

Pneumatic Conveying Engineering

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Springer Science & Business Media

Pneumatic Conveying Design Guide is a guide for the design of pneumatic conveying systems and includes detailed data and information on the conveying characteristics of a number of materials with a wide range of properties. This book includes logic diagrams for design procedures and scaling parameters for the conveying line configuration. It also explains how to improve the performance of pneumatic conveyors by optimizing, uprating, and extending the system or adapting it for a change of material. This book consists of 15 chapters divided into three sections and opens with an overview of the state of the art on pneumatic conveying, along with definitions of the terms used in pneumatic conveying. The next chapter describes the various types of pneumatic conveying systems and the parameters that influence their capabilities in terms of material flow rate and conveying distance. The discussion then turns to feeding and discharging of the conveying line; selection of a pneumatic conveying system for a particular application; and design procedures for pneumatic conveying system. The theory and use of compressed air in pneumatic conveying are also considered, along with the effect of material properties on conveying performance; troubleshooting; and operational problems and some solutions. The final chapter is devoted to the use of bench-scale test methods to determine the material properties relevant to pneumatic conveying. This monograph is intended for designers and users of pneumatic conveying systems.

Bulk Solids Handling John Wiley & Sons

Particle technology is a term used to refer to the science and technology related to the handling and processing of particles and powders. The production of particulate materials, with controlled properties tailored to subsequent processing and applications, is of major interest to a wide range of industries, including chemical and process, food, pharmaceuticals, minerals and metals companies and the handling of particles in gas and liquid solutions is a key technological step in chemical engineering. This textbook provides an excellent introduction to particle technology with worked examples and exercises. Based on feedback from students and practitioners worldwide, it has been newly edited and contains new chapters on slurry transport, colloids and fine particles, size enlargement and the health effects of fine powders. Topics covered include: Characterization (Size Analysis) Processing (Granulation, Fluidization) Particle Formation (Granulation, Size Reduction) Storage and Transport (Hopper Design, Pneumatic Conveying, Standpipes, Slurry Flow) Separation (Filtration, Settling, Cyclones) Safety (Fire and Explosion Hazards, Health Hazards) Engineering the Properties of Particulate Systems (Colloids, Respirable Drugs, Slurry Rheology) This book is essential reading for undergraduate students of chemical engineering on particle technology courses. It is also valuable supplementary reading for students in other branches of engineering, applied chemistry, physics, pharmaceuticals, mineral processing and metallurgy. Practitioners in industries in which powders are handled and processed may find it a useful starting point for gaining an understanding of the behavior of particles and powders. Review of the First Edition taken from *High Temperatures - High pressures* 1999 31 243 – 251 "...This is a modern textbook that presents clear-cut knowledge. It can be successfully used both for teaching particle technology at universities and for individual study of engineering problems in powder processing."

Fluidized Bed Combustion John Wiley & Sons

A realization of recent clean energy initiatives, fluidized bed

combustion (FBC) has quickly won industry preference due to its ability to burn materials as diverse as low-grade coals, biomass, and industrial and municipal waste. *Fluidized Bed Combustion* catalogs the fundamental physical and chemical processes required of bubbling fluidized beds before launching into application-centered coverage of hot-gas generator, incinerator, and boiler concepts and design, calculations for regime parameters and dimensions, and all aspects of FBC operation. It enumerates the environmental consequences of fluidized bed processes and proposes measures to reduce the formation of harmful emissions.

Intensive Short Course on Pneumatic Conveying Systems John Wiley & Sons

Industrial Ventilation Design Guidebook, Volume 2: Engineering Design and Applications brings together researchers, engineers (both design and plants), and scientists to develop a fundamental scientific understanding of ventilation to help engineers implement state-of-the-art ventilation and contaminant control technology. Now in two volumes, this reference contains extensive revisions and updates as well as a unique section on best practices for the following industrial sectors: Automotive; Cement; Biomass Gasifiers; Advanced Manufacturing; Industrial 4.0; Non-ferrous Smelters; Lime Kilns; Pulp and Paper; Semiconductor Industry; Steelmaking; Mining. Brings together global researchers and engineers to solve complex ventilation and contaminant control problems using state-of-the-art design equations Includes an expanded section on modeling and its practical applications based on recent advances in research Features a new chapter on best practices for specific industrial sectors

Rules of Thumb for Chemical Engineers CRC Press

Particle Technology and Engineering presents the basic knowledge and fundamental concepts that are needed by engineers dealing with particles and powders. The book provides a comprehensive reference and introduction to the topic, ranging from single particle characterization to bulk powder properties, from particle-particle interaction to particle-fluid interaction, from fundamental mechanics to advanced computational mechanics for particle and powder systems. The content focuses on fundamental concepts, mechanistic analysis and computational approaches. The first six chapters present basic information on properties of single particles and powder systems and their characterisation (covering the fundamental characteristics of bulk solids (powders) and building an understanding of density, surface area, porosity, and flow), as well as particle-fluid interactions, gas-solid and liquid-solid systems, with applications in fluidization and pneumatic conveying. The last four chapters have an emphasis on the mechanics of particle and powder systems, including the mechanical behaviour of powder systems during storage and flow, contact mechanics of particles, discrete element methods for modelling particle systems, and finite element methods for analysing powder systems. This thorough guide is beneficial to undergraduates in chemical and other types of engineering, to chemical and process engineers in industry, and early stage researchers. It also provides a reference to experienced researchers on mathematical and mechanistic analysis of particulate systems, and on advanced computational methods. Provides a simple introduction to core topics in particle technology: characterisation of particles and powders: interaction between particles, gases and liquids; and some useful examples of gas-solid and liquid-solid systems Introduces the principles and applications of two useful computational approaches: discrete element modelling and finite element modelling Enables engineers to build their knowledge and skills and to enhance their mechanistic understanding of particulate systems

Pneumatic conveying of solids in a 1", horizontal pipeline, with continuous recycling Butterworth-Heinemann

When the four of us decided to collaborate to write this book on pneumatic conveying, there were two aspects which were of some concern. Firstly, how could four people, who live on four different continents, write a book on a fairly complex subject with such wide lines of communications? Secondly, there was the problem that two of the authors are chemical engineers. It has been noted that the majority of chemical engineers who work in the field of pneumatic conveying research have spent most of their time considering flow in vertical pipes. As such, there was some concern that the book might be biased towards vertical pneumatic conveying and that the horizontal aspects (which are clearly the most difficult!) would be somewhat neglected. We hope that you, as the reader, are going to be satisfied with the fact that you have a truly international dissertation on pneumatic conveying and, also, that there is an even spread between the theoretical and practical aspects

of pneumatic conveying technology.

Design and Performance Aspects of Dense Phase Pneumatic Conveying Systems Butterworth-Heinemann

Pneumatic Conveying Design Guide, 3rd Edition is divided into three essential parts, system and components, system design, and system operation, providing both essential foundational knowledge and practical information to help users understand, design, and build suitable systems. All aspects of the pneumatic conveying system are covered, including the type of materials used, conveying distance, system constraints, including feeding and discharging, health and safety requirements, and the need for continuous or batch conveying. This new edition also covers information on the other conveying systems available and compares them to this method. The existing content is brought up-to-date and the references are expanded and updated. This guide is an almost encyclopedic coverage of pneumatic conveying and as such is an essential text for both designers and users of pneumatic conveying systems. Each aspect of the subject is discussed from basic principles to support those new to, or learning about, this versatile technique.

Mechanical Conveyors CRC Press

This handbook presents comprehensive coverage of the technology for conveying and handling particulate solids. Each chapter covers a different topic and contains both fundamentals and applications. Usually, each chapter, or a topic within a chapter, starts with one of the review papers. Chapter 1 covers the characterization of the particulate materials. Chapter 2 covers the behaviour of particulate materials during storage, and presents recent developments in storage and feeders design and performance. Chapter 3 presents fundamental studies of particulate flow, while Chapters 4 and 5 present transport solutions, and the pitfalls of pneumatic, slurry, and capsule conveying. Chapters 6, 7 and 8 cover both the fundamentals and development of processes for particulate solids, starting from fluidisation and drying, segregation and mixing, and size-reduction and enlargement. Chapter 9 presents environmental aspects and the classification of the particulate materials after they have been handled by one of the above-mentioned processes. Finally, Chapter 10 covers applications and developments of measurement techniques that are the heart of the analysis of any conveying or handling system.

Pneumatic Conveying Gulf Professional Publishing

This new book, *Food Process Engineering and Quality Assurance*, provides an abundance of valuable new research and studies in novel technologies used in food processing and quality assurance issues of food. The 750-page book gives a detailed technical and scientific background of various food processing technologies that are relevant to the industry. The food process related application of engineering technology involves interdisciplinary teamwork, which, in addition to the expertise of interdisciplinary engineers, draws on that of food technologists, microbiologists, chemists, mechanical engineers, biochemists, geneticists, and others. The processes and methods described in the book are applicable to many areas of the food industry, including drying, milling, extrusion, refrigeration, heat and mass transfer, membrane-based separation, concentration, centrifugation, fluid flow and blending, powder and bulk-solids mixing, pneumatic conveying, and process modeling, monitoring, and control. Food process engineering know-how can be credited with improving the conversion of raw foodstuffs into safe consumer products of the highest possible quality. This book looks at advanced materials and techniques used for, among other things, chemical and heat sterilization, advanced packaging, and monitoring and control, which are essential to the highly automated facilities for the high-throughput production of safe food products. With contributions from prominent scientists from around the world, this volume provides an abundance of valuable new research and studies on novel technologies used in food processing and quality assurance issues. It gives a detailed technical and scientific background of various food processing technologies that are relevant to the industry. Special emphasis is given to the processing of fish, candelilla, dairy, and bakery products. Rapid detection of pathogens and toxins and application of nanotechnology in ensuring food safety are also emphasized. Key features: • Presents recent research development with applications • Discusses new technology and processes in food process engineering • Provides several chapters on candelilla (which is frequently used as a food additive but can also be used in cosmetics, drugs, etc.), covering its characteristics, common uses, geographical distribution, and more **Pneumatic Conveying Design Handbook of Pneumatic Conveying Engineering** Sponsored jointly by the American Society of Mechanical Engineers and International Material Management Society, this single source reference is designed to meet today's need for updated technical information on planning, installing and operating materials handling systems. It not only classifies and describes the standard types of materials handling equipment, but also analyzes the engineering specifications and compares the operating capabilities of each type. Over one hundred professionals in various areas of materials handling present efficient methods, procedures and systems that have significantly reduced both manufacturing and distribution costs.

Bulk Material Handling Routledge

"Explains and summarizes the fundamental derivations, basic and advanced concepts, and equations central to the field of dynamics. Chapters stand as self-study guides-containing tables, summaries of relevant

equations, cross references, and illustrative examples. Utilizes Kane's equations and associated methods for the solution is as critical as the technical component. Michael Rivkin, Ph.D., draws on his decades of experience in design, construction, upgrading, optimization, troubleshooting, and maintenance throughout the world, to highlight topics such as:

Practical Pneumatics Springer Science & Business Media

This book is a comprehensive, practical guide and reference to today's mechanical conveyor systems. It covers all types of mechanical conveyors, providing in-depth information on their design, function and applications. More than 180 photographs and schematics illustrate details of design and system layout. An introductory chapter provides an understanding of the characteristics of various types of bulk solids, including their conveyability and the types of conveying systems most effective for each. Following chapters examine each of five major categories of conveying systems, with practical details on their design, operation and applications. The final chapter presents basic information on motors and drives for conveying systems, as well as related equipment such as speed reduction systems and conveyor brakes. The emphasis throughout the text is on practical engineering and operating information, with a minimum of theory. The presentation is systematic and organized for easy reference. A very detailed index enables the quick location of needed information. This guide and reference will be useful to all engineers and other personnel involved in the continuous movement of bulk solids. It serves as both a basic introduction and a desk-top reference. The Authors Dr. Fayed is a Professor and Director of the Powder Science & Technology Group at Ryerson Polytechnic University in Toronto. He is also a licensed Consulting Engineer, a Fellow of the American Institute of Chemical Engineers and the Canadian Society of Chemical Engineering. Previously he held positions in process design and development with ICI, Davy McKee, M. W. Kellogg, and Peabody. He has lectured at numerous seminars and workshops at meetings of the American Institute of Chemical Engineers, and other organizations. He has published many papers on particulate technology and is the co-editor of Powder Science & Technology Handbook. Thomas Skocir in an engineer presently with ECO-TEC

Dilute- and Dense-phase Pneumatic Conveying of Plastics CRC Press

When the four of us decided to collaborate to write this book on pneumatic conveying, there were two aspects which were of some concern. Firstly, how could four people, who live on four different continents, write a book on a fairly complex subject with such wide lines of communications? Secondly, there was the problem that two of the authors are chemical engineers. It has been noted that the majority of chemical engineers who work in the field of pneumatic conveying research have spent most of their time considering flow in vertical pipes. As such, there was some concern that the book might be biased towards vertical pneumatic conveying and that the horizontal aspects (which are clearly the most difficult!) would be somewhat neglected. We hope that you, as the reader, are going to be satisfied with the fact that you have a truly international dissertation on pneumatic conveying and, also, that there is an even spread between the theoretical and practical aspects of pneumatic conveying technology.

Handbook of Pneumatic Conveying Engineering Routledge

Handling of Bulk Solids provides a comprehensive discussion of the field of solids flow and handling in the process industries. Presentation of the subject follows classical lines of separate discussions for each topic, so each chapter is self-contained and can be read on its own. Topics discussed include bulk solids flow and handling properties; pressure profiles in bulk solids storage vessels; the design of storage silos for reliable discharge of bulk materials; gravity flow of particulate materials from storage vessels; pneumatic transportation of bulk solids; and the hazards of solid-materials handling and processing along with their prevention. Worked-out examples are included at the end of each chapter to familiarize the reader with the numerical manipulations and orders of magnitude of various parameters which occur in the subject of bulk solids handling. Because of the complicated form of most of the design equations involved, the computer is an ideal vehicle for the solution of many design problems in bulk solids handling. This book is suitable for advanced undergraduate and postgraduate levels as well as for practitioners in industry.

Handling of Bulk Solids Springer Science & Business Media

The most complete guide of its kind, this is the standard handbook for chemical and process engineers. All new material on fluid flow, long pipe, fractionators, separators and accumulators, cooling towers, gas treating, blending, troubleshooting field cases, gas solubility, and density of irregular solids. This substantial addition of material will also include conversion tables and a new appendix, "Shortcut Equipment Design Methods." This convenient volume helps solve field engineering problems with its hundreds of common sense techniques, shortcuts, and calculations. Here, in a compact, easy-to-use format, are practical tips, handy formulas, correlations, curves, charts, tables, and shortcut methods that will save engineers valuable time and effort. Hundreds of common sense techniques and calculations help users quickly and accurately solve day-to-day design, operations, and equipment problems.

Theoretical and Experimental Study of the Pneumatic Conveying of Suspended Solids in Pipe Lines Partridge Publishing Singapore

Presents a theory of dimensioning synthesized from several areas of geometry, starting from the works of Euclid and culminating in some recent results in classification of continuous symmetry groups. Features numerous examples and illustrations for better understanding of concepts.

Turbomachinery Fluid Dynamics and Heat Transfer CRC Press

Tens of thousands of mechanical engineers are engaged in the design, building, upgrading, and optimization of various material handling facilities. The peculiarity of material handling is that there are numerous technical solutions to any problem. The engineer's personal selection of the optimal

solution is as critical as the technical component. Michael Rivkin, Ph.D., draws on his decades of experience in design, construction, upgrading, optimization, troubleshooting, and maintenance throughout the world, to highlight topics such as:

- physical principles of various material handling systems;
- considerations in selecting technically efficient and environmentally friendly equipment;
- best practices in upgrading and optimizing existing bulk material handling facilities;
- strategies to select proper equipment in the early phases of a new project.

Filled with graphs, charts, and case studies, the book also includes bulleted summaries to help mechanical engineers without a special background in material handling find optimal solutions to everyday problems.

Handbook of Pneumatic Conveying Engineering Elsevier

Pneumatic power is ideal for the ever increasing range of 'light' applications in which a cheap, clean, adaptable source of power is needed. Used in conjunction with microprocessor control it forms the basis of manufacturing automation from basic conveying and handling lines to complex robotic assembly systems. Training courses and books aimed at the technician have not kept pace with these developments. This book is written to cover the British Fluid Power Association Pneumatics Certificate, which is also awarded as part of CGLI scheme 2340, and is in the process of NVQ accreditation at level 3. 'Practical Pneumatics' provides a clear and detailed discussion of pneumatic technology by tackling the principles of pneumatic components and the behaviour of air under compression, during treatment and in applications to production processes. The non-mathematical approach, the numerous detailed diagrams and the many exercises and examples explain concepts clearly and concisely and provide students with a foundation from which to develop practical competence.

Pneumatic Conveying of Solids CRC Press

Pneumatic conveying systems offer enormous advantages: flexibility in plant layout, automatic operation, easy control and monitoring, and the ability to handle diverse materials, especially dangerous, toxic, or explosive materials. The Handbook of Pneumatic Conveying Engineering provides the most complete, comprehensive reference on all types and s

Food Process Engineering and Quality Assurance CRC Press

Handling of powders and bulk solids is a critical industrial technology across a broad spectrum of industries, from minerals processing to bulk and fine chemicals, and the food and pharmaceutical industries, yet is rarely found in the curricula of engineering or chemistry departments. With contributions from leading authors in their respective fields, Characterisation of Bulk Solids provides the reader with a sound understanding of the techniques, importance and application of particulate materials characterisation. It covers the fundamental characteristics of individual particles and bulk particulate materials, and includes discussion of a wide range of measurement techniques, and the use of material characteristics in design and industrial practice. The reader will then be in a better position to diagnose solids handling and processing problems in industry, and to deal with experts and equipment suppliers from an informed standpoint. Written for post-graduate engineers, chemical scientists and technologists at all stages of their industrial career, the book will also serve as an ideal primer in any of the specialist areas to inform further study.