Optimization of Industrial Unit Processes discusses real-world processes - each plant consists of a combination of basic unit operations and can be optimized by maximizing efficiency and minimizing operating cost, of the individual unit operations from which it is composed. Optimization of Industrial Unit Processes discusses the "personality" and characteristics of each process in terms of its time constants, gains, and other unique features. This book provides information for engineers who design or operate industrial plants and who seek to increase the profitability of their installations.

Improving Compressed Air System Performance

Improving the performance of plants depends on the optimization of their equipment and systems. This guide offers step-by-step guidance on how to enhance the efficiency of a compressed air system, including energy use and system performance. It includes practical tips on how to reduce costs and increase productivity.

Electrode Processes and Electrochemical Engineering

Presents findings and discussions from the 29th European Symposium of Computer Aided Process Engineering (ESCAPE) event held in Eindhoven, The Netherlands, from June 16-19, 2019. It is a valuable resource for all those involved in process engineering with social sciences. It is with delight that I can recommend their book to anyone interested in the field. - Mats Söderström, Director Energy Systems Programme, Linköping University, Sweden.
The book documents 25 papers collected from the Special Issue Advances in Condition Monitoring, Optimization and Control for Complex Dynamic Systems. Clarifies how to identify thermal and chemical constraints and incorporate them into optimization models and solutions. Discusses engineering applications including power generation, resource upgrading, radiation conversion and chemical transformation, in static and dynamic systems. Emphasizes recent progress in life-cycle sustainable design, applying green engineering principles and the concept of Zero Effect, Zero Defect. Describes what the physical, economic, social, and technological constraints to achieving the goal of a sustainable environment are. It explains why industrial environmental management is important to human environmental interactions and chemical, mechanical, and environmental engineering.

The book is written for practicing engineers seeking information about sustainable design principles and methodology. It will also appeal to junior and senior level students in multidisciplinary engineering fields such as chemical, civil, environmental, and petroleum engineering. It will provide in-depth insight and practical tools to help readers find new and unique opportunities to implement profit optimization strategies. From strategic planning and implementation techniques for managers, senior executives, and technical service consultants to help increase profit margins. The book provides practical applications of optimization methods that help solve the problems of power maximization and optimal use of energy and resources in chemical processes. It contains comprehensive coverage of dynamic optimization of energy conversion systems and separation units, along with suitable computational algorithms for deterministic and stochastic optimization approaches based on nonlinear programming, dynamic programming, among others.

Addressing both theoretical and practical aspects, this book offers an in-depth study of mathematical programming and optimization techniques for solving complex engineering problems. It is an ideal textbook for advanced undergraduate and graduate students in chemical engineering, as well as a valuable reference for practicing engineers and researchers in the field.

This second edition contains substantial revisions, with particular focus on the rapid progress in the field of heat exchanger network (HEN) design. This integration involves systematic design and optimization of heat exchangers and water networks (HEN and WN). After presenting basic, insight-based Pinch Technology, systematic, optimization-based sequential and simultaneous approaches to HEN and WN are described. Special consideration is given to the HEN design problem targeting stage, in view of its importance at the site level for the industrial process design.

The book also includes information on waste recovery systems. It provides comprehensive coverage of dynamic optimization of energy conversion systems and separation units along with suitable computational algorithms for deterministic and stochastic optimization approaches based on nonlinear programming, dynamic programming, among others.
Optimization of Industrial Unit Processes discusses real-world processes - each plant consists of a combination of basic unit operations and can be optimized by maximizing the efficiency and minimizing the operating costs. In a fully optimized plant, efficiency and productivity are continuously maximized while levels, temperatures, pressures, or flows float within their allowable limits. This control philosophy differs from earlier approaches - where levels and temperatures were controlled at constant values, and plant productivity was only an accidental, uncontrolled consequence of those controlled variables. With this approach, the sides of a multivariable control envelope are the various constraints while inside the envelope the process is continuously moved to optimize the system.

In Optimization of Industrial Unit Processes, the term “optimization” means the maximizing of productivity and safety while minimizing operation costs. The book presents a practical approach that is based on a strictly systematic and mathematical model. It teaches how to develop a mathematical model that can be used for the control and optimization of industrial processes. Each optimization model is explained in detail, and the reader is introduced to the systematic approach of model development, which is based on a concept of feedback control systems. The book shows how to develop the controller when the process model is not available. It presents an extended state-space descriptive framework for complex industrial processes, e.g., how to develop a descriptive framework which could enable the digitalization and visualization of a process and how to develop an intelligent manufacturing system which considers the needs of the production target. This book shares the authors’ recent ideas/methodologies/algorithms on the intelligent manufacturing of complex industrial processes.

The book is tailored for anyone interested in industrial chemical processes, unit operations, processes and process engineering. It is particularly useful for chemical engineers, chemists, patent attorneys, and marketing managers and all those involved in the chemical process industry. The handbook is an invaluable and convenient source of information. The detailed and thoroughly edited articles are written by renowned experts from industry and academia. The three volumes provide coverage on all aspects of processes and process engineering. The major headings are: Separation Processes, Separation and Classification, Mixing, Particle Technology, Heat Generation Processes under Special Conditions, Principles of Process Engineering, Reactor Types. A keyword index and an author index complete the contents of this handbook.
The Instrument and Automation Engineers Handbook (IAEH) is the #1 process automation handbook in the world. Volume one of the Fifth Edition is dedicated to the design and operation of industrial processes. It provides a detailed introduction to the latest developments in industrial process technology, including optimization techniques in industrial chemical systems. The contributions in this volume will provide a unique and significant reference source for engineers and researchers in the field.

This book discusses conventional as well as unconventional wood drying technologies. It covers fundamental thermophysical and energetic aspects and integrates two complex thermodynamic systems, conventional kilns and heat pumps, aimed at improving the energy performance of industrial processes. The book includes practical examples for process and system/components calculation and design. The book presents promising advancements and R&D challenges and emphasizes dryer/heat pump optimum coupling, control, and energy efficiency. Problems are included in most chapters as practical, numerical tools for continuous energy and process improvements.

Energy Optimization in Process Systems and Fuel Cells provides a practical approach to energy optimization in process systems and fuel cells. It covers the latest developments in energy management and optimization of process systems and fuel cells. The book includes case studies and examples of energy optimization in various industrial processes. It is a useful reference for industry professionals, engineers, and technicians specializing in advanced optimization control technologies.

This book is a comprehensive introduction to model predictive control (MPC), including its basic principles and algorithms, system analysis and design methods, strategy developments and practical applications. The main contents of the book include an overview of the development of MPC and its related algorithms, the diversification development of MPC with respect to control structures and optimization strategies, and robust MPC. Finally, applications of MPC and its generalization to optimization-based dynamic systems and systems with stochastic disturbances are discussed.

Generalized Methodology for Conducting Industrial Toxicity Reduction Evaluations (TREs) describes the latest methodologies for conducting toxicity reduction evaluations (TREs) in industrial processes. It covers the most recent methods for assessing and reducing the toxicity of industrial processes. The book includes case studies and examples of the application of the generalized methodology for conducting TREs.

Recent Advances in Sustainable Process Design and Optimization discusses the latest developments in sustainable process design and optimization. It covers the most recent methods for designing and optimizing industrial processes to reduce their environmental impact. The book includes case studies and examples of the application of sustainable process design and optimization methods.