

Process Control A Practical Approach 1st Edition

Model Predictive Control (MPC) has become a widely used methodology across all engineering disciplines, yet there are few books which study this approach. Until now, no book has addressed in detail all key issues in the field including a priori stability and robust stability results. Engineers and MPC researchers now have a volume that provides a complete overview of the theory and practice of MPC as it relates to process and control engineering. Model-Based Predictive Control, A Practical Approach, analyzes predictive control from its base mathematical foundation, but delivers the subject matter in a readable, intuitive style. The author writes in layman's terms, avoiding jargon and using a style that relies upon personal insight into practical applications. This detailed introduction to predictive control introduces basic MPC concepts and demonstrates how they are applied in the design and control of systems, experiments, and industrial processes. The text outlines how to model, provide robustness, handle constraints, ensure feasibility, and guarantee stability. It also details options in regard to algorithms, models, and complexity vs. performance issues.

Intended for control system engineers working in the chemical, refining, paper, and utility industries, this book reviews the general characteristics of processes and control loops, provides an intuitive feel for feedback control behavior, and explains how to obtain the required control action with

This book is aimed at engineers and technicians who need to have a clear, practical understanding of the essentials of process control, loop tuning and how to optimize the operation of their particular plant or process. The reader would typically be involved in the design, implementation and upgrading of industrial control systems. Mathematical theory has been kept to a minimum with the emphasis throughout on practical applications and useful information. This book will enable the reader to:

- * Specify and design the loop requirements for a plant using PID control
- * Identify and apply the essential building blocks in automatic control
- * Apply the procedures for open and closed loop tuning
- * Tune control loops with significant dead-times
- * Demonstrate a clear understanding of analog process control and how to tune analog loops
- * Explain concepts used by major manufacturers who use the most up-to-date technology in the process control field

· A practical focus on the optimization of process and plant

· Readers develop professional competencies, not just theoretical knowledge

· Reduce dead-time with loop tuning techniques

Maintaining a practical perspective, Python Programming: A Practical Approach acquaints you with the wonderful world of programming. The book is a starting point for those who want to learn Python programming. The backbone of any programming, which is the data structure and components such as strings, lists, etc., have been illustrated with many examples and enough practice problems to instill a level of self-confidence in the reader. Drawing on knowledge gained directly from teaching Computer Science as a subject and working on a wide range of projects related to ML, AI, deep learning, and blockchain, the authors have tried their best to present the necessary skills for a Python programmer. Once the foundation of Python programming is built and the readers are aware of the exact structure, dimensions, processing, building blocks, and representation of data, they can readily take up their specific problems from the area of interest and solve them with the help of Python. These include, but are not limited to, operators, control flow, strings, functions, module processing, object-oriented programming, exception and file handling, multithreading, synchronization, regular expressions, and Python database programming. This book on Python programming is specially designed to keep readers busy with learning fundamentals and generates a sense of confidence by attempting the assignment problems. We firmly believe that explaining any particular technology deviates from learning the fundamentals of a programming language. This book is focused on helping readers attempt implementation in their areas of interest through the skills imparted through this book. We have attempted to present the real essence of Python programming, which you can confidently apply in real life by using Python as a tool.

Salient Features

- ? Based on real-world requirements and solution.
- ? Simple presentation without avoiding necessary details of the topic.
- ? Executable programs on almost every topic.
- ? Plenty of exercise questions, designed to test readers' skills and understanding.

Purposefully designed to be instantly applicable, Python Programming: A Practical Approach provides implementation examples so that the described subject matter can be immediately implemented due to the well-known versatility of Python in handling different data types with ease.

Updated throughout for this new edition, Water Distribution System Monitoring describes the latest water quality monitoring approaches, techniques, and equipment that will assist water utilities for compliance with the "Lead and Copper Rule" as well as address numerous other water quality issues. Water quality data are obtained using the approach.

Brewing Materials and Processes: A Practical Approach to Beer Excellence presents a novel methodology on what goes into beer and the results of the process. From adjuncts to yeast, and from foam to chemometrics, this unique approach puts quality at its foundation, revealing how the right combination builds to a great beer. Based on years of both academic and industrial research and application, the book includes contributions from around the world with a shared focus on quality assurance and control. Each chapter addresses the measurement tools and approaches available, along with the nature and significance of the specifications applied. In its entirety, the book represents a comprehensive description on how to address quality performance in brewing operations. Understanding how the grain, hops, water, gases, worts, and other contributing elements establish the framework for quality is the core of ultimate quality achievement. The book is ideal for users in corporate R&D, researchers, students, highly-skilled small-scale brewers, and those seeking an understanding on how the parts impact the whole in beer production, providing them with an ideal companion to complement Beer: A Quality Perspective. Focuses on the practical approach to delivering beer quality, beginning with raw ingredients Includes an analytical perspective for each element, giving the reader insights into its role and impact on overall quality Provides a hands-on reference work for daily use Presents an essential volume in brewing education that addresses areas only

lightly covered elsewhere

Foundations of Fuzzy Control: A Practical Approach, 2nd Edition has been significantly revised and updated, with two new chapters on Gain Scheduling Control and Neurofuzzy Modelling. It focuses on the PID (Proportional, Integral, Derivative) type controller which is the most widely used in industry and systematically analyses several fuzzy PID control systems and adaptive control mechanisms. This new edition covers the basics of fuzzy control and builds a solid foundation for the design of fuzzy controllers, by creating links to established linear and nonlinear control theory. Advanced topics are also introduced and in particular, common sense geometry is emphasised. Key features: Sets out practical worked through problems, examples and case studies to illustrate each type of control system. Accompanied by a website hosting downloadable MATLAB programs. Accompanied by an online course on Fuzzy Control which is taught by the author. Students can access further material and enrol at the companion website. Foundations of Fuzzy Control: A Practical Approach, 2nd Edition is an invaluable resource for researchers, practitioners, and students in engineering. It is especially relevant for engineers working with automatic control of mechanical, electrical, or chemical systems.

Software Requirements Using the Unified Process: A Practical Approach presents an easy-to-apply methodology for creating requirements. Learn to build user requirements, requirements architecture, and the specifications more quickly and at a lower cost. The authors present realistic solutions for the entire requirements process: gathering, analysis, specification, and maintenance.

Design for Six Sigma (DFSS) is an innovative continuous improvement methodology for designing new products, processes, and services by integrating Lean and Six Sigma principles. This book will explain how the DFSS methodology is used to design robust products, processes, or services right the first time by using the voice of the customer to meet Six Sigma performance. Robust designs are insensitive to variation and provide consistent performance in the hands of the customer. DFSS is used to meet customer needs by understanding their requirements, considering current process capability, identifying and reducing gaps, and verifying predictions to develop a robust design. This book offers: Methodology on how to implement DFSS in various industries. Practical examples of the use of DFSS. Sustainability utilizing Lean Six Sigma techniques and Lean product development. Innovative designs using DFSS with concept generation. Case studies for implementing the DFSS methodology. Design for Six Sigma (DFSS) enables organizations to develop innovative designs. In order to redesign an existing process or design a new process, the success is dependent on a rigorous process and methodology. DFSS ensures that there are minimal defects in the introduction of new products, processes, or services. The authors have compiled all of the tools necessary for implementation of a practical approach through innovation.

A Practical Approach to Chemical Engineering for Non-Chemical Engineers is aimed at people who are dealing with chemical engineers or those who are involved in chemical processing plants. The book demystifies complicated chemical engineering concepts through daily life examples and analogies. It contains many illustrations and tables that facilitate quick and in-depth understanding of the concepts handled in the book. By studying this book, practicing engineers (non-chemical), professionals, technicians and other skilled workers will gain a deeper understanding of what chemical engineers say and ask for. The book is also useful for engineering students who plan to get into chemical engineering and want to know more on the topic and any related jargon. Provides numerous graphs, images, sketches, tables, help better understanding of concepts in a visual way. Describes complicated chemical engineering concepts by daily life examples and analogies, rather than by formula. Includes a virtual tour of an imaginary process plant. Explains the majority of units in chemical engineering.

Historically batch control systems were designed individually to match a specific arrangement of plant equipment. They lacked the ability to convert to new products without having to modify the control systems, and did not lend themselves to integration with manufacturing management systems. Practical Batch Management Systems explains how to utilize the building blocks and arrange the structures of modern batch management systems to produce flexible schemes suitable for automated batch management, with the capability to be reconfigured to use the same plant equipment in different combinations. It introduces current best practice in the automation of batch processes, including the drive for integration with MES (Manufacturing Execution System) and ERP (Enterprise Resource Planning) products from major IT vendors. References and examples are drawn from DCS / PLC batch control products currently on the market. - Implement modern batch management systems that are flexible and easily reconfigured - Integrate batch management with other manufacturing systems including MES and ERP - Increase productivity through industry best practice

Process Control A Practical Approach John Wiley & Sons

Automation systems, often referred to as SCADA systems, involve programming at several levels; these systems include computer type field controllers that monitor and control plant equipment such as conveyor systems, pumps, and user workstations that allow the user to monitor and control the equipment through color graphic displays. All of the components of these systems are integrated through a network, such as Ethernet for fast communications. This book provides a practical guide to developing the application software for all aspects of the automation system, from the field controllers to the user interface workstations. The focus of the book is to not only provide practical methods for designing and developing the software, but also to develop a complete set of software documentation. Providing tested examples and procedures, this book will be indispensable to all engineers managing automation systems. Clear instructions with real-world examples. Guidance on how to design and develop well-structured application programs. Identification of software documentation requirements and organization of point names with logical naming system. Guidance on best practice of standardized

programming methods for SCADA systems

The tools and technique used in Statistical Process Control have been used around the world to monitor and measure process variation and allow real positive changes to be made. The majority of engineers and scientists have had some exposure to this important technique but in many cases this has been badly taught and they fail to see the usefulness of it properly applied. This book has been written with the authors 30 years experience in practical Statistical Process Control and is aimed squarely at practising engineers and scientists rather than statisticians and mathematicians. Practical Statistical Process Control takes a graphical approach using a software tool called Minitab. The author concentrates on each step of using the technique with explanations along the way of each decision point. Readers will find this guide both practical and useful, with copious screenshots of the software in use and clear precise explanations. The emphasis is on understanding the technique and being able to use it in real world applications. Key points: * Provides tools and techniques for practical business and process improvement. * Introduces screenshots and explanations for each step of SPC including the importance of assessing the measurement system and constructing control charts. * A worked example, using Minitab sample data with clear explanations of the variables and analyses. This book will be extremely useful to engineers and scientists who want to solve quality, process and manufacturing problems quickly and easily.

Written by Chitram Lutchman, a project management professional with more than 20 years of field and business experience, Project Execution: A Practical Approach to Industrial and Commercial Project Management gives you a more optimistic view of this exciting and challenging area. The book focuses on the essential requirements for successful executi

Widely used across industrial and manufacturing automation, Programmable Logic Controllers (PLCs) perform a broad range of electromechanical tasks with multiple input and output arrangements, designed specifically to cope in severe environmental conditions such as automotive and chemical plants. Programmable Logic Controllers: A Practical Approach using CoDeSys is a hands-on guide to rapidly gain proficiency in the development and operation of PLCs based on the IEC 61131-3 standard. Using the freely-available* software tool CoDeSys, which is widely used in industrial design automation projects, the author takes a highly practical approach to PLC design using real-world examples. The design tool, CoDeSys, also features a built in simulator/soft PLC enabling the reader to undertake exercises and test the examples. Key features: Introduces to programming techniques using IEC 61131-3 guidelines in the five PLC-recognised programming languages. Focuses on a methodical approach to programming, based on Boolean algebra, flowcharts, sequence diagrams and state-diagrams. Contains a useful methodology to solve problems, develop a structured code and document the programming code. Covers I/O like typical sensors, signals, signal formats, noise and cabling. Features Power Point slides covering all topics, example programs and solutions to end-of-chapter exercises via companion website. No prior knowledge of programming PLCs is assumed making this text ideally suited to electronics engineering students pursuing a career in electronic design automation. Experienced PLC users in all fields of manufacturing will discover new possibilities and gain useful tips for more efficient and structured programming. * Register at www.codesys.com www.wiley.com/go/hanssen/logiccontrollers

The business, commercial and public-sector world has changed dramatically since John Oakland wrote the first edition of Statistical Process Control – a practical guide in the mid-eighties. Then people were rediscovering statistical methods of 'quality control' and the book responded to an often desperate need to find out about the techniques and use them on data. Pressure over time from organizations supplying directly to the consumer, typically in the automotive and high technology sectors, forced those in charge of the supplying production and service operations to think more about preventing problems than how to find and fix them. Subsequent editions retained the 'took kit' approach of the first but included some of the 'philosophy' behind the techniques and their use. The theme which runs throughout the 7th edition is still processes - that require understanding, have variation, must be properly controlled, have a capability, and need improvement - the five sections of this new edition. SPC never has been and never will be simply a 'took kit' and in this book the authors provide, not only the instructional guide for the tools, but communicate the management practices which have become so vital to success in organizations throughout the world. The book is supported by the authors' extensive and latest consulting work within thousands of organisations worldwide. Fully updated to include real-life case studies, new research based on client work from an array of industries, and integration with the latest computer methods and Minitab software, the book also retains its valued textbook quality through clear learning objectives and end of chapter discussion questions. It can still serve as a textbook for both student and practicing engineers, scientists, technologists, managers and for anyone wishing to understand or implement modern statistical process control techniques.

Offering a modern, process-oriented approach emphasizing process control scheme development instead of extended coverage of Laplace space descriptions of process dynamics, this text focuses on aspects that are most important for process engineering in the 21st century. Instead of starting with the controller, the book starts with the process and moves on to how basic regulatory control schemes can be designed to achieve the process' objectives while maintaining stable operations. In addition to continuous control concepts, process and control system dynamics are embedded into the text with each new concept presented. The book also includes sections on batch and semi-batch processes and safety automation within each concept area. It discusses the four most common process control loops—feedback, feedforward, ratio, and cascade—and discusses application of these techniques for process control schemes for the most common types of unit operations. It also discusses more advanced and less commonly used regulatory control options such as override, allocation, and split range controllers, includes an introduction to higher level automation functions, and provides guidance for ways to increase the overall safety, stability, and efficiency for many process applications. It introduces the theory behind the most common types of controllers used in the process industries and also provides various additional plant automation-related subjects.

An application-oriented approach to process control. The reference text systematically explains process identification, control and optimization, the three key steps needed to solve a multivariable control problem. Theory is discussed as far as it is needed to understand and solve the defined problem, while numerous examples written in MATLAB illustrate the problem-solving approach.

This thoroughly updated edition of Fluid Catalytic Cracking Handbook provides practical information on the design, operation, troubleshooting, and optimization of fluid catalytic cracking (FCC) facilities. Based on the author's years of field experience, this expanded, second edition covers the latest technologies to improve the profitability and reliability of the FCC units, and provides several "no-to-low-cost" practical

recommendations. A new chapter supplies valuable recommendations for debottlenecking and optimizing the performance of cat cracker operations.

Food companies, regardless of their size and scope, understand that it is impossible to establish a single division devoted to "quality", as quality is the responsibility and purpose of every company employee. Applying this theory demands the cooperation of each employee and an understanding of the methodology necessary to establish, implement, and evaluate a Quality Assurance program. Quality Assurance for the Food Industry: A Practical Approach provides in-depth coverage of all aspects of quality assurance. It identifies the basic concepts and principles behind Total Quality Management and presents examples of Quality Assurance programs that can be applied to the food industry using simple, proven formats. The author discusses the role of Quality Assurance in product manufacturing, emphasizing the need for interactions among an organization's Quality Assurance, Quality Control, Product Development, Marketing, Sales, and Consumer Affairs departments. He analyzes the characteristics of a quality audit and the purpose of a proper audit, then focuses on specific examples including product manufacturing audits, food plant sanitation audits, and product quality audits. A comprehensive examination of HACCP and its applications concludes the coverage. This practical, industry-oriented reference explains the fundamental role of Quality Assurance and provides the knowledge required for establishing a Total Quality Management system in your own company. The concepts and procedures discussed are the key components for attaining and maintaining the highest standards of quality in the food industry. Practical Process Control introduces process control to engineers and technicians unfamiliar with control techniques, providing an understanding of how to actually apply control in a real industrial environment. It avoids analytical treatment of the numerous statistical process control techniques to concentrate on the practical problems involved. A practical approach is taken, making it relevant in virtually all manufacturing and process industries. There is currently no information readily available to practising engineers or students that discusses the real problems and such material is long overdue. An indispensable guide for all those involved in process control Includes equipment specification, troubleshooting, system specification and design Provided with guidelines of HOW TO and HOW NOT TO install process control

This new edition of this bestselling guide offers an integrated approach to process improvement that delivers quick and substantial results in quality and productivity in diverse settings. The authors explore their Model for Improvement that worked with international improvement efforts at multinational companies as well as in different industries such as healthcare and public agencies. This edition includes new information that shows how to accelerate improvement by spreading changes across multiple sites. The book presents a practical tool kit of ideas, examples, and applications.

An Essential Guide to Control Engineering Fundamentals Understand the day-to-day procedures of today's control engineer with the pragmatic insights and techniques contained in this unique resource.

Written in clear, concise language, Practical Control Engineering shows, step-by-step, how engineers simulate real-world phenomena using dynamic models and algorithms. Learn how to handle single and multiple-staged systems, implement error-free feedback control, eliminate anomalies, and work in the frequency and discrete-time domains. Extensive appendices cover basic calculus, differential equations, vector math, Laplace and Z-transforms, and Matlab basics. Practical Control Engineering explains how to: Gain insight into control engineering and process analysis Write and debug algorithms that simulate physical processes Understand feedback, feedforward, open loops, and cascade controls Build behavioral models using basic applied mathematics Analyze lumped, underdamped, and distributed processes Comprehend matrix, vector, and state estimation concepts Convert from continuous to discrete-time and frequency domains Filter out white noise, colored noise, and stochastic disturbances

This ground-breaking book addresses the critical, growing need among health care administrators and practitioners to measure the effectiveness of quality improvement efforts. Written by respected healthcare quality professionals, Measuring Quality Improvement in Healthcare covers practical applications of the tools and techniques of statistical process control (SPC), including control charts, in healthcare settings. The authors' straightforward discussions of data collection, variation, and process improvement set the context for the use and interpretation of control charts. Their approach incorporates "the voice of the customer" as a key element driving the improvement processes and outcomes. The core of the book is a set of 12 case studies that show how to apply statistical thinking to health care process, and when and how to use different types of control charts. The practical, down-to-earth orientation of the book makes it accessible to a wide readership.

A practical guide to Quality by Design for pharmaceutical product development Pharmaceutical Quality by Design: A Practical Approach outlines a new and proven approach to pharmaceutical product development which is now being rolled out across the pharmaceutical industry internationally. Written by experts in the field, the text explores the QbD approach to product development. This innovative approach is based on the application of product and process understanding underpinned by a systematic methodology which can enable pharmaceutical companies to ensure that quality is built into the product. Familiarity with Quality by Design is essential for scientists working in the pharmaceutical industry. The authors take a practical approach and put the focus on the industrial aspects of the new QbD approach to pharmaceutical product development and manufacturing. The text covers quality risk management tools and analysis, applications of QbD to analytical methods, regulatory aspects, quality systems and knowledge management. In addition, the book explores the development and manufacture of drug substance and product, design of experiments, the role of excipients, multivariate analysis, and include several examples of applications of QbD in actual practice. This important resource: Covers the essential information about Quality by Design (QbD) that is at the heart of modern pharmaceutical development Puts the focus on the industrial aspects of the new QbD approach Includes several illustrative examples of applications of QbD in practice Offers advanced specialist topics that can be systematically applied to industry Pharmaceutical Quality by Design offers a guide to the principles and application of Quality by Design (QbD), the holistic approach to manufacturing that offers a complete understanding of the manufacturing processes involved, in order to yield consistent and high quality products.

This expanded new edition is specifically designed to meet the needs of the process industry, and closes the gap between theory and practice. Back-to-basics approach, with a focus on techniques that have an immediate practical application, and heavy maths relegated to the end of the book Written by an experienced practitioner, highly regarded by major corporations, with 25 years of teaching industry courses Supports the increasing expectations for Universities to teach more practical process control (supported by IChemE)

The first statistics guide focussing on practical application to process control design and maintenance Statistics for Process Control Engineers is the only guide to statistics

written by and for process control professionals. It takes a wholly practical approach to the subject. Statistics are applied throughout the life of a process control scheme – from assessing its economic benefit, designing inferential properties, identifying dynamic models, monitoring performance and diagnosing faults. This book addresses all of these areas and more. The book begins with an overview of various statistical applications in the field of process control, followed by discussions of data characteristics, probability functions, data presentation, sample size, significance testing and commonly used mathematical functions. It then shows how to select and fit a distribution to data, before moving on to the application of regression analysis and data reconciliation. The book is extensively illustrated throughout with line drawings, tables and equations, and features numerous worked examples. In addition, two appendices include the data used in the examples and an exhaustive catalogue of statistical distributions. The data and a simple-to-use software tool are available for download. The reader can thus reproduce all of the examples and then extend the same statistical techniques to real problems. Takes a back-to-basics approach with a focus on techniques that have immediate, practical, problem-solving applications for practicing engineers, as well as engineering students Shows how to avoid the many common errors made by the industry in applying statistics to process control Describes not only the well-known statistical distributions but also demonstrates the advantages of applying the large number that are less well-known Inspires engineers to identify new applications of statistical techniques to the design and support of control schemes Provides a deeper understanding of services and products which control engineers are often tasked with assessing This book is a valuable professional resource for engineers working in the global process industry and engineering companies, as well as students of engineering. It will be of great interest to those in the oil and gas, chemical, pulp and paper, water purification, pharmaceuticals and power generation industries, as well as for design engineers, instrument engineers and process technical support.

"Internal Control Strategies: A Mid to Small Business Guide clearly explains the latest PCAOB, SEC, and COSO guidance, providing you with an effective tool and reference guide for successful implementation of sections 302 and 404 of the Sarbanes-Oxley Act."--Publisher's website.

Quantitative Process Control Theory explains how to solve industrial system problems using a novel control system design theory. This easy-to-use theory does not require designers to choose a weighting function and enables the controllers to be designed or tuned for quantitative engineering performance indices such as overshoot. In each chapter, a s

Using a series of rigorous authentic examples, the authors demonstrate several simple yet practical techniques for utilizing adaptive neural networks to produce more efficient process control. Their in-depth description of implementation issues offers a wealth of pragmatic wisdom.

Substrate integrated waveguide (SIW) technology is a twenty-first century transmission line that has evolved recently to open new doors to the development of efficient circuits and devices operating in the microwave and millimeter-wave frequency range. Microstrip circuits and devices are inefficient at high frequency applications and require very stringent manufacturing tolerances when used to implement microwave and millimeter-wave components. This is as a result of the fact that wavelengths are short at higher frequencies. Waveguide circuits and devices are preferred for higher frequency applications, but they are expensive and difficult to manufacture. It is also very challenging to integrate a waveguide device with planar devices in its vicinity. The SIW bridges the gap between the traditional air-filled waveguide and planar transmission lines such as microstrip. Practical Approach to Substrate Integrated Waveguide (SIW) Diplexer: Emerging Research and Opportunities is an essential reference source that discusses the development of efficient circuits and devices operating in the microwave and millimeter-wave frequency range through the use of substrate integrated waveguides. Featuring research on topics such as microstrip resonators, circuit model analysis, and quality factor extraction, this book is ideally designed for researchers, engineers, scientists, developers, scholars, practitioners, educators, policymakers, and students.

Designed to provide a comprehensive, step-by-step approach to organic process research and development in the pharmaceutical, fine chemical, and agricultural chemical industries, this book describes the steps taken, following synthesis and evaluation, to bring key compounds to market in a cost-effective manner. It describes hands-on, step-by-step, approaches to solving process development problems, including route, reagent, and solvent selection; optimising catalytic reactions; chiral syntheses; and "green chemistry." Second Edition highlights: • Reflects the current thinking in chemical process R&D for small molecules • Retains similar structure and orientation to the first edition. • Contains approx. 85% new material • Primarily new examples (work-up and prospective considerations for pilot plant and manufacturing scale-up) • Some new/expanded topics (e.g. green chemistry, genotoxins, enzymatic processes) • Replaces the first edition, although the first edition contains useful older examples that readers may refer to Provides insights into generating rugged, practical, cost-effective processes for the chemical preparation of "small molecules" Breaks down process optimization into route, reagent and solvent selection, development of reaction conditions, workup, crystallizations and more Presents guidelines for implementing and troubleshooting processes

Filling a gap in the literature for a practical approach to the topic, this book is unique in including a whole section of case studies presenting a wide range of applications from polymerization reactors and bioreactors, to distillation column and complex fluid catalytic cracking units. A section of general tuning guidelines of MPC is also present. These thus aid readers in facilitating the implementation of MPC in process engineering and automation. At the same time many theoretical, computational and implementation aspects of model-based control are explained, with a look at both linear and nonlinear model predictive control. Each chapter presents details related to the modeling of the process as well as the implementation of different model-based control approaches, and there is also a discussion of both the dynamic behaviour and the economics of industrial processes and plants. The book is unique in the broad coverage of different model based control strategies and in the variety of applications presented. A special merit of the book is in the included library of dynamic models of several industrially relevant processes, which can be used by both the industrial and academic community to study and implement advanced control strategies.

An introduction to CFD fundamentals and using commercial CFD software to solve engineering problems, designed for the wide variety of engineering students new to CFD, and for practicing engineers learning CFD for the first time. Combining an appropriate level of mathematical background, worked examples, computer screen shots, and step by step processes, this book walks the reader through modeling and computing, as well as interpreting CFD results. The first book in the field aimed at CFD users rather than developers. New to this edition: A more comprehensive coverage of CFD techniques including discretisation via finite element and spectral element as well as finite difference and finite volume methods and multigrid method. Coverage of different approaches to CFD grid generation in order to closely match how CFD meshing is being used in industry. Additional coverage of high-pressure fluid dynamics and meshless approach to provide a broader overview of the application areas where CFD can be used. 20% new content

Innovative new technology now allows the measurement and collection of data throughout many manufacturing processes previously unavailable. The The Application of Statistical Process Control in the Pharmaceutical and Biotechnology Industries is a starting point for anyone who has been tasked to use technology to measure and collect data to gain an understanding of their processes in order to improve and control lengthy, complex supply chains in the pharmaceutical industry. It is a practical guide on how to apply statistical process control (SPC) within the pharmaceutical industry. It encourages all those involved in the industry - whether it be production, quality or the regulatory bodies - to start assessing data in a different way. This book delivers a way of viewing data that is both simple and easy to understand and relates to our understanding of the world in which we work. The first book to describe SPC in the pharmaceutical and biotechnology industries Highly practical approach Contains many case studies showing the application of SPC

Recognizing that complexity calls for innovative, conceptual, and methodological solutions, Dealing with Complexity in Development Evaluation by Michael Bamberger, Jos Vaessen, and Estelle Raimondo offers practical guidance to policymakers, managers, and evaluation practitioners on how to design and implement complexity-responsive evaluations that can be undertaken in the real world of time, budget, data, and political constraints. Introductory chapters present comprehensive, non-technical overviews of the most common evaluation tools and methodologies, and additional content addresses more cutting-edge material. The book also includes six case study chapters to illustrate examples of various evaluation contexts from around the world.

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