Optimization Of Turning Parameters Using Taguchi Method


Optimization and Analysis of Surface Roughness in CNC Turning Inconel 718 using Taguchi’s and ANOVA analysis 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.

Engineering Properties of Magnesium Alloys As per present manufacturing scenario, focus of all manufacturing organizations is to produce good quality product with a minimum cost. CNC turning process is the most common machining process that is used in now days. Present work has been done to optimize the machining parameters for material AL 6061 like depth of cut, feed rate and cutting speed. As per the requirements of the manufacturing sector there is huge application of AL6061. Therefore it becomes necessary to optimize the various machining parameters of AL6061. In present work CNC Turning parameters has been optimized for AL 6061 using Response surface Method (RSM). Initially after selecting the parameters and their levels individually a RSM matrix has been prepared. After words experiments were performed as per RSM matrix. Material removal rate and surface roughness was recorded as per the defined set of experiments of matrix. Afterwards significance of individual parameters like Speed, feed and depth of cut has been noticed at 95% confidence level by applying regression tests. Further the optimized results have been verified using One Way ANOVA. MINITAB 16 software is used for the formulating the matrix and for the analysis of regression and response surface methodology.

Proceedings of ICDMC 2019 This two-volume book presents outcomes of the 7th International Conference on Soft Computing for Problem Solving, SocProS 2017. This conference is a joint technical collaboration between the Soft Computing Research Society, Liverpool Hope University (UK), the Indian Institute of Technology Roorkee, the South Asian University New Delhi and the National Institute of Technology Silchar, and brings together researchers, engineers and practitioners to discuss thought-provoking developments and challenges in order to select potential future directions. The book presents the latest advances and innovations in the interdisciplinary areas of soft computing, including original research papers in the areas including, but not limited to, algorithms (artificial immune systems, artificial neural networks, genetic algorithms, genetic programming, and particle swarm optimization) and applications (control systems, data mining and clustering, finance, weather forecasting, game theory, business and forecasting applications). It is a valuable resource for both young and experienced researchers dealing with complex and intricate real-world problems for which finding a solution by traditional methods is a difficult task.

Optimization of Turning Parameters Using Ant Colony Optimization 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. Techno-Societal 2020 This book comprises peer-reviewed contributions from the International Conference on Production and Industrial Engineering (CPIE) 2019. This volume provides insights into the current scenario and advances in the domain of industrial and production engineering in the context of optimum value. Optimization and its applicability in various areas of production and industrial engineering like selection of designing parameters and machining parameters, decisions related to conditions of optimum process/operation parameters, behavior of response variables, facilities planning and management.
transportation and supply chain management, quality engineering, reliability and maintenance, product design and development, human factors and ergonomics, service system and service management, waste management, sustainable manufacturing and operations, systems design, and performance measurement are discussed in the book. Given the range of topics covered, this book can be useful for students, researchers, and professionals interested in latest optimization techniques related to industrial and production engineering.

Design of Experiments in Production Engineering This book presents select peer-reviewed proceedings of the International Conference on Advances in Mechanical Engineering (ICAME 2020). The contents cover latest research in several areas such as advanced energy sources, automation, mechatronics and robotics, automobiles, biomedical engineering, CAD/CAM, CFD, advanced engineering materials, mechanical design, heat and mass transfer, manufacturing and production processes, tribology and wear, surface engineering, ergonomics and human factors, artificial intelligence, and supply chain management. The book brings together advancements happening in the different domains of mechanical engineering, and hence, this will be useful for students and researchers working in mechanical engineering.

Advances in Mechanical and Materials Technology In this thesis, Artificial Neural Network (ANN) technique is used to model and simulate the Turning Process. Significant machining parameters (i.e. spindle speed, feed rate, and, depths of cut) and process parameters (surface roughness and cutting forces) are considered. It is shown that Multi-Layer Back Propagation Neural Network is capable to perform this particular task. Design of Experiments approach is used for efficient selection of values of parameters used during experiments to reduce cost and time for experiments. The Particle Swarm Optimization methodology is used for constrained optimization of machining parameters to minimize surface roughness as well as cutting forces. ANN and Particle Swarm Optimization, two computational intelligence techniques when combined together, provide efficient computational strategy for finding optimum solutions. The proposed method is capable of handling multiple parameter optimization problems for processes that have non-linear relationship between input and output parameters e.g. milling, drilling etc. In addition, this methodology provides reliable, fast and efficient tool that can provide suitable solution to many problems faced by manufacturing industry today.

Optimization of Cnc Turning Parameters for Al-6061 Using Response Surface Methodology 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 1–2, 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 micromechatronics, 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.

AI Based Modelling and Optimization of Turning Process Genetic algorithms have been used in science and engineering as adaptive algorithms for solving practical problems and as computational models of natural evolutionary systems. This brief, accessible introduction describes some of the most interesting research in the field and also enables readers to implement and experiment with genetic algorithms on their own. It focuses in depth on a small set of important and interesting topics—particularly in machine learning, scientific modeling, and artificial life—and reviews a broad span of research, including the work of Mitchell and her colleagues. The descriptions of applications and modeling projects stretch beyond the strict boundaries of computer science to include dynamical systems theory, game theory, molecular biology, ecology, evolutionary biology, and population genetics, underscoring the exciting "general purpose" nature of genetic algorithms as search methods that can be employed across disciplines. An Introduction to Genetic Algorithms is accessible to students and researchers in any scientific discipline. It includes many thought and computer exercises that build on and reinforce the reader's understanding of the text. The first chapter introduces genetic algorithms and their terminology and describes two provocative applications in detail. The second and third chapters look at the use of genetic algorithms in machine learning (computer programs, data analysis and prediction, neural networks) and in scientific models (interactions among learning, evolution, and culture; sexual selection; ecosystems; evolutionary activity). Several approaches to the theory of genetic algorithms are discussed in depth in the fourth chapter. The fifth chapter takes up implementation, and the last chapter poses some currently unanswered questions and surveys prospects for the future of evolutionary computation.

Optimization of Machining Parameters in Multi-pass Turning and Milling Operations 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 a valuable text for undergraduate and postgraduate students 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
Optimization of Turning Parameters Using Genetic Algorithm Method

This project proposed a new optimization technique based on the ant colony algorithm for solving single-pass turning optimization problems. The cutting process has focus on roughing stages. There are enough handbooks to provide recommended cutting parameters and not consider the economic aspects of machining. The cost of machining on these machines is sensitive to the machining variable. The project objectives are to develop Ant Colony Optimization (ACO) algorithm for CNC turning process and to optimize turning parameters for minimized production cost per unit. Method used for this project is Ant Colony Optimization. This method consists of many steps will elaborate detail in this thesis. The machining parameters are determined by minimized production cost per unit, subject to various practical machining constraints. The results indicate that the proposed ant colony framework is effective to optimized turning parameter. Lastly, ACO algorithm was successfully optimize depth of cut, cutting speed, feed rate and minimized production cost per unit.

Advances in Manufacturing Technology

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 cutting 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.

Optimization for Engineering Problems

This book gathers selected high-quality research papers presented at the International Conference on Advances in Systems, Control and Computing (AISC2020), held at MNIT Jaipur during February 27–28, 2020. The first part is advances in systems and it is dedicated to applications of the artificial neural networks, evolutionary computation, swarm intelligence, artificial immune systems, fuzzy system, autonomous and multi-agent systems, machine learning, other intelligent systems and related areas. In the second part, machine learning and other intelligent algorithms for design of control/control analysis are covered. The last part covers advancements, modifications, improvements and applications of intelligent algorithms.

Machining—Recent Advances, Applications and Challenges

This book presents selected peer-reviewed papers from the International Conference on Mechanical and Energy Technologies, which was held on 7–8 November 2019 at Galgotias College of Engineering and Technology, Greater Noida, India. The book reports on the latest developments in the field of mechanical and energy technology in contributions prepared by experts from academia and industry. The broad range of topics covered includes aerodynamics and fluid mechanics, artificial intelligence and nanomanufacturing technologies, rapid manufacturing technologies and prototyping, remanufacturing, renewable energies technologies, metrology and computer-aided inspection, etc. Accordingly, the book offers a valuable resource for researchers in various fields, especially mechanical and industrial engineering, and energy technologies.

Advances in Engineering Research and Application

This book, divided in two volumes, originates from Techno-Societal 2020: the 3rd International Conference on Advanced Technologies for Societal Applications, Maharashtra, India, that brings together faculty members of various engineering colleges to solve Indian regional relevant problems under the guidance of eminent researchers from various reputed organizations. The focus of this volume is on technologies that help develop and improve society, in particular on issues such as sensor and ICT based technologies for the betterment of people, Technologies for agriculture and healthcare, micro and nano technological applications. This conference aims to help innovators to share their best practices or products developed to solve specific local problems which in turn may help the other researchers to take inspiration to solve problems in their region. On the other hand, technologies proposed by expert researchers may find applications in different regions. This offers a multidisciplinary platform for researchers from a broad range of disciplines of Science, Engineering and Technology for reporting innovations at different levels.

Design and Optimization of Mechanical Engineering Products

This book presents selected peer-reviewed papers presented at the International Conference on Innovative Technologies in Mechanical Engineering (ITME) 2019. The book discusses a wide range of topics in mechanical engineering such as mechanical systems, materials engineering, micro-machining, renewable energy, systems engineering, thermal engineering, additive manufacturing, automotive technologies, rapid prototyping, computer aided design and manufacturing. This book, in addition to assisting students and researchers working in various areas of mechanical engineering, can also be useful to researchers and professionals working in various allied and interdisciplinary fields.

Advanced Multiresponse Process Optimisation

This book gathers high-quality papers presented at International Conference on Science, Technology and Innovation for Society (CITIS 2021), held in Guayaquil, Ecuador, on May 26–28, 2021. This book will present the recent research trends in the fields
of software engineering, big data analysis, cloud computing, data engineering, data management and data mining, machine learning, deep learning, artificial intelligence, smart systems, robotics and automation, mechatronic design, and industrial processes design.

Proceedings of International Conference in Mechanical and Energy Technology The Special Issue Machining—Recent Advances, Applications and Challenges is intended as a humble collection of some of the hottest topics in machining. The manufacturing industry is a varying and challenging environment where new advances emerge from one day to another. In recent years, new manufacturing procedures have retained increasing attention from the industrial and scientific community. However, machining still remains the key operation to achieve high productivity and precision for high-added value parts. Continuous research is performed, and new ideas are constantly considered. This Special Issue summarizes selected high-quality papers which were submitted, peer-reviewed, and recommended by experts. It covers some (but not only) of the following topics: High performance operations for difficult-to-cut alloys, wrought and cast materials, light alloys, ceramics, etc.; Cutting tools, grades, substrates and coatings. Wear damage: Advanced cooling in machining: Minimum quantity of lubricant, dry or cryogenics; Modelling, focused on the reduction of risks, the process outcome, and to maintain surface integrity; Vibration problems in machines: Active and passive/predictive methods, sources, diagnosis and avoidance; Influence of machining in new concepts of machine-tool, and machine static and dynamic behaviors; Machinability of new composites, brittle and emerging materials; Assisted machining processes by high-pressure, laser, US, and others; Introduction of new analytics and decision making into machining programming. We wish to thank the reviewers and staff from Materials for their comments, advice, suggestions and invaluable support during the development of this Special Issue.

Advances in Mechanical Engineering

Recent Advances in Mechanical Engineering This book comprises select proceedings of the International Conference on Design, Materials, Cryogenics and Constructions (ICDMC 2019). The chapters cover latest research in different areas of mechanical engineering such as additive manufacturing, automation in industry and agriculture, combustion and emission control, CFD, finite element analysis, and engineering design. The book focuses on emerging systems and low-temperature materials for cost-effective and energy-efficient solutions to current challenges in the manufacturing sector. Given its contents, the book can be useful for students, academics, and practitioners.

Optimization of Machining Parameters for Product Quality and Productivity in Turning Process of Aluminum This book consists of peer-reviewed proceedings from the International Conference on Innovations in Mechanical Engineering (ICIME 2020). The contents cover latest research in all major areas of mechanical engineering, and are broadly divided into five parts: (i) thermal engineering, (ii) design and optimization, (iii) production and industrial engineering, (iv) materials science and metallurgy, and (v) multidisciplinary topics. Different aspects of designing, modeling, manufacturing, optimizing, and processing are discussed in the context of emerging applications. Given the range of topics covered, this book can be useful for students, researchers as well as professionals.

Deep Learning and Neural Networks: Concepts, Methodologies, Tools, and Applications This book provides energy efficiency quantitative analysis and optimal methods for discrete manufacturing systems from the perspective of global optimization. In order to analyze and optimize energy efficiency for discrete manufacturing systems, it uses real-time access to energy consumption information and models of the energy consumption, and constructs an energy efficiency quantitative index system. Based on the rough set and analytic hierarchy process, it also proposes a principal component quantitative analysis and a combined energy efficiency quantitative analysis. In turn, the book addresses the design and development of quantitative analysis systems. To save energy consumption on the basis of energy efficiency analysis, it presents several optimal control strategies, including one for single-machine equipment, an integrated approach based on RWA-MOPSO, and one for production energy efficiency based on a teaching and learning optimal algorithm. Given its scope, the book offers a valuable guide for students, teachers, engineers and researchers in the field of discrete manufacturing systems.

An Introduction to Genetic Algorithms Research Paper (postgraduate) from the year 2015 in the subject Materials Science, , course: Mechanical, language: English, abstract: The purport of this experimentation was to fixate on the analysis of optimum cutting conditions to get the minimum surface roughness in CNC turning of Inconel 718 alloy steel by Taguchi method. The nine experiments were designed by utilizing Minitab17 software. In this research work all the tribulations were conducted at a constant spindle speed (2800 RPM) and in a dry environment. The results were analyzed utilizing analysis of variance (ANOVA) method. Taguchi method has shown that cutting speed has a consequential role to play in engendering lower surface roughness followed by alimnet rate. The vibrations of the implement wear, implement life are the other factors which may contribute poor surface roughness to the results and such factors ignored in analyses. The results obtained by this research work may be subsidiary for other researcher for further study for other replications such as implement vibration, implement wear, implement life, cutting forces etc.

Recent Advances in Mechanical Engineering All machining process are dependent on a number of inherent process parameters. It is of 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 gene expression 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
metaheuristics-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.

Intelligent Manufacturing and Mechatronics

Data-Driven Optimization of Manufacturing Processes This book presents an intelligent, integrated,
problem-independent method for multiresponse process optimization. In contrast to traditional
approaches, the idea of this method is to provide a unique model for the optimization of various
processes, without imposition of assumptions relating to the type of process, the type and number of
process parameters and responses, or interdependences among them. The presented method for experimental
design of processes with multiple correlated responses is composed of three modules: an expert system
that selects the experimental plan based on the orthogonal arrays; the factor effects approach, which
performs processing of experimental data based on Taguchi's quality loss function and multivariate
statistical methods; and process modeling and optimization based on artificial neural networks and
metaheuristic optimization algorithms. The implementation is demonstrated using four case studies
relating to high-tech industries and advanced, non-conventional processes.

Quantitative Analysis and Optimal Control of Energy Efficiency in Discrete Manufacturing System

This book comprises select papers presented at the International Conference on Latest Innovations in
Materials Engineering and Technology (ICLIEET 2018). The book focuses on diverse
engineering materials, their design and applications. The materials in discussion include those related
to coatings, polymers, composites, tribology, acoustic insulators, lubricants, and cryogenics. The book
also highlights emerging nano and micro materials, bio engineering materials, as well as new energy
materials for solar cells and photovoltaic cells. This book will serve as an useful reference for
students, researchers, and professionals working in the field of materials science and engineering.

Applications of Advanced Computing in Systems

This book presents select papers from the International Conference on Advances in Manufacturing
Technology (ICAMT 2018). It includes contributions from different researchers and practitioners working
in the field of advanced manufacturing technology. This book covers diverse topics of contemporary
manufacturing technology including material processes, machine tools, cutting tools, robotics and
automation, manufacturing systems, optimization technologies, 3D scanning and re-engineering, and 3D
printing. Computer applications in design, analysis, and simulation tools for solving manufacturing
problems at various levels starting from material designs to complex manufacturing systems are also
discussed. This book will be useful for students, researchers, and practitioners working in the field of
manufacturing technology.

Soft Computing for Problem Solving Optimization is central to any problem involving decision-making in
engineering. Optimization theory and methods deal with selecting the best option regarding the given
objective function or performance index. New algorithmic and theoretical techniques have been developed
for this purpose, and have rapidly diffused into other disciplines. As a result, our knowledge of all
aspects of the field has grown even more profound. In Optimization for Engineering Problems, eminent
researchers in the field present the latest knowledge and techniques on the subject of optimization in
engineering. Whereas the majority of work in this area focuses on other applications, this book applies
advanced and algorithm-based optimization techniques specifically to problems in engineering.

Applications of Advanced Computing in Systems This book presents select papers from the International
the three core areas of energy, material sciences and mechanical engineering. The topics covered include non-
conventional energy resources, energy harvesting, polymers, composites, 2D materials, systems
engineering, materials engineering, micro-machining, renewable energy, industrial engineering and
additive manufacturing. This book will be useful to researchers and professionals working in the areas of
mechanical and industrial engineering, materials applications, and energy technology.

Optimization of Turning Process Magnesium and magnesium alloys provide unique properties for engineering
applications. Magnesium alloys are popular as a structural material because of their combination of
light weight and strength. They are desirable for portable tools, appliances, electronic devices,
airplanes, space vehicles, and land transportation. This book is written for engineers, scientists,
teachers, and students engaged in the design process of material selection and material elimination.
While focused on mechanical properties for structural design, the physical properties that are germane
to corrosion behavior and electrical applications are represented. Two-thirds of the book is devoted to
data sheets for individual alloys which provide a handy quick reference to specific properties and
performance. The remainder of the book addresses topics common to all magnesium alloys such as the alloy
designation system and product forms. Casting alloys and wrought alloys are compared. The alloy
performance at elevated temperature is presented, as are fatigue properties. Finally, a summary of the
corrosion behavior of selected alloys is discussed along with how these corrosion mechanisms can be applied for beneficial results.

Optimization of Machining Parameters with Consideration of Tool Adjustment in Turning Operations Due to the growing use of web applications and communication devices, the use of data has increased throughout various industries. It is necessary to develop new techniques for managing data in order to ensure adequate usage. Deep learning, a subset of artificial intelligence and machine learning, has been recognized in various real-world applications such as computer vision, image processing, and pattern recognition. The deep learning approach has opened new opportunities that can make such real-life applications and tasks easier and more efficient. Deep Learning and Neural Networks: Concepts, Methodologies, Tools, and Applications is a vital reference source that trends in data analytics and potential technologies that will facilitate insight in various domains of science, industry, business, and consumer applications. It also explores the latest concepts, algorithms, and techniques of deep learning and training using a range of topics such as natural language processing, predictive analytics, and deep neural networks, this multi-volume book is ideally designed for computer engineers, software developers, IT professionals, academicians, researchers, and upper-level students seeking current research on the latest trends in the field of deep learning.

Recent Advances in Material Sciences This book includes recent theoretical and practical advancements in green composite materials and advanced manufacturing technology. It provides important original and theoretical experimental results which use nonroutine technologies often unfamiliar to some readers and covers novel applications of more familiar experimental techniques and analyses of composite problems. Green Materials and Advanced Manufacturing Technology: Concepts and Applications provides insight and a better understanding into the development of green composite materials and advanced manufacturing technology used in various manufacturing sectors. It highlights recent trends in the fields of green composites, metal matrix composites, ceramic matrix composites, surface modification using laser cladding, types of dust collectors in waste management and recycling in industries, machinability studies of metals and composites using surface grinding, drilling, electrical discharge machining, joining of metals using friction stir welding, shielded metal arc welding, and linear friction welding. This book is written for engineering students, postgraduate students, research scholars, faculty members, and industry professionals who are engaged in green composite materials and development of advanced manufacturing technology.

Recent Trends in Mechanical Engineering This book presents selected peer reviewed papers from the International Conference on Advanced Production and Industrial Engineering (ICAPIE 2019). It covers a wide range of topics and latest research in mechanical systems engineering, materials engineering, micro-machining, renewable energy, industrial and production engineering, and additive manufacturing. Given the range of topics discussed, this book will be useful for students and researchers primarily working in mechanical and industrial engineering, and energy technologies.

Metal Machining This book presents the select proceedings of the International Conference on Recent Advancements in Mechanical Engineering (ICRAME 2020). It provides a comprehensive overview of the various technical challenges faced, their systematic investigation, contemporary developments, and future perspectives in the domain of mechanical engineering. The book covers a wide array of topics including fluid flow techniques, compressible flows, waste management and waste disposal, bio-fuels, renewable energy, cryogenic applications, computing in applied mechanics, product design, dynamics and control of structures, fracture and failure mechanics, solid mechanics, finite element analysis, tribology, nano-mechanics and MEMS, robotics, supply chain management and logistics, intelligent manufacturing system, rapid prototyping and reverse engineering, quality control and reliability, conventional and non-conventional machining, and ergonomics. This book can be useful for students and researchers interested in mechanical engineering and its allied fields.

Advances in Manufacturing and Industrial Engineering Modern production is faced with the challenges in reducing the environmental impacts related to machining processes. Turning process is a manufacturing process widely used with a vast application for creating engineering components. In this context, many studies have been conducted in order to optimize the machining parameters and facilitate the decision-making process. This paper considers the quality of the products (surface finish) and the productivity rate of the turning manufacturing process to be both optimized. Product quality is quantified using surface roughness ($R_a$) and the productivity rate using material removal rate (MRR). We develop a predictive and optimization model by coupling artificial neural networks (ANN) and the Particle Swarm Optimization (PSO), a multi-function optimization technique, as an alternative to predict the model response ($R_a$) first and then search for the optimal value of turning parameters to minimize the surface roughness ($R_a$) and maximize the material removal rate (MRR). To obtain the data, Aluminum is used to perform the turning process experiments, considering the cutting speed, feed rate, depth of cut and nose radius of the cutting tool as our design factors. We used the gathered data to train and develop the ANN model. The results predicted by the proposed models indicate good agreement between the predicted and experimental values, proving that the proposed ANN model is capable of predicting the surface roughness accurately. Then, the optimization model PSO has provided a Pareto Front for the optimal solution, determining the optimum machining parameters for minimum $R_a$ and maximum MRR. This study has application in the real industry where the selection of optimal machining parameters helps to complete and manage conflicting objectives that constitute hurdles in the decision-making of the manufacturing plans.

Teaching Learning Based Optimization Algorithm This book covers design of experiments (DoE) applied in production engineering as a combination of manufacturing technology with applied management science. It presents recent research advances and applications of design experiments in production engineering and
the chapters cover metal cutting tools, soft computing for modelling and optimization of machining, waterjet machining of high performance ceramics, among others.

Green Materials and Advanced Manufacturing Technology The success of any product sold to consumers is based, largely, on the longevity of the product. This concept can be extended by various methods of improvement including optimizing the initial creation structures which can lead to a more desired product and extend the product's time on the market. Design and Optimization of Mechanical Engineering Products is an essential research source that explores the structure and processes used in creating goods and the methods by which these goods are improved in order to continue competitiveness in the consumer market. Featuring coverage on a broad range of topics including modeling and simulation, new product development, and multi-criteria decision making, this publication is targeted toward students, practitioners, researchers, engineers, and academicians.

Optimization Methods in Engineering 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.

Communication, Smart Technologies and Innovation for Society This study about development of optimization for turning parameters based on the Genetic Algorithm (GA). This method was demonstrated for the optimization of machining parameters for turning operation using conventional lathe machines. Currently, everybody has start realizing the importance of this new manufacturing optimization in order to improve the performance and its efficiency. The purpose of this project is to find the optimum parameters values for turning operations that will benefit such as reduces the machining time, improves their quality and productivity and also minimize the unit cost of the product. GA can be used in optimization problems such as scheduling, materials engineering, optimal control, and so forth. This approach has led to the important following discoveries such as GA has robustness, the balance between efficiency and performances for survival in many different environments. The machining parameters that been consider in this thesis are cutting speed, feed rate and depth of cut. The GA simulation are been develop to achieve the objective. The MATLAB software will be use to develop the GA simulation. An example to apply the Genetic Algorithm to the problem has been presented at the end of this paper to give more understanding picture from the application of the system and how its work. The result obtained from this simulation shown GA has a potential for improvements in order to optimize the turning parameters and minimize the unit production cost. The simulation based on Genetic Algorithm are successful develop and the optimum parameters values are obtained from the simulation.

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