

Ultrasonic Welding A Connection Technology For Flexible

This comprehensive handbook gives a fully updated guide to lasers and laser technologies, including the complete range of their technical applications. This third volume covers modern applications in engineering and technology, including all new and updated case studies spanning telecommunications and data storage to medicine, optical measurement, defense and security, nanomaterials processing and characterization. Key Features:

- Offers a complete update of the original, bestselling work, including many brand-new chapters.
- Deepens the introduction to fundamentals, from laser design and fabrication to host matrices for solid-state lasers, energy level diagrams, hosting materials, dopant energy levels, and lasers based on nonlinear effects.
- Covers new laser types, including quantum cascade lasers, silicon-based lasers, titanium sapphire lasers, terahertz lasers, bismuth-doped fiber lasers, and diode-pumped alkali lasers.
- Discusses the latest applications, e.g., lasers in microscopy, high-speed imaging, attosecond metrology, 3D printing, optical atomic clocks, time-resolved spectroscopy, polarization and profile measurements, pulse measurements, and laser-induced fluorescence detection.
- Adds new sections on laser materials processing, laser spectroscopy, lasers in imaging, lasers in environmental sciences, and lasers in communications.

This handbook is the ideal companion for scientists, engineers, and students working with lasers, including those in optics, electrical engineering, physics, chemistry, biomedicine, and other relevant areas.

The 'machines' as we see them today use certain level of technology which is contemporary to today's standards. In garment manufacturing, activities have been mechanized over a

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period of time and mechatronics and electronics are added to enable better productivity, repeatability of output and consistency of quality. In the last one-and-a-half decade, the integration of computer and information technology made the machines capable of generating, storing and transmitting data automatically with added ease of diagnostics and quick repair. The future will likely see these machines support sustainable practices while becoming energyefficient and caring for the environment. The book traces the evolution of technology for different garment manufacturing machinery and equipment and how the gradual improvement of features has supported the users.

This book features papers focusing on the implementation of new and future technologies, which were presented at the International Conference on New Technologies, Development and Application, held at the Academy of Science and Arts of Bosnia and Herzegovina in Sarajevo on 27th–29th June 2019. It covers a wide range of future technologies and technical disciplines, including complex systems such as Industry 4.0; robotics; mechatronics systems; automation; manufacturing; cyber-physical and autonomous systems; sensors; networks; control, energy, automotive and biological systems; vehicular networking and connected vehicles; effectiveness and logistics systems, smart grids, as well as nonlinear, power, social and economic systems. We are currently experiencing the Fourth Industrial Revolution “Industry 4.0”, and its implementation will improve many aspects of human life in all segments, and lead to changes in business paradigms and production models. Further, new business methods are emerging, transforming production systems, transport, delivery, and consumption, which need to be monitored and implemented by every company involved in the global market. Electronics has become the largest industry, surpassing agriculture, auto, and heavy metal

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industries. It has become the industry of choice for a country to prosper, already having given rise to the phenomenal prosperity of Japan, Korea, Singapore, Hong Kong, and Ireland among others. At the current growth rate, total worldwide semiconductor sales will reach \$300B by the year 2000. The key electronic technologies responsible for the growth of the industry include semiconductors, the packaging of semiconductors for systems use in auto, telecom, computer, consumer, aerospace, and medical industries, displays, magnetic, and optical storage as well as software and system technologies. There has been a paradigm shift, however, in these technologies, from mainframe and supercomputer applications at any cost, to consumer applications at approximately one-tenth the cost and size. Personal computers are a good example, going from \$500/MIP when products were first introduced in 1981, to a projected \$100/MIP within 10 years. Thin, light portable, user friendly and very low-cost are, therefore, the attributes of tomorrow's computing and communications systems. Electronic packaging is defined as interconnection, powering, cooling, and protecting semiconductor chips for reliable systems. It is a key enabling technology achieving the requirements for reducing the size and cost at the system and product level.

This book provides details and collective information on working principle, process mechanism, salient features, and unique applications of various advanced manufacturing techniques and processes belong. The book is divided in three sessions covering modern machining methods, advanced repair and joining techniques and, finally, sustainable manufacturing. The latest trends and research aspects of those fields are highlighted.

Selected, peer reviewed papers from the 2013 International Conference on Mechatronics and Intelligent Materials (MIM 2013), May 18-19, 2013, XiShuangBanNa, China

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A comprehensive reference on the properties, selection, processing, and applications of the most widely used nonmetallic engineering materials. Section 1, General Information and Data, contains information applicable both to polymers and to ceramics and glasses. It includes an illustrated glossary, a collection of engineering tables and data, and a guide to materials selection. Sections 2 through 7 focus on polymeric materials--plastics, elastomers, polymer-matrix composites, adhesives, and sealants--with the information largely updated and expanded from the first three volumes of the Engineered Materials Handbook. Ceramics and glasses are covered in Sections 8 through 12, also with updated and expanded information. Annotation copyright by Book News, Inc., Portland, OR

Abstract: Ultrasonic metal welding is an energy-efficient, fast and clean joining technology without the need of additional filler materials. Single spot ultrasonic metal welding of aluminum to steel sheets using automotive materials has already been investigated. Up to now, further studies to close the gap to application-relevant multi-metal structures with multiple weld spots generated are still missed. In this work, two different spot arrangements are presented, each consisting of two weld spots, joined 0.9 mm thick sheets of wrought aluminum alloy AA6005A-T4 with 1 mm sheets of galvanized (galvanized and annealed) dual-phase steel HCT980X. An anvil equipped with variable additional clamping punches was used for the first time. The tensile shear forces reached 4076 ± 277 N for parallel connection and 3888 ± 308 N for series connection. Temperature measurements by thermocouples at the interface and through thermal imaging presented peak temperatures above 400 °C at the multi-metal interface. Microscopic investigations of fractured surfaces identified the Zn layer of the steel sheets as the strength-limiting factor. Energy-dispersive X-ray spectroscopy (EDX) indicated intermetallic

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phases of Fe and Zn in the border areas of the weld spots as well as the separation of the zinc layer from the steel within these areas

Advanced Welding and Deforming explains the background theory, working principles, technical specifications, and latest developments on a wide range of advanced welding-joining and deforming techniques. The book's subject matter covers manufacturing, with chapters specifically addressing remanufacturing and 3D printing applications. Drawing on experts in both academia and industry, coverage addresses theoretical developments as well as practical improvements from R&D. By presenting over 35 important processes, from plasma arc welding to nano-joining and hybrid friction stir welding, this is the most complete guide to this field available. This unique guide will allow readers to compare the characteristics of different processes, understand how they work, and create parameters for their effective implementation. As part of a 4 volume set entitled Handbooks in Advanced Manufacturing, this series also includes volumes on Advanced Machining and Finishing, Additive Manufacturing and Surface Treatment, and Sustainable Manufacturing Processes. Provides theory, operational parameters, and the latest developments in over 35 different processes Addresses new welding technologies such as additive manufacturing using wire and arc, as well as the latest developments in more traditional applications Introduces basic concepts in welding, joining and deformation in three introductory chapters, thus helping readers with a range of backgrounds engage with the subject matter

Lead-Acid Battery Technologies: Fundamentals, Materials, and Applications offers a systematic and state-of-the-art overview of the materials, system design, and related issues for the development of lead-acid rechargeable battery technologies. Featuring contributions from

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leading scientists and engineers in industry and academia, this book: Describes the underlying science involved in the operation of lead-acid batteries Highlights advances in materials science and engineering for materials fabrication Delivers a detailed discussion of the mathematical modeling of lead-acid batteries Analyzes the integration of lead-acid batteries with other primary power systems Explores emerging applications such as electric bicycles and microhybrid vehicles Lead-Acid Battery Technologies: Fundamentals, Materials, and Applications provides researchers, students, industrial professionals, and manufacturers with valuable insight into the latest theories, experimental methodologies, and research achievements in lead-acid battery technologies.

Advanced Joining Processes: Welding, Plastic Deformation, and Adhesion brings together a range of advanced thermal, mechanical, and chemical methods of joining, offering an up-to-date resource for those looking to understand and utilize the very latest techniques. Efficient joining techniques are critical to a range of innovative applications, with technology in constant development. The first section of the book provides in-depth information on advanced welding techniques, including friction stir, explosive, ultrasonic, laser, electron beam, and computational weld analysis and fatigue of structures. The second section highlights key developments in joining by plastic deformation, adhesive bonding, and hybrid joining. The coverage of each technique is supported by practical guidance, detailed analysis, and finite element simulations. This is an essential reference for researchers and advanced students in joining, welding, adhesion, materials processing, mechanical engineering, plastics engineering, manufacturing, civil engineering, and automotive/aerospace engineering, as well as engineers, scientists, and R&D professionals, using joining, welding, and adhesion methods, across a

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range of industries. Presents the latest research findings and developments across welding, joining by plastic deformation, and adhesion Includes state-of-the-art methods, such as laser, ultrasonic and electron beam welding, hybrid joining, and the use of electromagnetic pulses Offers practical guidance, detailed analysis, and finite element simulations, for all techniques covered

This book will focus on lignocellulosic fibres as a raw material for several applications. It will start with wood chemistry and morphology. Then, some fibre isolation processes will be given, before moving to composites, panel and paper manufacturing, characterization and aging. Lists citations with abstracts for aerospace related reports obtained from world wide sources and announces documents that have recently been entered into the NASA Scientific and Technical Information Database.

Joining Technologies for Composites and Dissimilar Materials, Volume 10 of the Proceedings of the 2016 SEM Annual Conference & Exposition on Experimental and Applied Mechanics, the tenth volume of ten from the Conference, brings together contributions to this important area of research and engineering. The collection presents early findings and case studies on a wide range of areas, including: Composite Joints Non-Adhesive Bonding Adhesive Bonding Joining of Ceramic & Other Materials

Joining and welding are two of the most important processes in manufacturing. These technologies have vastly improved and are now extensively used in numerous industries. This book covers a wide range of topics, from arc welding (GMAW and GTAW), FSW, laser and hybrid welding, and magnetic pulse welding on metal joining to

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the application of joining technologies for textile products. The analysis of temperature and phase transformation is also incorporated. This book also discusses the issue of dissimilar joint between metal and ceramic, as well as the technology of diffusion bonding.

This is the third work in a series of monographs* written by a collective group of authors and is devoted to the physical mechanisms of specific ultrasonic technological processes that have already come into general use, as well as those which have just begun to enjoy practical applications. The problems covered in the book are exceedingly important insofar as the understanding of the physical mechanisms of ultrasonic processes forms the solitary basis of an intelligent approach to the design of industrial equipment and proper choice of optimum working conditions. The purely empirical approach to the solution of these problems does not afford satisfactory results, because the state of affairs in a high-intensity acoustic field is complex and diversified. Many papers in the Soviet Union and abroad have been concerned with the practical utilization of ultrasound, but the overwhelming majority is limited to the solution of highly individualized practical problems, usually under conditions that are not amenable to comparison. Systematic studies have been initiated in the Ultrasonics Section of the Acoustics Institute of the Academy of Sciences of the USSR on the physics of high-intensity ultrasonic waves and their effects on matter; the results of these studies form the basis of the present book.

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Light Metals—Advances in Research and Application: 2012 Edition is a ScholarlyEditions™ eBook that delivers timely, authoritative, and comprehensive information about Light Metals. The editors have built Light Metals—Advances in Research and Application: 2012 Edition on the vast information databases of ScholarlyNews.™ You can expect the information about Light Metals 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 Light Metals—Advances in Research and Application: 2012 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/>.

When I attended college we studied vacuum tubes in our junior year. At that time an average radio had 7 vacuum tubes and better ones even seven. Then transistors appeared in 1960s. A good radio was judged to be one with more than ten transistors. Later good radios had 15–20 transistors and after that everyone stopped counting transistors. Today modern processors running personal computers have over 10 million transistors and more millions will be added every year. The difference between 20 and 20M is in complexity, methodology and business models. Designs with 20 tr-

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sistors are easily generated by design engineers without any tools, whilst designs with 20M transistors can not be done by humans in reasonable time without the help of Prof. Dr. Gajski demonstrates the Y-chart automation. This difference in complexity introduced a paradigm shift which required sophisticated methods and tools, and introduced design automation into design practice. By the decomposition of the design process into many tasks and abstraction levels the methodology of designing chips or systems has also evolved. Similarly, the business model has changed from vertical integration, in which one company did all the tasks from product specification to manufacturing, to globally distributed, client server production in which most of the design and manufacturing tasks are outsourced.

Advances in Battery Technologies for Electric Vehicles provides an in-depth look into the research being conducted on the development of more efficient batteries capable of long distance travel. The text contains an introductory section on the market for battery and hybrid electric vehicles, then thoroughly presents the latest on lithium-ion battery technology. Readers will find sections on battery pack design and management, a discussion of the infrastructure required for the creation of a battery powered transport network, and coverage of the issues involved with end-of-life management for these types of batteries. Provides an in-depth look into new research on the development of more efficient, long distance travel batteries Contains an introductory section on the market for battery and hybrid electric vehicles Discusses battery pack design and

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management and the issues involved with end-of-life management for these types of batteries

This book illuminates advanced cutting and joining processes, what they are used for, and the capabilities of these manufacturing techniques, especially in micro- and nano-fabrication. The authors illustrate the use of water jets and lasers that can be used to cut highly complex shapes without leaving burrs or heat affected zones, as well as friction stir welding processes that were not possible in the past. Rounding out their examination, the authors describe in detail the use of additive manufacturing for fabrication of micro and nano-scale components and the direction of future research. Incorporating many examples from industry, the book is ideal for professional engineers, technicians, and fabrication managers in multiple industries. Maximizes understanding of advanced manufacturing processes and their capabilities, as well as the limitations of each of these technologies; Explains use of contactless manufacturing processes in applications such as electronics and sensor fabrication; Serves as a ready reference on the latest cutting and joining technologies, including those at the micro- and nano-scale.

This new edition of the bestselling Handbook of Thermoplastics incorporates recent developments and advances in thermoplastics with regard to materials development, processing, properties, and applications. With contributions from 65 internationally recognized authorities in the field, the second edition features new and updated

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discussions of several topics, including: Polymer nanocomposites Laser processing of thermoplastic composites Bioplastics Natural fiber thermoplastic composites Materials selection Design and application Additives for thermoplastics Recycling of thermoplastics Regulatory and legislative issues related to health, safety, and the environment The book also discusses state-of-the-art techniques in science and technology as well as environmental assessment with regard to the impact of thermoplastics. Each chapter is written in a review format that covers: Historical development and commercialization Polymerization and process technologies Structural and phase characteristics in relation to use properties The effects of additives on properties and applications Blends, alloys, copolymers, and composites derived from thermoplastics Applications Giving thorough coverage of the most recent trends in research and practice, the Handbook of Thermoplastics, Second Edition is an indispensable resource for experienced and practicing professionals as well as upper-level undergraduate and graduate students in a wide range of disciplines and industries.

This book is based on lectures held at the faculty of mechanical engineering at the Technical University of Kaiserslautern. The focus is on the central theme of societies overall aircraft requirements to specific material requirements and highlights the most important advantages and challenges of carbon fiber reinforced plastics (CFRP) compared to conventional materials. As it is fundamental to decide on the right material

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at the right place early on the main activities and milestones of the development and certification process and the systematic of defining clear requirements are discussed. The process of material qualification - verifying material requirements is explained in detail. All state-of-the-art composite manufacturing technologies are described, including changes and complemented by examples, and their improvement potential for future applications is discussed. Tangible case studies of high lift and wing structures emphasize the specific advantages and challenges of composite technology. Finally, latest R&D results are discussed, providing possible future solutions for key challenges such as low cost high performance materials, electrical function integration and morphing structures.

The main goal of the present series of conferences is to provide international scientific fora for the exchange of new ideas in a number of fields and interact in depth via discussions with their peers from around the world. The research areas include Management Engineering, Manufacturing Engineering and Modeling, System Modeling and Simulation, Automation Control and Applications, Materials Science and Engineering, Computer Science and Logistics Engineering, Sensors and the Internet, Computer Science and Logistics Engineering, Engineering and Management, Mechanical Science and Engineering.

This book includes the original, peer-reviewed research papers from the 2nd International Conference on Electrical Systems, Technology and Information (ICESTI

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2015), held in September 2015 at Patra Jasa Resort & Villas Bali, Indonesia. Topics covered include: Mechatronics and Robotics, Circuits and Systems, Power and Energy Systems, Control and Industrial Automation, and Information Theory. It explores emerging technologies and their application in a broad range of engineering disciplines, including communication technologies and smart grids. It examines hybrid intelligent and knowledge-based control, embedded systems, and machine learning. It also presents emerging research and recent application in green energy system and storage. It discusses the role of electrical engineering in biomedical, industrial and mechanical systems, as well as multimedia systems and applications, computer vision and image and signal processing. The primary objective of this series is to provide references for dissemination and discussion of the above topics. This volume is unique in that it includes work related to hybrid intelligent control and its applications. Engineers and researchers as well as teachers from academia and professionals in industry and government will gain valuable insights into interdisciplinary solutions in the field of emerging electrical technologies and its applications. In this book, you will find information on new materials and new welding technologies. Problems related to the welding of difficult-to-weld materials are considered and solved. The latest welding technologies and processes are presented. This book provides an opportunity to learn about the latest trends and developments in the welding industry. Enjoy reading.

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A comprehensive introduction to the concepts of joining technologies for hybrid structures This book introduces the concepts of joining technology for polymer-metal hybrid structures by addressing current and new joining methods. This is achieved by using a balanced approach focusing on the scientific features (structural, physical, chemical, and metallurgical/polymer science phenomena) and engineering properties (mechanical performance, design, applications, etc.) of the currently available and new joining processes. It covers such topics as mechanical fastening, adhesive bonding, advanced joining methods, and statistical analysis in joining technology. Joining of Polymer-Metal Hybrid Structures: Principles and Applications is structured by joining principles, in adhesion-based, mechanical fastened, and direct-assembly methods. The book discusses such recent technologies as friction riveting, friction spot joining and ultrasonic joining. This is used for applications where the original base material characteristics must remain unchanged. Additional sections cover the main principles of statistical analysis in joining technology (illustrated with examples from the field of polymer-metal joining). Joining methods discussed include mechanical fastening (bolting, screwing, riveting, hinges, and fits of polymers and composites), adhesive bonding, and other advanced joining methods (friction staking, laser welding, induction welding, etc.). Provides a combined engineering and scientific approach used to describe principles, properties, and applications of polymer-metal hybrid joints Describes the current developments in design of experiments and statistical analysis in

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joining technology with emphasis on joining of polymer-metal hybrid structures Covers recent innovations in joining technology of polymer-metal hybrid joints including friction riveting, friction spot joining, friction staking, and ultrasonic joining Principles illustrated by pictures, 3D-schemes, charts, and drawings using examples from the field of polymer-metal joining Joining of Polymer-Metal Hybrid Structures: Principles and Applications will appeal to chemical, polymer, materials, metallurgical, composites, mechanical, process, product, and welding engineers, scientists and students, technicians, and joining process professionals.

Smart clothes and wearable technology is a relatively novel and emerging area of interdisciplinary research within the fashion, textile, electronics and related industries. This book provides a comprehensive review of the end-user's requirements and the technologies and materials available for the design and production of smart clothing. Part one looks at the design of smart clothing and wearable technology including the emergence of wearable computing, end-user requirements, and the design process from fibre selection to product launch. Part two examines the general requirements for merging of a range of textile structures with technology and communications for wearable technologies. Part three reviews the types of production technologies available for the development of smart clothing, including garment construction and fabric joining, and the final part discusses the application of these new technologies in smart clothing products and their presentation to consumers. Smart clothes and

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wearable technology is a unique and essential reference source for researchers, designers and engineers developing textiles and clothing products in this cross-disciplinary area. It is also beneficial for those in the healthcare industry and academics researching textiles, fashion and design. Examines this emerging area of textile research including a brief history and industry overview Assesses the technologies and materials available for the design and production of smart clothing Summarises requirements for smart textiles from both health and performance perspectives

Lithium-ion battery is one the most popular types of batteries currently used in electric vehicles. To meet the power requirement, hundreds of Lithium ion battery cells are connected together before being assembled into a battery pack. Ultrasonic welding is the most widely used joining technology to connect battery cells together. In an ultrasonic welding process, high frequency oscillation is used to generate small relative motions between sheet metals to be welded, and produce solid-state bonds between the sheet metals clamped under pressure. One of the major issues for battery pack ultrasonic welding is that sometimes the welding process damages the battery cell. It is hypothesized that, during the ultrasonic welding process, high frequency vibrations of battery tabs may transfer vibration energy into the battery cell, inducing high stresses and even causes damages at the interior joints of the battery cell. In this study, an analytical model to describe the vibration of battery tabs was developed. Experimental data shows good correlation to the analytical model in the stress value. For the

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experimental measurement, a signal conditioning and data acquisition system was developed which was shown to have good signal-noise ratios when compared to a commercially available measurement system.

Ultrasonic Welding of Metal Sheets covers various aspects of ultrasonic welding (USW) of metal sheets, including the discussion on modeling and numerical simulations of ultrasonic welding to improve this welding process and performance. This book aims to provide an accessible, comprehensive and up-to-date exposition of the various aspects of joining of dissimilar metal sheets ranging from its fundamentals thorough to metallurgical characteristics covering fundamental concepts, in-detailed explanation about the USW including its implementation, design criteria, work material, welding, thermo-mechanical and research scopes. The book is aimed at researchers, professionals and graduate students in manufacturing, welding, mechanical engineering. Features The ultrasonic spot welding of various metal sheets is described in simplified expression and concepts are elucidated by relevant illustrations. Discusses modeling and numerical simulations of ultrasonic welding to improve the ultrasonic welding process and performance As opposed to competition in the market, this title provides thorough clarification of ultrasonic spot welding of metal sheets with its applications.

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Vols. for 1970-71 includes manufacturers' catalogs.

The primary aim of this volume is to provide researchers and engineers from both academia and industry with up-to-date coverage of recent advances in the fields of robotic welding, intelligent systems and automation. It gathers selected papers from the 2017 International Workshop on Intelligentized Welding Manufacturing (IWIWM'2017), held June 23-26, 2017 in Shanghai, China. The contributions reveal how intelligentized welding manufacturing (IWM) is becoming an inescapable trend, just as intelligentized robotic welding is becoming a key technology. The volume is divided into four main parts: Intelligent Techniques for Robotic Welding, Sensing in Arc Welding Processing, Modeling and Intelligent Control of Welding Processing, and Intelligent Control and its Applications in Engineering.

This congress proceedings provides recent research on leading-edge manufacturing processes. The aim of this scientific congress is to work out diverse individual solutions of "production at the leading edge of technology" and transferable methodological approaches. In addition, guest speakers with different backgrounds will give the congress participants food for thoughts, interpretations, views and suggestions. The manufacturing industry is currently undergoing a profound structural change, which on the one hand produces

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innovative solutions through the use of high-performance communication and information technology, and on the other hand is driven by new requirements for goods, especially in the mobility and energy sector. With the social discourse on how we should live and act primarily according to guidelines of sustainability, structural change is gaining increasing dynamic. It is essential to translate politically specified sustainability goals into socially accepted and marketable technical solutions. Production research is meeting this challenge and will make important contributions and provide innovative solutions from different perspectives.

CD-ROM contains: "several 3-D models, informative PowerPoint presentations, and dxf files of selected microwave components for direct CNC-machining."

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