook for advanced undergraduate and postgraduate mining studies.

Coupled Processes in Subsurface Deformation, Flow, and Transport

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Surface and Underground Excavations – Methods, Techniques and Equipment (2nd edition) covers the latest technologies and developments in the excavation arena at any locale: surface or underground. In the first few chapters, unit operations are discussed and subsequently, excavation techniques are described for various operations: tunnelling, drifting, raising, sinking, stoping, quarrying, surface mining, liquidation and mass blasting as well as construction of large subsurface excavations such as caverns and underground chambers. The design, planning and development of excavations are treated in a separate chapter. Especially featured are methodologies to select stoping methods through incremental analysis. Furthermore, this edition encompasses comprehensive sections on mining at ‘ultra depths’, mining difficult deposits using non-conventional technologies, mineral inventory evaluation (ore – reserves estimation) and mine closure. Concerns over Occupational Health and Safety (OHS), environment and loss prevention, and sustainable development are also addressed in advocating a solution to succeed within a scenario of global competition and recession. This expanded second edition has been wholly revised, brought fully up-to-date and includes (wherever feasible) the latest trends and best practices, case studies, global surveys and toolkits as well as questions at the end of each chapter. This volume will now be even more appealing to students in earth sciences, geology, and in civil, mining and construction engineering, to practicing engineers and professionals in these disciplines as well as to all with a general or professional interest in surface and

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