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Advanced Modeling and Optimization of Manufacturing Processes R. Venkata Rao 2010-12-01 Advanced Modeling and Optimization of Manufacturing Processes presents a comprehensive review of the latest international research and development trends in the modeling and optimization of manufacturing processes, with a focus on machining. It uses examples of various manufacturing processes to demonstrate advanced modeling and optimization techniques. Both basic and advanced concepts are presented for various manufacturing processes, mathematical models, traditional and non-traditional optimization techniques, and real case studies. The results of the application of the proposed methods are also covered and the book highlights the most useful modeling and optimization strategies for achieving best process performance. In addition to covering the advanced modeling, optimization and environmental aspects of machining processes, Advanced Modeling and Optimization of Manufacturing Processes also covers the latest technological advances, including rapid prototyping and tooling, micromachining, and nano-finishing. Advanced Modeling and Optimization of Manufacturing Processes is written for designers and manufacturing engineers who are responsible for the technical aspects of product realization, as it presents new models and optimization techniques to make their work easier, more efficient, and more effective. It is also a useful text for practitioners, researchers, and advanced students in mechanical, industrial, and manufacturing engineering.

Design Optimization of Renewable Energy Systems Using Advanced Optimization Algorithms Venkata Rao Ravipudi 2022-03-01 This book describes applications of Jaya and Rao algorithms on real case studies concerning different renewable energy sources. In the last few decades, researchers have focused on renewable energy resources like solar energy, bio-energy, wave energy, ocean thermal energy, tidal energy, geothermal energy, and wind energy. This has resulted in the development of new techniques and tools that could harvest energy from renewable energy sources. Many researchers and scientists have focused on developing and optimizing the energy systems to extract and utilize renewable energy more efficiently. In this book, recently developed Jaya and Rao (Rao-1, Rao-2, and Rao-3) algorithms are introduced for single- and multi-objective optimization of selected renewable energy systems. The results of applications of the different versions of Jaya and Rao algorithms are compared with the other optimization techniques like GA, NSGA-II, PSO, MOPSO, ABC, etc., and the performance of the Jaya and Rao algorithms is highlighted compared to other optimization algorithms in the case of renewable energy systems. The book also includes the validation of different versions of the Jaya and Rao algorithms through the application to complex single- and multi-objective unconstrained benchmark functions. The algorithms and computer codes of different version of Jaya and Rao algorithms are included in the book that will be very much useful to readers in industry and academic research.

Techniques, Tools and Methodologies Applied to Quality Assurance in Manufacturing Jorge Luis Garcia Alcaraz 2021-05-18 This book presents a collection of real cases from industrial practices that production system and quality managers implement to ensure a high quality as well as a low cost in products. This book is divided in sections that are focused on: · The quality and philosophies implemented to production systems; starting from the product design as well as from the supply system. · The principal statistical techniques applied to the quality assurance (statistical quality control, analysis of tests and failure, quality function deployment, accelerated life tests, among others), the process of gathering information, its validation, its reliability process, and techniques for data analysis. · The techniques applied to the integration of human resources in the process of quality assurance, such as managers and operators' participation, training, and training processes. · Use of information and communications technologies, software, and programs implemented to guarantee the quality of the products in the production systems. ISO standards and policies that are used for quality management and monitoring.

Multi-Objective Optimization in Chemical Engineering Gade Pandu Rangaiah 2013-03-20 For reasons both financial and environmental, there is a perpetual need to optimize the design and operating conditions of industrial process systems in order to improve their performance, energy efficiency, profitability, safety and reliability. However, with most chemical engineering application problems having many variables with complex inter-relationships, meeting these optimization objectives can be challenging. This is where Multi-Objective Optimization (MOO) is useful to find the optimal trade-offs among two or more conflicting objectives. This book provides an overview of the recent developments and applications of MOO for modeling, design and operation of chemical, petrochemical, pharmaceutical, energy and related processes. It then covers important theoretical and computational developments as well as specific applications such as metabolic reaction networks, chromatographic systems, CO₂ emissions targeting for petroleum refining units, ecodesign of chemical processes, ethanol purification and clemene process design. Multi-Objective Optimization in Chemical Engineering: Developments and Applications is an invaluable resource for researchers and graduate students in chemical engineering as well as industrial practitioners and engineers involved in process design, modeling and optimization.

Computational Intelligence in Expensive Optimization Problems Yoel Tenne 2010-03-10 In modern science and engineering, laboratory experiments are replaced by high fidelity and computationally expensive simulations. Using such simulations reduces costs and shortens development times but introduces new challenges to design optimization process. Examples of such challenges include limited computational resource for simulation runs, complicated response surface of the simulation inputs-outputs, and etc. Under such difficulties, classical optimization and analysis methods may perform poorly. This motivates the application of computational intelligence methods such as evolutionary algorithms, neural networks and fuzzy logic, which often perform well in such settings. This is the first book to introduce the emerging field of computational intelligence in expensive optimization problems. Topics covered include: dedicated implementations of evolutionary algorithms, neural networks and fuzzy logic, reduction of expensive evaluations (modeling, variable-fidelity, fitness inheritance), frameworks for optimization (model management, complexity control, model selection), parallelization of algorithms (implementation issues on clusters, grids, parallel machines), incorporation of expert systems and human-system interface, single and multiobjective algorithms, data mining and statistical analysis, analysis of real-world cases (such as multidisciplinary design optimization). The edited book provides both theoretical treatments and real-world insights gained by experience, all contributed by leading researchers in the respective fields. As such, it is a comprehensive reference for researchers, practitioners, and advanced-level students interested in both the theory and practice of using computational intelligence for expensive optimization problems.

Enabling Industry 4.0 through Advances in Manufacturing and Materials Amiril Sahab Abdul Sani 2022-09-26 This book presents part of the proceedings of the Manufacturing and Materials track of the IM3F 2021 conference held in Malaysia. This collection of articles deliberates on the key challenges and trends related to manufacturing as well as materials engineering and technology in setting the stage for the world in embracing the Fourth Industrial Revolution. It presents recent findings with regard to manufacturing and materials that are pertinent toward the realizations and ultimately the embodiment of Industry 4.0, with contributions from both industry and academia.

Nature-Inspired Optimization in Advanced Manufacturing Processes and Systems Ganesh M. Kakandikar 2020-12-15 Nature-Inspired Optimization in Advanced Manufacturing Processes and Systems Subject Guide: Engineering/Industrial and Manufacturing The manufacturing system is going through substantial changes and developments in light of Industry 4.0. Newer manufacturing technologies are being developed and applied. There is a need to optimize these techniques when applied in different circumstances with respect to materials, tools, product configurations, and process parameters. This book covers computational intelligence applied to manufacturing. It discusses nature-inspired optimization of processes and the design and development in manufacturing systems. It explores all manufacturing processes, at both macro and micro levels, and offers manufacturing philosophies. Nonconventional manufacturing, real industry problems and case studies, research on generative processes, and relevance of all this to Industry 4.0, is also included. Researchers, students, academicians, and industry professionals will find this reference title very useful.

Issues in Structural and Materials Engineering: 2011 Edition 2012-01-09 Issues in Structural and Materials Engineering: 2011 Edition is a ScholarlyEditions eBook that delivers timely, authoritative, and comprehensive information about Structural and Materials Engineering. The editors have built Issues in Structural and Materials Engineering: 2011 Edition on the vast information databases of ScholarlyNews. You can expect the information about Structural and Materials Engineering in this eBook to be deeper than what you can access anywhere else, as well as consistently reliable, authoritative, informed, and relevant. The content of Issues in Structural and Materials Engineering: 2011 Edition has been produced by the world's leading scientists, engineers, analysts, research institutions, and companies. All of the content is from peer-reviewed sources, and all of it is written, assembled, and edited by the editors at ScholarlyEditions and available exclusively from us. You now have a source you can cite with authority, confidence, and credibility. More information is available at <http://www.ScholarlyEditions.com/>.

Teaching Learning Based Optimization Algorithm R. Venkata Rao 2015-11-14 Describing a new optimization algorithm, the Teaching-Learning-Based Optimization (TLBO), in a clear and lucid style, this book maximizes reader insights into how the TLBO algorithm can be used to solve continuous and discrete optimization problems involving single or multiple objectives. As the algorithm operates on the principle of teaching and learning, where teachers influence the quality of learners' results, the elitist version of TLBO algorithm (ETLBO) is described along with applications of the TLBO algorithm in the fields of electrical engineering, mechanical design, thermal engineering, manufacturing engineering, civil engineering, structural engineering, computer engineering, electronics engineering, physics and biotechnology. The book offers a valuable resource for scientists, engineers and practitioners involved in the development and usage of advanced optimization algorithms.

Soft Computing Techniques in Solid Waste and Wastewater Management Rama Karri 2021-07-24 Soft Computing Techniques in Solid Waste and Wastewater Management is a thorough guide to computational solutions for researchers working in solid waste and wastewater management operations. This book covers in-depth analysis of process variables, their effects on overall efficiencies, and optimal conditions and procedures to improve performance using soft computing techniques. These topics coupled with the systematic analyses described will help readers understand various techniques that can be effectively used to achieve the highest performance. In-depth case studies along with discussions on applications of various soft-computing techniques help readers control waste processes and come up with short-term, mid-term and long-term strategies. Waste management is an increasingly important field due to rapidly increasing levels of waste production around the world. Numerous potential solutions for reducing waste production are underway, including applications of machine learning and computational studies on waste management processes. This book details the diverse approaches and techniques in these fields, providing a single source of information researchers and industry practitioners. It is ideal for academics, researchers and engineers in waste management, environmental science, environmental engineering and computing, with relation to environmental science and waste management. Provides a comprehensive reference on the implementation of soft computing techniques in waste management, drawing together current research and future implications Includes detailed algorithms used, enabling authors to understand and appreciate potential applications Presents relevant case studies in solid and wastewater management that show real-world applications of discussed technologies

Advances in Sustainable Machining and Manufacturing Processes Kishor Kumar Gajrani 2022-05-19 This text provides an in-depth overview of sustainability in machining processes, challenges during machining of difficult-to-cut materials and different ways of green machining in achieving sustainability. It discusses important topics including green and sustainable machining, dry machining, textured cutting coated tools for machining, solid lubricants-based machining, gas-cooled machining, cryogenic cooling for intelligent machining, artificial neural network for machining, big data based machining, and hybrid intelligent machining. This book - Covers advances in sustainable machining such as gas-cooled machining, near dry machining, and minimum quantity lubrication. Explores use of big data, machine learning and artificial intelligence for machining processes. Provides case studies and experimental design as well as results with analysis focusing on achieving sustainability. Discusses artificial intelligence and machine learning based machining processes. Cover the latest applications of sustainable manufacturing for a better understanding of the concepts. The text is primarily written for senior undergraduate, graduate students, and researchers in the fields of mechanical, manufacturing, industrial, production engineering and materials science.

Advanced Manufacturing and Processing Technology Chandar Prakash 2020-10-25 This book disseminates recent research, theories, and practices relevant to the areas of surface engineering and the processing of materials for functional applications in the aerospace, automobile, and biomedical industries. The book focuses on the hidden technologies and advanced manufacturing methods that may not be standardized by research institutions but are greatly beneficial to material and manufacturing industrial engineers in many ways. It details projects, research activities, and innovations in a global platform to strengthen the knowledge of the concerned community. The book covers surface engineering including coating, deposition, cladding, nanotechnology, surface finishing, precision machining, processing, and emerging advanced manufacturing technologies to enhance the performance of materials in terms of corrosion, wear, and fatigue. The book captures the emerging areas of materials science and advanced manufacturing engineering and presents recent trends in research for researchers, field engineers, and academic professionals.

RSM Simplified Mark J. Anderson 2016-08-05 Anderson and Whitcomb pick up where they left off in DOE Simplified with RSM Simplified -- a practical tool for design of experiments that anyone with a minimum of technical training can understand and appreciate. Their approach is simple and fun for those who desire knowledge on response surface methods but are put off by the academic nature of other books on the topic. RSM Simplified keeps formulas to a minimum and makes liberal use of figures, charts, graphs, and checklists. It offers many relevant examples with amusing sidebars and do-it-yourself exercises that will lead readers to the peak potential for their product quality and process efficiency.

Multi-objective Optimization: Techniques And Applications In Chemical Engineering (Second Edition) Rangaiah Gade Pandu 2016-12-22 Optimization is now essential in the design, planning and operation of chemical and related processes. Although process optimization for multiple objectives was studied in the 1970s and 1980s, it has attracted active research in the last 15 years, spurred by the new and effective techniques for multi-objective optimization (MOO). To capture this renewed interest, this monograph presents recent research in MOO techniques and applications in chemical engineering. Following a brief introduction and review of MOO applications in chemical engineering since 2000, the book presents selected MOO techniques and many chemical engineering applications in detail. In this second edition, several chapters from the first edition have been updated, one chapter is completely revised and three new chapters have been added. One of the new chapters describes three MS Excel programs useful for MOO of application problems. All the chapters will be of interest to researchers in MOO and/or chemical engineering. Several exercises are included at the end of many chapters, for use by both practicing engineers and students.

Advances in Engineering Research and Application Duy Cuong Nguyen 2022-01-12 This book covers the International Conference on Engineering Research and Applications (ICERA 2021), which took place at Thai Nguyen University of Technology, Thai Nguyen, Vietnam on December 10-12, 2021, and provided an international forum to disseminate information on latest theories and practices in engineering research and applications. The conference focused on original research work in areas including mechanical engineering, materials and mechanics of materials, mechatronics and micro-mechanics, automotive engineering, electrical and electronics engineering, information and communication technology. By disseminating the latest advances in the field, the Proceedings of ICERA 2021, Advances in Engineering Research and Application, helps academics and professionals alike to reshape their thinking on sustainable development.

Recent Trends in Communication and Intelligent Systems Harish Sharma 2020-01-17 The book gathers the best research papers presented at the International Conference on Recent Trends in Communication and Intelligent Systems (ICRTICIS 2019), organized by Rajasthan Technical University Kota, and Arya College of Engineering and IT, Jaipur, on 8-9 June 2019. It discusses the latest technologies in communication and intelligent systems, covering various areas of communication engineering, such as signal processing, VLSI design, embedded systems, wireless communications, and electronics and communications in general. Featuring work by leading researchers and technocrats, the book serves as a valuable reference resource for young researchers and academics as well as practitioners in industry.

Proceedings of Seventh International Conference on Bio-Inspired Computing: Theories and Applications (BIC-TA 2012) Jagdish C. Bansal 2012-12-04 The book is a collection of high quality peer reviewed research papers presented in Seventh International Conference on Bio-Inspired Computing (BIC-TA 2012) held at ABV-IIITM Gwalior, India. These research papers provide the latest developments in the broad area of "Computational Intelligence". The book discusses wide variety of industrial, engineering and scientific applications of nature/bio-inspired computing and presents invited papers from the inventors/originators of novel computational techniques.

Handbook of Research on Predictive Modeling and Optimization Methods in Science and Engineering Kim, Dookie 2018-06-15 The disciplines of science and engineering rely heavily on the forecasting of prospective constraints for concepts that have not yet been proven to exist, especially in areas such as artificial intelligence. Obtaining quality solutions to the problems presented becomes increasingly difficult due to the number of steps required to sift through the possible solutions, and the ability to solve such problems relies on the recognition of patterns and the categorization of data into specific sets. Predictive modeling and optimization methods allow unknown events to be categorized based on statistics and classifiers input by researchers. The Handbook of Research on Predictive Modeling and Optimization Methods in Science and Engineering is a critical reference source that provides comprehensive information on the use of optimization techniques and predictive models to solve real-life engineering and science problems. Through discussions on techniques such as robust design optimization, water level prediction, and the prediction of human actions, this publication identifies solutions to developing problems and new solutions for existing problems, making this publication a valuable resource for engineers, researchers, graduate students, and other professionals.

Multidisciplinary Design Optimization Methods for Electrical Machines and Drive Systems Gang Lei 2016-02-05 This book presents various computationally efficient component- and system-level design optimization methods for advanced electrical machines and drive systems. Readers will discover novel design optimization concepts developed by the authors and other researchers in the last decade, including application-oriented, multi-disciplinary, multi-objective, multi-level, deterministic, and robust design optimization methods. A multi-disciplinary analysis includes various aspects of materials, electromagnetics, thermotics, mechanics, power electronics, applied mathematics, manufacturing technology, and quality control and management.

This book will benefit both researchers and engineers in the field of motor and drive design and manufacturing, thus enabling the effective development of the high-quality production of innovative, high-performance drive systems for challenging applications, such as green energy systems and electric vehicles.

Comprehensive Materials Finishing Saleem Hashmi 2016-08-29 Finish Manufacturing Processes are those final stage processing techniques which are deployed to bring a product to readiness for marketing and putting in service. Over recent decades a number of finish manufacturing processes have been newly developed by researchers and technologists. Many of these developments have been reported and illustrated in existing literature in a piecemeal manner or in relation only to specific applications. For the first time, Comprehensive Materials Finishing integrates a wide body of this knowledge and understanding into a single, comprehensive work. Containing a mixture of review articles, case studies and research findings resulting from R & D activities in industrial and academic domains, this reference work focuses on how some finish manufacturing processes are advantageous for a broad range of technologies. These include applicability, energy and technological costs as well as practicality of implementation. The work covers a wide range of materials such as ferrous, non-ferrous and polymeric materials. There are three main distinct types of finishing processes: Surface Treatment by which the properties of the material are modified without generally changing the physical dimensions of the surface; Finish Machining Processes by which a small layer of material is removed from the surface by various machining processes to render improved surface characteristics; and Surface Coating Processes by which the surface properties are improved by adding fine layer(s) of materials with superior surface characteristics. Each of these primary finishing processes is presented in its own volume for ease of use, making Comprehensive Materials Finishing an essential reference source for researchers and professionals at all career stages in academia and industry. Provides an interdisciplinary focus, allowing readers to become familiar with the broad range of uses for materials finishing Brings together all known research in materials finishing in a single reference for the first time Includes case studies that illustrate theory and show how it is applied in practice

Nanofluids and Mass Transfer Mohammad Reza Rahimpour 2021-09-04 In the recent decades, efficiency enhancement of refineries and chemical plants has become a focus of research and development groups. Use of nanofluids in absorption, regeneration, liquid-liquid extraction and membrane processes can lead to mass transfer and heat transfer enhancement in processes which results in an increased efficiency in all these processes. Nanofluids and Mass Transfer introduces the role of nanofluids in improving mass transfer phenomena and expressing their characteristics and properties. The book also covers the theory and modelling procedures in details and finally illustrates various applications of Nanofluids in mass transfer enhancement in various processes such as absorption, regeneration, liquid-liquid extraction and membrane processes and how can nanofluids increase mass transfer in processes. Introduces specifications of nanofluids and mechanisms of mass transfer enhancement by nanofluids in various mass transfer processes Discusses mass transfer enhancement in various mass transfer processes such as: absorption, regeneration, liquid-liquid extraction and membrane processes Offers modelling mass transfer and flow in nanofluids Challenges industrialization and scale up of nanofluids

Advanced Manufacturing Techniques for Engineering and Engineered Materials Thanigaivelan, R. 2022-03-11 As technology advances, it is imperative to stay current in the newest developments made within the engineering industry and within material sciences. Trends in manufacturing such as 3D printing, casting, welding, surface modification, computer numerical control (CNC), non-traditional, Industry 4.0 ergonomics, and hybrid machining methods must be closely examined to utilize these important resources for the betterment of society. Advanced Manufacturing Techniques for Engineering and Engineered Materials provides a unified and complete overview about the recent and emerging trends, developments, and associated technology with scope for the commercialization of techniques specific to manufacturing materials. This book also reviews the various machining methods for difficult-to-cut materials and novel materials including matrix composites. Covering topics such as agro-waste, conventional machining, and material performance, this book is an essential resource for researchers, engineers, technologists, students and professors of higher education, industry workers, entrepreneurs, researchers, and academicians.

Philosophical Transactions of the Royal Society 2007

EngOpt 2018 Proceedings of the 6th International Conference on Engineering Optimization H.C. Rodrigues 2018-09-13 The papers in this volume focus on the following topics: design optimization and inverse problems, numerical optimization techniques, efficient analysis and reanalysis techniques, sensitivity analysis and industrial applications. The conference EngOpt brings together engineers, applied mathematicians and computer scientists working on research, development and practical application of optimization methods in all engineering disciplines and applied sciences.

Applications and Developments in Grid, Cloud, and High Performance Computing Udoh, Emmanuel 2012-09-30 "This book provides insight into the current trends and emerging issues by investigating grid and cloud evolution, workflow management, and the impact new computing systems have on the education fields as well as the industries"--Provided by publisher.

Simulation Modelling Practice and Theory Evon Abu-Ta'ieh 2019-02

Proceedings of the 5th International Conference on Electrical Engineering and Information Technologies for Rail Transportation (EITRT) 2021 Limin Jia 2022-02-21 This book reflects the latest research trends, methods and experimental results in the field of electrical and information technologies for rail transportation, which covers abundant state-of-the-art research theories and ideas. As a vital field of research that is highly relevant to current developments in a number of technological domains, the subjects it covered include intelligent computing, information processing, communication technology, automatic control, etc. The objective of the proceedings is to provide a major interdisciplinary forum for researchers, engineers, academicians and industrial professionals to present the most innovative research and development in the field of rail transportation electrical and information technologies. Engineers and researchers in academia, industry and government will also explore an insightful view of the solutions that combine ideas from multiple disciplines in this field. The volumes serve as an excellent reference work for researchers and graduate students working on rail transportation and electrical and information technologies. **Green Transportation and New Advances in Vehicle Routing Problems Houda Derbel 2020-12-08** This book presents recent work that analyzes general issues of green transportation. The contributed chapters consider environmental objectives in transportation, including topics such as battery swap stations for electric vehicles, efficient home healthcare routing, waste collection, and various vehicle routing problems. The content will be valuable for researchers and postgraduate students in computer science, operations research, and urban planning.

Recent Advances in Manufacturing Modelling and Optimization Shalendra Kumar 2022-04-21 This book presents the selected proceedings of 2nd International Conference on Recent Advances in Manufacturing (RAM 2021). The book provides insights to current research trends and opportunities in modelling and optimization of manufacturing processes and systems. The topics covered include modelling analysis, computing and simulation, traditional and non-traditional optimization techniques, surface coating methods, additive manufacturing processes, CAD/CAM, robotics and automation, welding and joining processes, supply chain management and CAE and reverse engineering. This book will be a good reference for beginners, researchers and professionals interested in modelling and optimization related to manufacturing engineering and related fields.

Electric Discharge Hybrid-Machining Processes Basil Kuriachen 2022-01-19 This book provides the knowledge and insight into the fundamental aspects of Electric Discharge Machining (EDM) processes and various hybrid machining technologies derived to improve the machining efficiencies. Fundamental theory of material removal, recent research trends and future research directions have been covered in each chapter. After explaining EDM, Dry and Near-dry EDM processes,

Electrochemical Spark Machining, Arc Machining processes, Electric Discharge Hybrid-Turning processes, Electrical Discharge Grinding, Electric Discharge Milling, and various assisted EDM processes have been discussed. Finally, modeling and simulation of hybrid machining processes are also included. The book reflects the recent developments and trends in electric discharge hybrid machining processes. It covers in detail the basics of EDM, various hybrid and assistive technologies in EDM. It includes the updated discussion on the significance of process parameters in various hybrid EDM processes. An overview of modelling and simulation of hybrid EDM process is provided. This book is aimed at Graduate students, researchers in manufacturing engineering, production engineering, and materials engineering.

Proceedings of the 5th Joint ASME/JSME Fluids Engineering Summer Conference - 2007 2007

Intelligent Robotics and Applications Xin-Jun Liu 2021-10-19 The 4-volume set LNAI 13013 // 13016 constitutes the proceedings of the 14th International Conference on Intelligent Robotics and Applications, ICIRA 2021, which took place in Yantai, China, during October 22-25, 2021. The 299 papers included in these proceedings were carefully reviewed and selected from 386 submissions. They were organized in topical sections as follows: Robotics dexterous manipulation; sensors, actuators, and controllers for soft and hybrid robots; cable-driven parallel robot; human-centered wearable robotics; hybrid system modeling and human-machine interface; robot manipulation skills learning; micro_nano materials, devices, and systems for biomedical applications; actuating, sensing, control, and instrumentation for ultra-precision engineering; human-robot collaboration; robotic machining; medical robot; machine intelligence for human motion analytics; human-robot interaction for service robots; novel mechanisms, robots and applications; space robot and on-orbit service; neural learning enhanced motion planning and control for human robot interaction; medical engineering.

Hot Stamping Advanced Manufacturing Technology of Lightweight Car Body Ping Hu 2016-10-14 This book summarizes the advanced manufacturing technology of original innovations in hot stamping of lightweight car body. A detailed description of the technical system and basic knowledge of sheet metal forming is given, which helps readers quickly understand the relevant knowledge in the field. Emphasis has been placed on the independently developed hot stamping process and equipment, which help describe the theoretical and experimental research on key problems involving stress field, thermal field and phase transformation field in hot stamping process. Also, a description of the formability at elevated temperature and the numerical simulation algorithms for high strength steel hot stamping is given in combination with the experiments. Finally, the book presents some application cases of hot stamping technology such as the lightweight car body design using hot stamping components and gradient hardness components, and the cooling design of the stamping tool. This book is intended for researchers, engineers and graduate students in vehicle engineering, mechanical engineering, especially in the field of advanced manufacturing technology. The book also provides a useful reference for other new technology related temperature and phase transformation, such as aluminum-magnesium alloy hot stamping.

Computational Optimization, Methods and Algorithms Sławomir Koziel 2011-06-17 Computational optimization is an important paradigm with a wide range of applications. In virtually all branches of engineering and industry, we almost always try to optimize something - whether to minimize the cost and energy consumption, or to maximize profits, outputs, performance and efficiency. In many cases, this search for optimality is challenging, either because of the high computational cost of evaluating objectives and constraints, or because of the nonlinearity, multimodality, discontinuity and uncertainty of the problem functions in the real-world systems. Another complication is that most problems are often NP-hard, that is, the solution time for finding the optimum increases exponentially with the problem size. The development of efficient algorithms and specialized techniques that address these difficulties is of primary importance for contemporary engineering, science and industry. This book consists of 12 self-contained chapters, contributed from worldwide experts who are working in these exciting areas. The book strives to review and discuss the latest developments concerning optimization and modelling with a focus on methods and algorithms for computational optimization. It also covers well-chosen, real-world applications in science, engineering and industry. Main topics include derivative-free optimization, multi-objective evolutionary algorithms, surrogate-based methods, maximum simulated likelihood estimation, support vector machines, and metaheuristic algorithms. Application case studies include aerodynamic shape optimization, microwave engineering, black-box optimization, classification, economics, inventory optimization and structural optimization. This graduate level book can serve as an excellent reference for lecturers, researchers and students in computational science, engineering and industry.

Energy Efficiency of Manufacturing Processes and Systems Konstantinos Salonitis 2020-11-09 This Special Issue addresses the important issue of the energy efficiency of both manufacturing processes and systems. Manufacturing is responsible for one-third of global energy consumption and CO2 emissions. Thus, improving the energy efficiency of production has been the focus of research in recent years. Energy efficiency has begun to be considered as one of the key decision-making attributes for manufacturing. This book includes recent studies on methods for the measurement of energy efficiency, tools and techniques for the analysis and development of improvements with regards to energy consumption, modeling and simulation of energy efficiency, and the integration of green and lean manufacturing. This book presents a breadth of relevant information, material, and knowledge to support research, policy-making, practices, and experience transferability to address the issues of energy efficiency.

Functional Materials and Advanced Manufacturing Chandar Prakash 2020-10-26 This three-volume set addresses a new knowledge of function materials, their processing, and their characterizations. "Functional and Smart Materials", covered the synthesis and fabrication route of functional and smart materials for universal applications such as material science, mechanical engineering, manufacturing, metrology, nanotechnology, physics, chemical, biology, chemistry, civil engineering, and food science. "Advanced Manufacturing and Processing Technology" covers the advanced manufacturing technologies includes coating, deposition, cladding, nanotechnology, surface finishing, precision machining, processing, and emerging advanced manufacturing technologies for processing of materials for functional applications. "Characterization, Testing, Measurement and Metrology" covered the application of new and advanced characterization techniques to investigate and analysis the processed materials.

Futuristic Composites Sarabjeet Singh Sidhu 2018-09-26 This book presents a collection of chapters on various aspects of futuristic composite materials, from manufacturing challenges to materials characterization. The book covers the scientific basis of processing and synthesizing futuristic composites, including the prerequisite theoretical background and latest fabrication techniques. The book also discusses industrial applications of composites, such as in aerospace, automotive, and sports equipment. This book will serve as a valuable guide for researchers and professionals working in the area of futuristic lightweight materials.

Artificial Intelligence and Data Driven Optimization of Internal Combustion Engines Jihad Badra 2022-01-21 Artificial Intelligence and Data Driven Optimization of Internal Combustion Engines summarizes recent developments in Artificial Intelligence (AI)/Machine Learning (ML) and data driven optimization and calibration techniques for internal combustion engines. The book covers AI/ML and data driven methods to optimize fuel formulations and engine combustion systems, predict cycle to cycle variations, and optimize after-treatment systems and experimental engine calibration. It contains all the details of the latest optimization techniques along with their application to ICE, making it ideal for automotive engineers, mechanical engineers, OEMs and R&D centers involved in engine design. Provides AI/ML and data driven optimization techniques in combination with Computational Fluid Dynamics (CFD) to optimize engine combustion systems Features a comprehensive overview of how AI/ML techniques are used in conjunction with simulations and experiments Discusses data driven optimization techniques for fuel formulations and vehicle control calibration

International Conference on Reliable Systems Engineering (ICoRSE) - 2021 Daniela Doina Ciobotău 2021-07-27 This current book comprises state-of-the-art research results in the field of mechatronics and reliable systems engineering, gathering papers from almost all continents. Since the chapters represent contributions of research scholars who work in both governmental financed institutions and in the business environment, one could infer that they certainly reflect a clear picture of the developments in these cutting-edge sciences. Moreover, the contributions are not limited to mechatronics, as nowadays it has grown to embed all smart technical sciences. Medical applications based on nano-technologies // seemingly the most promising of all newly developed branches // could not be left out of this work. It is our belief that the book is useful to both students, who want to learn from the best scholars (as most of the authors hold a Ph.D. degree and are well-known professors), and to researchers in all areas of smart engineering, who will definitely find here hot topics meant to inspire them in their line of work.

CFD Modeling of Complex Chemical Processes Li Xi 2021-09-01 Computational fluid dynamics (CFD), which uses numerical analysis to predict and model complex flow behaviors and transport processes, has become a mainstream tool in engineering process research and development. Complex chemical processes often involve coupling between dynamics at vastly different length and time scales, as well as coupling of different physical models. The multiscale and multiphysics nature of those problems calls for delicate modeling approaches. This book showcases recent contributions in this field, from the development of modeling methodology to its application in supporting the design, development, and optimization of engineering processes.