

Optimization Of Cutting Conditions For Sustainable

This book presents the proceedings of SympoSIMM 2020, the 3rd edition of the Symposium on Intelligent Manufacturing and Mechatronics. Focusing on "Strengthening Innovations Towards Industry 4.0", the book presents studies on the details of Industry 4.0's current trends. Divided into five parts covering various areas of manufacturing engineering and mechatronics stream, namely, artificial intelligence, instrumentation and controls, intelligent manufacturing, modelling and simulation, and robotics, the book will be a valuable resource for readers wishing to embrace the new era of Industry 4.0.

Collected here are 112 papers concerned with new directions in manufacturing systems, given at the 41st CIRP Conference on Manufacturing Systems. The high-quality material includes reports of work from both scientific and engineering standpoints.

Metal machining is the most widespread metal-shaping process in the mechanical manufacturing industry. World-wide investment in metal machining tools increases year on year - and the wealth of nations can be judged by it. This text - the most up-to-date in the field - provides in-depth discussion of the theory and application of metal machining at an advanced level. It begins with an overview of the development of metal machining and its role in the current industrial environment and continues with a discussion of the theory and practice of machining. The underlying mechanics are analysed in detail and there are extensive chapters examining applications through a discussion of simulation and process control. "Metal Machining: Theory and Applications" is essential reading for senior undergraduates and postgraduates specialising in cutting technology. It is also an invaluable reference tool for professional engineers. Professors Childs, Maekawa, Obikawa and Yamane are four of the leading authorities on metal machining and have worked together for many years. Of interest to all mechanical, manufacturing and materials engineers Theoretical and practical problems addressed

The work contains the results of the Sixth International Conference on Advanced Manufacturing Systems and Technology – AMST'02, which was held in Udine in June 2002. It presents up-to-date information on the latest developments – research results and experience – in the field of machining of conventional and advanced materials, machine tools and flexible manufacturing systems, forming, nonconventional processes, robotics, measurement and control, quality, design and ecodesign, rapid prototyping, rapid tooling and manufacturing, materials and mechanics.

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.

This book comprises selected proceedings of the International Conference on Engineering Materials, Metallurgy and Manufacturing (ICEMMM 2018). It discusses innovative manufacturing processes, such as rapid prototyping, nontraditional machining, advanced computer numerical control (CNC) machining, and advanced metal forming. The book particularly focuses on finite element simulation and optimization, which aid in reducing experimental costs and time. This book is a valuable resource for students, researchers, and

professionals alike.

This book presents recent research in intelligent and fuzzy techniques. Emerging conditions such as pandemic, wars, natural disasters and various high technologies force people for significant changes in business and social life. The adoption of digital technologies to transform services or businesses, through replacing non-digital or manual processes with digital processes or replacing older digital technology with newer digital technologies through intelligent systems is the main scope of this book. It focuses on revealing the reflection of digital transformation in our business and social life under emerging conditions through intelligent and fuzzy systems. The latest intelligent and fuzzy methods and techniques on digital transformation are introduced by theory and applications. The intended readers are intelligent and fuzzy systems researchers, lecturers, M.Sc. and Ph.D. students studying digital transformation. Usage of ordinary fuzzy sets and their extensions, heuristics and metaheuristics from optimization to machine learning, from quality management to risk management makes the book an excellent source for researchers.

Manufacturing a product is not difficult, the difficulty consists in manufacturing a product of high quality, at a low cost and rapidly. Drastic technological advances are changing global markets very rapidly. In such conditions the ability to compete successfully must be based on innovative ideas and new products which has to be of high quality yet low in price. One way to achieve these objectives would be through massive investments in research of computer based technology and by applying the approaches presented in this book. The First International Conference on Advanced Manufacturing Systems and Technology AMST87 was held in Opatija (Croatia) in October 1987. The Second International Conference on Advanced Manufacturing Systems and Technology AMSV90 was held in Trento (Italy) in June 1990. The Third, Fourth, Fifth and Sixth Conferences on Advanced Manufacturing Systems and Technology were all held in Udine (Italy) as follows: AMST93 in April 1993, AMST96 in September 1996, AMST99 in June 1999 and AMST02 in June 2002.

Metal cutting applications span the entire range from mass production to mass customization to high-precision, fully customized designs. The careful balance between precision and efficiency is maintained only through intimate knowledge of the physical processes, material characteristics, and technological capabilities of the equipment and workpieces involved. The best-selling first edition of Metal Cutting Theory and Practice provided such knowledge, integrating timely research with current industry practice. This brilliant reference enters its second edition with fully updated coverage, new sections, and the inclusion of examples and problems. Supplying complete, up-to-date information on machine tools, tooling, and workholding technologies, this second edition stresses a physical understanding of machining processes including forces, temperatures, and surface finish. This provides a practical basis for troubleshooting and evaluating vendor claims. In addition to updates in all chapters, the book features three new chapters on cutting fluids, agile and high-throughput machining, and design for machining. The authors also added examples and problems for additional hands-on insight. Rounding out the treatment, an entire chapter is devoted to machining economics and optimization. Endowing you with practical knowledge and a fundamental understanding of underlying physical concepts, Metal Cutting Theory and Practice, Second Edition is a necessity for designing, evaluating, purchasing, and using machine tools.

The third International Symposium on Materials and Sustainable Development ISMSD2017 (CIMDD2017) will include a 2-day Conferences (07 & 08 November). Organized by the Research Unit: Materials, Processes and Environment and University M'hamed Bougara of Boumerdes, this symposium follows the success of CIMDD 2013-2015 and continues the traditions of the highly successful series of International Conferences on the materials, processes and Environment. The Symposium will provide a unique topical forum to share the latest results of the materials and sustainable development research in Algeria and worldwide.

All machining processes are dependent on a number of inherent process parameters. It is of the utmost importance to find suitable combinations to all the process parameters so that the desired output response is optimized. While doing so may be nearly impossible or too expensive by carrying out experiments at all possible combinations, it may be done quickly and efficiently by using computational intelligence techniques. Due to the versatile nature of computational intelligence techniques, they can be used at different phases of the machining process design and optimization process. While powerful machine-learning methods like genetic programming (GEP), artificial neural network (ANN), support vector regression (SVM), and more can be used at an early phase of the design and optimization process to act as predictive models for the actual experiments, other metaheuristic-based methods like cuckoo search, ant colony optimization, particle swarm optimization, and others can be used to optimize these predictive models to find the optimal process parameter combination. These machining and optimization processes are the future of manufacturing. *Data-Driven Optimization of Manufacturing Processes* contains the latest research on the application of state-of-the-art computational intelligence techniques from both predictive modeling and optimization viewpoint in both soft computing approaches and machining processes. The chapters provide solutions applicable to machining or manufacturing process problems and for optimizing the problems involved in other areas of mechanical, civil, and electrical engineering, making it a valuable reference tool. This book is addressed to engineers, scientists, practitioners, stakeholders, researchers, academicians, and students interested in the potential of recently developed powerful computational intelligence techniques towards improving the performance of machining processes.

This book, based on the Fourth International Conference on Advanced Manufacturing Systems and Technology - AMST '96 aims at presenting trend and up-to-date information on the latest developments - research results and industrial experience in the field of machining processes, optimization and process planning, forming, flexible machining systems, non conventional machining, robotics and control, measuring and quality, thus providing an international forum for a beneficial exchange of ideas, and furthering a favourable cooperation between research and industry.

"This book presents a variety of practical applications of neural networks in two important domains of economic activity: finance and manufacturing"--Provided by publisher.

This book provides a detailed understanding of optimization methods as they are implemented in a variety of manufacturing, fabrication and machining processes. It covers the implementation of statistical methods, multi-criteria decision making methods and evolutionary techniques for single and multi-objective optimization to improve quality, productivity, and sustainability in manufacturing. It reports on the theoretical aspects, special features, recent research and latest development in the field. *Optimization of Manufacturing Processes* is a valuable source of information for researchers and practitioners, as it fills the gap where no dedicated book is available on intelligent manufacturing/modeling and optimization in manufacturing. Readers will develop an understanding of the implementation of statistical and evolutionary techniques for modeling and optimization in manufacturing.

This book showcases cutting-edge research papers from the 6th International Conference on Research into Design (ICoRD 2017) – the largest in India in this area – written by eminent researchers from across the world on design process, technologies, methods and tools, and their impact on innovation, for supporting design for communities. While design traditionally focused on the development of products for the individual, the emerging consensus on working towards a more sustainable world demands greater attention to designing for and with communities, so as to promote their sustenance and harmony - within each community and across communities. The special features of the book are the insights into the product and system innovation process, and the host of methods and tools from all major areas of design

research for the enhancement of the innovation process. The main benefit of the book for researchers in various areas of design and innovation are access to the latest quality research in this area, with the largest collection of research from India. For practitioners and educators, it is exposure to an empirically validated suite of theories, models, methods and tools that can be taught and practiced for design-led innovation. The contents of this volume will be of use to researchers and professionals working in the areas on industrial design, manufacturing, consumer goods, and industrial management.

This volume includes select papers presented during the 4th International and 19th National Conference on Machines and Mechanism (iNaCoMM 2019), held in Indian Institute of Technology, Mandi. It presents research on various aspects of design and analysis of machines and mechanisms by academic and industry researchers.

The book contains Optimization of Multi response of Turning Process Parameters by Using Tool Inserts, now a days mostly used optimization technique which is better than single response optimizing technique because all the output is affected at a time by all the input factors. The objective of this book is to determine the optimal setting of cutting parameters speed (N)m/min, depth of cut(d) mm, feed(f)mm/rev, Nose Radius(r)mm, variation amplitude(mm/sec²), vibration frequency(kHz) in Cutting tool inserts to minimize surface roughness (Ra) and to increase the Tool life. In this book the experiment has been carried out on CNC (SPINNER 15) lathe in dry, Wet and MQL (Minimum Quantity Lubrication) cutting Condition turning of a commercially used EN 24 grade steel as a work material and carbide insert tool (CNMG120408 CNMG120412). This book highlights use of Taguchi experiment design to optimize the multi response parameters on turning operation. For this experiment Taguchi design of experiment was carried out to collect the data for surface roughness and tool vibration. The results indicate the optimum values of the input factors and the results are conformed by a confirmatory test. This book describes use and steps of Taguchi design of experiments and orthogonal array to find a specific range and combinations of turning parameters like cutting speed, feed rate and depth of cut, Nose Radius and Cutting condition to achieve optimal values of response variables like surface roughness, tool life, material removal rate in turning of Split Bush of EN24 Material.

Mechanics of Materials in Modern Manufacturing Methods and Processing Techniques provides a detailed overview of the latest developments in the mechanics of modern metal forming manufacturing. Focused on mechanics as opposed to process, it looks at the mechanical behavior of materials exposed to loading and environmental conditions related to modern manufacturing processes, covering deformation as well as damage and fracture processes. The book progresses from forming to machining and surface-treatment processes, and concludes with a series of chapters looking at recent and emerging technologies. Other topics covered include simulations in autofrettage processes, modeling strategies related to cutting simulations, residual stress caused by high thermomechanical gradients and pultrusion, as well as the mechanics of the curing process, forging, and cold spraying, among others. Some non-metallic materials, such as ceramics and composites, are covered as well.

Synthesizes the latest research in the mechanics of modern metal forming processes
Suggests theoretical models and numerical codes to predict mechanical responses
Covers mechanics of shot peening, pultrusion, hydroforming, magnetic pulse forming
Considers applicability of different materials and processes for optimum performance

This book reports on topics at the interface between manufacturing and materials engineering, with a special emphasis on design and simulation issues. Specifically, it covers the development of CAx technologies for product design, the implementation of smart manufacturing systems and Industry 4.0 strategies, topics in technological assurance, numerical simulation and experimental studies on cutting, milling, grinding, pressing and profiling processes, as well as the development and implementation of new advanced

materials. Based on the 3rd International Conference on Design, Simulation, Manufacturing: The Innovation Exchange (DSMIE-2020), held on June 9-12, 2020 in Kharkiv, Ukraine, this first volume in a two-volume set provides academics and professionals with extensive information on the latest trends, technologies, challenges and practice-oriented lessons learned in the above-mentioned areas.

The two volumes IFIP AICT 459 and 460 constitute the refereed proceedings of the International IFIP WG 5.7 Conference on Advances in Production Management Systems, APMS 2015, held in Tokyo, Japan, in September 2015. The 163 revised full papers were carefully reviewed and selected from 185 submissions. They are organized in the following topical sections: collaborative networks; globalization and production management; knowledge based production management; project management, engineering management, and quality management; sustainability and production management; co-creating sustainable business processes and ecosystems; open cloud computing architecture for smart manufacturing and cyber physical production systems; the practitioner's view on "innovative production management towards sustainable growth"; the role of additive manufacturing in value chain reconfiguration and sustainability; operations management in engineer-to-order manufacturing; lean production; sustainable system design for green products; cloud-based manufacturing; ontology-aided production - towards open and knowledge-driven planning and control; product-service lifecycle management: knowledge-driven innovation and social implications; and service engineering.

This book reports on cutting-edge research in the broad fields of mechanical engineering and mechanics. It describes innovative applications and research findings in applied and fluid mechanics, design and manufacturing, thermal science and materials. A number of industrially relevant recent advances are also highlighted. All papers were carefully selected from contributions presented at the International Conference on Advances in Mechanical Engineering and Mechanics, ICAMEM2019, held on December 16–18, 2019, in Hammamet, Tunisia, and organized by the Laboratory of Electromechanical Systems (LASEM) at the National School of Engineers of Sfax (ENIS) and the Tunisian Scientific Society (TSS), in collaboration with a number of higher education and research institutions in and outside Tunisia.

This book covers a variety of topics in mechanics, with a special emphasis on material mechanics. It reports on fracture mechanics, fatigue of materials, stress-strain behaviours, as well as transferability problems and constraint effects in fracture mechanics. It covers different kind of materials, from metallic materials such as ferritic and austenitic steels, to composites, concrete, polymers and nanomaterials. Additional topics include heat transfer, quality control and reliability of structures and components. Furthermore, the book gives particular attention to new welding technologies such as STIR welding and spray metal coating, and to novel methods for quality control, such as Taguchi design, fault diagnosis and wavelet analysis. Based on the 2015 edition of the Algerian Congress of Mechanics (Congrès Algérien de Mécanique, CAM), the book also covers energetics, in terms of simulation of turbulent reactive flow, behaviour of supersonic jet, turbulent combustion, fire induced smoke layer, and heat and mass transfer, as well as important concepts related to human reliability and safety of components and structures. All in all, the book represents a complete, practice-oriented reference guide for both academic and professionals in the field of mechanics.

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.

Presented here are 73 refereed papers given at the 34th MATADOR Conference held at UMIST in July 2004. The MATADOR series of conferences covers the topics of Manufacturing Automation and Systems Technology, Applications, Design, Organisation and Management, and Research. The 34th proceedings contains original papers contributed by researchers from many countries on different continents. The papers cover both the technological aspect of manufacturing processes; and the systems, business and management features of manufacturing enterprise. The papers in this volume reflect: - the importance of manufacturing to international wealth creation; - the necessity of responsiveness and agility of manufacturing companies to meet market-led requirements and international change; - the role of information technology and electronic communications in the growth of global manufacturing enterprises; - the impact of new technologies, new materials and processes, on the ability to produce goods of higher quality, more quickly, to meet markets needs at a lower cost. Some of the major generic developments which have taken place in these areas since the 33rd MATADOR conference was held in 2000 are reported in this volume.

This book comprises a selection of papers on new methods for analysis and design of hybrid intelligent systems using soft computing techniques from the IFSA 2007 World Congress, held in Cancun, Mexico, June 2007.

This book presents the proceedings of the second Vehicle Engineering and Vehicle Industry conference, reflecting the outcomes of theoretical and practical studies and outlining future development trends in a broad field of automotive research. The conference's main themes included design, manufacturing, economic and educational topics.

Advanced Machining Processes of Metallic Materials updates our knowledge on the metal cutting processes in relation to theory and industrial practice. In particular, many topics reflect recent developments, e.g. modern tool materials, computational machining, computer simulation of various process phenomena, chip control, monitoring of the cutting state, progressive and hybrid machining operations, and generation and modelling of surface integrity. This book addresses the present state and future development of machining technologies. It provides a comprehensive description of metal cutting theory, experimental and modelling techniques along with basic machining processes and their effective use in a wide range of manufacturing applications. Topics covered include fundamental physical phenomena and methods for their evaluation, available technology of machining processes for specific classes of materials and surface integrity. The book also provides strategies for optimization techniques and assessment of machinability. Moreover, it describes topics not currently covered in other sources, such as high performance and multitasking (complete) machining with a high potential for increasing productivity, and virtual and e-machining. The research covered here has contributed to a more generalized vision of machining technology, including not only traditional manufacturing tasks but also new potential (emerging) applications such as micro- and nanotechnology. Many practical examples of modern machining technology Applicable for various technical, engineering and scientific levels

Collects together 20 years of research in the field and related technical information

"This study develops software that provides optimum lathe cutting conditions for specific materials and parameters. This is accomplished by developing a model, based on empirical and analytical relationships, which estimates the optimum cutting conditions, (i.e. spindle speed, feed rate and depth of cut) for a single pass, external turning operation. These parameters are optimized to yield the minimum production cost, while satisfying constraints imposed by workpiece specifications and equipment limitations. The equipment limitations considered include the available machine power, maximum workholding force of the lathe, range of spindle speeds, feed rates for the lathe and tool, and the range of depth of cut of the tool. The workpiece constraints are the surface finish specification for the part and the maximum allowable deflection of the part at each cross section. The effects of each of these limitations are discussed. The developed analytical model introduces manufacturing economics, along with the above constraints, into a decision making process which heretofore relied primarily on the lathe operator's experience and standard handbooks. Typically, the determination of the metal cutting conditions is based on the machinist's experience. This method of specifying cutting conditions tends to emphasize the requirements of the workpiece specifications - i.e. surface finish and dimensional tolerances - excluding economic considerations. On the other hand, a pure rate of production analysis would maximize the ratio of actual cutting time to total machining time without considering workpiece specifications or the implications of operating the equipment at the maximum production rate. While minimizing the production time generally reduces production costs, there is a trade off to be considered. A higher production rate requires an increase in spindle speed or tool feedrate resulting in a decreased tool life. This reduction in tool life adds the associated costs of additional tools and tool changing times to the production cost. Hence, it is necessary to find the operating conditions which will minimize cost while considering all aspects of the manufacturing process. With the increasing usage of CNC lathes which involve large capital expenditures, the use of an economic analysis combined with technical considerations becomes imperative for minimizing the overall production cost. Further, an effective optimization procedure allows low volume runs on many different part numbers with the first part being both cost effective and fit for function. The methodology used to develop the model was based on published literature, experimentation, and several well known and widely accepted equations defining tool-life and tool-workpiece relationships. Through the use of a statistically designed experiment, data was obtained and a set of equations was determined to estimate the cutting forces generated in the turning operation. The data compared favorably with the published equations for calculating cutting forces which were used in this model. The parameters for this experiment, which was conducted on an instrumented lathe at Rensselaer Polytechnic Institute, were feed rate and depth of cut. An additional experiment was conducted to determine the tool life corresponding to the maximum allowable tool flank wear for several feed rates. These values are unique for a tool-workpiece material combination. For the purpose of applying the model, the experimentation was restricted to the use of a carbide coated tool insert and a free machining stainless steel, AISI 416. The work was based on the actual needs and production tooling of a major company. The determination of the empirical constants for other tool-workpiece material combinations would extend the model's application. The optimization procedure is incorporated into a computer program to calculate the economical machining parameters in a finishing operation."--Abstract.

Issues in Technology Theory, Research, and Application: 2013 Edition is a ScholarlyEditions™ book that delivers timely, authoritative, and comprehensive information about Ocean Technology. The editors have built Issues in Technology Theory, Research, and Application: 2013 Edition on the vast information databases of ScholarlyNews.™ You can expect the information about Ocean Technology in this book to be deeper than what you can access

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This book gathers selected papers presented at the Second International Conference on Intelligent Manufacturing and Automation (ICIMA 2020), which was jointly organized by the Departments of Mechanical Engineering and Production Engineering at Dwarkadas J. Sanghvi College of Engineering (DJSCE), Mumbai, and by the Indian Society of Manufacturing Engineers (ISME). Covering a range of topics in intelligent manufacturing, automation, advanced materials and design, it focuses on the latest advances in e.g.

CAD/CAM/CAE/CIM/FMS in manufacturing, artificial intelligence in manufacturing, IoT in manufacturing, product design & development, DFM/DFA/FMEA, MEMS & nanotechnology, rapid prototyping, computational techniques, nano- & micro-machining, sustainable manufacturing, industrial engineering, manufacturing process management, modelling & optimization techniques, CRM, MRP & ERP, green, lean & agile manufacturing, logistics & supply chain management, quality assurance & environmental protection, advanced material processing & characterization of composite & smart materials. The book is intended as a reference guide for future researchers, and as a valuable resource for students in graduate and doctoral programmes.

Fuzzy logic techniques have had extraordinary growth in various engineering systems. The developments in engineering sciences have caused apprehension in modern years due to high-tech industrial processes with ever-increasing levels of complexity. *Advanced Fuzzy Logic Approaches in Engineering Science* provides innovative insights into a comprehensive range of soft fuzzy logic techniques applied in various fields of engineering problems like fuzzy sets theory, adaptive neuro fuzzy inference system, and hybrid fuzzy logic genetic algorithms belief networks in industrial and engineering settings. The content within this publication represents the work of particle swarms, fuzzy computing, and rough sets. It is a vital reference source for engineers, research scientists, academicians, and graduate-level students seeking coverage on topics centered on the applications of fuzzy logic in high-tech industrial processes.

This collection of papers, presented at the 11th International Conference on Precision Engineering, offers a broader global perspective on the challenges and opportunities ahead. The discussion encompasses leading-edge technologies and forecasts future trends.

Coverage includes advanced manufacturing systems; ultra-precision- and micro-machining; nanotechnology for fabrication and measurement; rapid prototyping and production technology; new materials and advanced processes; computer-aided production engineering; manufacturing process control; production planning and scheduling, and much more.

Economic selection of cutting conditions is an important task in the field of machining. The main problem faced in optimization of cutting conditions is that once selected the optimum cutting conditions do not remain optimum throughout the complete machining operation. This is due to the dynamic variations in the process parameters upon which the decision of optimization depends. So, there is a need to update the optimum cutting conditions continuously throughout the entire machining operation. To achieve this task the tool flank wear is measured by conducting experiments on lathe machine. The data values obtained from experiments are used to develop an equation for tool wear as function of speed, feed and time using Response Surface Methodology. This equation is used in simulation of multi objective optimization of turning operation

This book comprises select peer-reviewed papers presented at the International Conference

on Advanced Engineering Optimization Through Intelligent Techniques (AEOTIT) 2018. The book combines contributions from academics and industry professionals, and covers advanced optimization techniques across all major engineering disciplines like mechanical, manufacturing, civil, automobile, electrical, chemical, computer and electronics engineering. Different optimization techniques and algorithms such as genetic algorithm (GA), differential evolution (DE), simulated annealing (SA), particle swarm optimization (PSO), artificial bee colony (ABC) algorithm, artificial immune algorithm (AIA), teaching-learning-based optimization (TLBO) algorithm and many other latest meta-heuristic techniques and their applications are discussed. This book will serve as a valuable reference for students, researchers and practitioners and help them in solving a wide range of optimization problems.

This book offers recommendations on the milling processes for the carbon fiber reinforced plastic CFRP/Al2024. Due to the anisotropic and non-homogeneous structure of CFRP and the ductile nature of aluminum, the machining of this material is very challenging and causes various types of damage, such as matrix cracking and thermal alterations, fiber pullout and fuzzing during drilling and trimming, which affect the quality of machined surface. The book studies and models the machined surface quality of CFRP/Al2024 using a two-level full factorial design experiment. It describes the processes of trimming using down milling, and statistically and graphically analyzes the influence and interaction of cutting parameters. Lastly, the book presents the optimization of the cutting parameters in order to create a surface texture quality of CFRP/Al2024 to less than 1 μm .

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.

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