Digital Twin Spark Ignition Engine

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MANAGING INTELLECTUAL PROPERTY **KHANNA PUBLISHING**

This book constitutes the refereed post-conference proceedings of the 16th IFIP WG 5.1 International Conference on Product Lifecycle Management, PLM 2019, held in Moscow, Russia, in July 2019. The 38 revised full papers presented were carefully reviewed and selected from 63 submissions. The papers are organized in the following topical sections: 3D modelling and data structures; PLM maturity and industry 4.0; ontologies and semantics; PLM and conceptual design; knowledge and change management; IoT and PLM; integrating manufacturing realities; and integration of in-service and operation.

Computer Simulation Of Compression-Ignition Engine Processes Academic Press

This book attempts to provide a simplified framework for the vast and complex map of technical material that exists on compression-ignition engines, and at the same time include sufficient details to convey the complexity of engine simulation. The emphasis here is on the thermodynamics, combustion physics and chemistry, heat transfer, and friction processes relevant to compression-ignition engines with simplifying assumpations.

Advanced Combustion Technologies for Low Carbon Emissions Universities Press

The Digital Twin Paradigm for Smarter Systems and Environments: The Industry Use Cases, Volume 117, the latest volume in the Advances in Computers series, presents detailed coverage of new advancements in computer hardware, software, theory, design and applications. Chapters vividly illustrate how the emerging discipline of digital twin is strategically contributing to various digital transformation initiatives. Specific chapters cover Demystifying the Digital Twin Paradigm, Digital Twin Technology for "Smarter Manufacturing", The Fog Computing/ Edge Computing to leverage Digital Twin, The industry use cases for the Digital Twin idea, Enabling Digital Twin at the Edge, The Industrial Internet of Things (IIOT), and much more. Provides in-depth descriptions of digital transformation technologies and tools Covers various research accomplishments in this flourishing field of relevance Includes many detailed industry use cases with all the right information

Digital-Twin-Enabled Smart Control Engineering Springer

The book, now in its fifth edition, offers a comprehensive treatment of Intellectual Property concepts and their applications in Indian industry. It provides a strategic framework for IP management, leading to competitive advantage for a business enterprise. Besides explaining the conceptual framework and practices of IP management, the book discusses IP as a strategic tool, its commercial exploitation and strategies for risk management of IP. Web-based material comprising chapter-wise PowerPoint Presentations (PPTs) and Multiple Choice Questions is available at www.phindia.com/sople. This book is primarily intended as a text for postgraduate students of management, students of engineering and those who are pursuing certificate, postgraduate diploma or degree courses in IPR. In addition, professionals and corporate decision-makers should find the text valuable.NEW TO THE FIFTH EDITION • A new chapter has been introduced on Filing Patent Applications. • Numerous sections such as clinical research regulations, planned purification, combination therapy, alternate delivery, trade dress trademark protection, trademark caution notice, comparative advertising and trademark violation, contributory and vicarious infringement, two statutes for farmers ' rights, incremental innovation, piracy in fashion design, patentable or not patentable biotech inventions have now been incorporated in the respective chapters. • More cases/caselets have been introduced in the present edition. KEY FEATURES • Discusses IPs such as Patents, Copyrights, Trademarks, Trade Secrets, Designs, Semiconductor Circuit Layouts and Geographical Indications, etc. • Practices issues of IPRs in Cyber Space, Fashion Design, Biotechnology and Pharmaceutical industry. • Classifies systems in practice for various IPs. • Provides IPRs legal provision in Indian context. • Includes a comprehensive glossary of important terms. • Encloses CD-ROM containing Intellectual Property Rights ' laws in India as per the latest amendments.

Multiple-spark ignition system for internal combustion ... PHI Learning Pvt. Ltd.

This open access book summarizes the results of the European research project "Twin-model based virtual manufacturing for machine tool-process simulation and control" (Twin-Control). The first part reviews the applications of ICTs in machine tools and manufacturing, from a scientific and industrial point of view, and introduces the Twin-Control approach, while Part 2 discusses the development of a digital twin of machine tools. The third part addresses the monitoring and data management infrastructure of machines and manufacturing processes and numerous applications of energy monitoring. Part 4 then highlights various features developed in the project by combining the developments covered in Parts 3 and 4 to control the manufacturing processes applying the so-called CPSs. Lastly, Part 5 presents a complete validation of Twin-Control features in two key industrial sectors: aerospace and automotive. The book offers a representative overview of the latest trends in the manufacturing industry, with a focus on machine tools.

INTELLECTUAL PROPERTY RIGHTS Academic Press

This book introduces the computing, mathematical and engineering background to understand and develop the concept of the digital twin. It provides background in modeling/simulation, computing technology, sensor/actuators, and so forth, needed to develop the next generation of digital twins.

Alternative Fuels and Advanced Combustion Techniques as Sustainable Solutions for Internal Combustion Engines Springer Nature

This book presents a novel design framework for the development of Digital Twin (DT) models for process- and motion-control applications. It is based on system-data acquisition using cutting-edge computing technologies, modelling of physical-system behavior through detailed simultaneous simulation of different aspects of the system, and optimal dynamic behavior-matching of the process. The design framework is enhanced with real-time data analytics to improve the performance of the DT's behavior-matching with the real system or physical twin. The methods of creating a DT detailed in Digital-Twin-Enabled Smart Control Engineering make possible the study of a system for real-time controller tuning and fault detection. They also facilitate life-cycle analysis for multiple critical and dangerous conditions that cannot be explored in the corresponding real system or physical twin. The authors show how a DT can be exploited to enable self-optimizing capabilities in feedback control systems. The DT framework and the control-performance assessment, fault diagnosis and prognosis, remaining-useful-life analysis, and self-optimizing control abilities it allows are validated with both process- and motion-control systems and their DTs. Supporting MATLAB-based material for a case study and an expanded introduction to the basic elements of DTs can be accessed on an associated website. This book helps university researchers from many areas of engineering to develop new tools for control design and reliability and life-cycle assessment and helps practicing engineers working with robotic, manufacturing and processing, and mechatronic systems to maintain and develop the mechanical tools they use.

Diagnostics and Modeling in SI Engines Academic Press

Various combinations of commercially available technologies could greatly reduce fuel consumption in passenger cars, sport-utility vehicles, minivans, and other light-duty vehicles without compromising vehicle performance or safety. Assessment of Technologies for Improving Light Duty Vehicle Fuel Economy estimates the potential fuel savings and costs to consumers of available technology combinations for three types of engines: spark-ignition gasoline, compression-ignition diesel, and hybrid. According to its estimates, adopting the full combination of improved technologies in medium and large cars and pickup trucks with spark-ignition engines could reduce fuel consumption by 29 percent at an additional cost of $2,200 to the consumer. Replacing spark-ignition engines with diesel engines and components would yield fuel savings of about 37 percent at an added cost of approximately $5,900 per vehicle, and replacing spark-ignition engines with hybrid engines and components would reduce fuel consumption by 43 percent at an increase of $6,000 per vehicle. The book focuses on fuel consumption-the amount of fuel consumed in a given driving distance-because energy savings are directly related to the amount of fuel used. In contrast, fuel economy measures how far a vehicle will travel with a gallon of fuel. Because fuel consumption data indicate money saved on fuel purchases and reductions in carbon dioxide emissions, the book finds that vehicle stickers should provide consumers with fuel consumption data in addition to fuel economy information.

Assessment of Fuel Economy Technologies for Light-Duty Vehicles Elsevier

DIGITAL TWIN TECHNOLOGY The book lucidly explains the fundamentals of digital twin technology along with its applications and various industrial real-world examples. Digital twin basically means a replicated model of any object or product in digital form. A digital twin has many advantages as it remains connected with the original object or product it is replicating and receives real-time data. Therefore, the obstacles and issues that could be encountered in a product or object can be known before their actual happening which helps to prevent errors and major losses which otherwise might have been incurred. The various capabilities of digital twin technology make it a powerful tool that can be used to effectively boost various sectors of the healthcare, automotive, and construction industries, among others. Although this technology has been making its way into various sectors, it has not yet received the kind of exposure necessary to increase awareness of its potential in these industries. Therefore, it is critical that a better understanding of digital twin technology is acquired to facilitate growth and to have it implemented in the various sectors so that transformation can be ushered in. Therefore, this book was designed to be a useful resource for those who want to become well acquainted with digital twin technology. Audience Engineers, researchers, and advanced students in information technology, computer science, and electronics, as well as IT specialists and professionals in various industries such as healthcare, automotive, and transportation.

Strategic Management Academic Press

Digital Twin for Smart Manufacturing: Emerging Approaches and Applications provides detailed descriptions on how to integrate and optimize novel digital technologies for smart manufacturing. The book discusses digital twins, which combine the industrial internet of things, artificial intelligence, machine learning and software analytics with spatial network graphs to create living digital simulation models that update and change as their physical counterparts change. In addition, they provide an effective way to integrate technologies like cyber-physical systems into a smart manufacturing system, potentially optimizing the entire business process and operating procedure of the manufacturing firm. Drawing on the latest research, the book addresses the topics and technologies key to successful implementation of a smart manufacturing system, including augmented and virtual reality, big data and energy management. Broader subjects such as additive manufacturing and robotics are also covered in this context, covering every aspect of production. Includes detailed case studies that show how digital twins have been successfully implemented Shows how digital twins can be used to improve sustainability through superior energy usage management Outlines potential future uses of the digital twin, thus pointing the way for future research directions

History and Futureof Spark Ignition Engines, a Report Prepared for the Committee on Public Works..., by the Environmental Policy Division of the Congressional Research Service ..., at the Request of Senator Edmund S. Muskie. September 1973 Springer Nature

The Handbook of Mechanical Engineering is a complete work for B.E./B.Tech. students as well as applicants preparing for competitive examinations such as the IES/IFS/GATE State Services and competitive tests held by public and private sector businesses to choose apprentice engineers. The third edition of this well-designed textbook presents the principles of mechanical engineering in the areas of thermodynamics, mechanics, machine theory, material strength, and fluid dynamics. This work is well adapted to meet the needs of the common course in mechanical engineering specified in the curriculum of practically all areas of engineering, as these courses are a fundamental aspect of an engineer's education. To match the course requirement, this revised "THIRD EDITION" includes a new chapter on 'Hydraulic and Pneumatic System.' With the world's finest engineering manual, you can solve any mechanical engineering problem fast and easily. Nearly 2400 pages of mechanical engineering facts, figures, standards, and practices, 2000 illustrations, and 900 tables clarifying important mathematical and engineering principles, as well as the collective wisdom of 160 experts, will help you answer any analytical, design, or application question you may have. Covers the important aspects of mechanical engineering in a concise manner, including definitions, equations, examples, theory, proofs, and explanations for all major topic areas. The purpose of the third edition of the Handbook of Principle of Mechanical Engineering is to continue providing practicing engineers in industry, government, and academia with up-to-date information on the most important topics of modern mechanical engineering. ? This book provides a comprehensive and wide-ranging introduction to the fundamental principles of mechanical engineering in a distinct and clear manner. The book is intended for a core introductory course in the area of foundations and applications of mechanical engineering, ?

Digital Twin Technology NestFame Creations Pvt Ltd.

Creations of mind can vary in its form—from a brilliant thought to a gizmo gadget to a popular fiction—all come under the legal term called Intellectual Property. In the world of upheaval technology, where information on anything and everything is freely available and accessible, guarding these intellectual properties legally becomes a prerequisite. This book comprehensively discusses how to manage and secure the intellectual property and the legal norms associated with it. The book begins with introducing the concepts related to Intellectual Property and the WTO Agreement. The following chapters explain various types of Intellectual Property Rights such as Patents, Copyrights, Trade Marks, Industrial Designs, Integrated Circuits, and Geographical Indications. These chapters also provide in-depth and detailed insight on regulations and procedures for protection of Intellectual Property Rights. The book further explicates the creation of Intellectual Property and spells out the conceptual framework for creativity and innovation. Management of Intellectual Property is as important

as its creation, and therefore the concluding chapters describe the activities for management and commercialization of Intellectual Property Rights, and the emerging issues surrounding them. Two separate cases have been added at the end of the book, to provide an analytical insight of the subject to the students. The book is meant for the undergraduate and postgraduate students of management and technology. Besides, the book can be useful for the undergraduate students of law as a ready reference.

Spark Ignition Engine Modeling and Control System Design Elsevier

Digital Twin Driven Smart Manufacturing examines the background, latest research, and application models for digital twin technology, and shows how it can be central to a smart manufacturing process. The interest in digital twin in manufacturing is driven by a need for excellent product reliability, and an overall trend towards intelligent, and connected manufacturing systems. This book provides an ideal entry point to this subject for readers in industry and academia, as it answers the questions: (a) What is a digital twin? (b) How to construct a digital twin? (c) How to use a digital twin to improve manufacturing efficiency? (d) What are the essential activities in the implementation of a digital twin? (e) What are the most important obstacles to overcome for the successful deployment of a digital twin? (f) What are the relations between digital twin and New Technologies? (g) How to combine digital twin with the New Technologies to achieve high efficiency and smartness in manufacturing? This book focuses on these problems as it aims to help readers make the best use of digital twin technology towards smart manufacturing. Analyzes the differences, synergies and possibilities for integration between digital twin technology and other technologies, such as big data, service and Internet of Things Discuss new requirements for a traditional three-dimension digital twin and proposes a methodology for a five-dimension version Investigates new models for optimized manufacturing, prognostics and health management, and cyber-physical fusion based on the digital twin

Proceedings of International Conference on Thermofluids Springer Nature

Digital Twin Driven Smart Service draws on the latest industry practice and research to explain how to implement digital twin service in a range of scenarios. It addresses relevant theory and methodologies, including product service, prognostic health management service, energy efficient service and testing service. Other sections discuss key enabling technologies supported by cutting-edge case studies of implementation. Drawing on the work of researchers at the forefront of this technology, this book is the ideal guide for anyone interested in product services, manufacturing services and digital twin services. This book is one part of a trilogy on digital twins, the other titles being Digital Twin Driven Smart Design and Digital Twin Driven Smart Manufacturing. Provides a wide range of applications, including tribological testing, cutting tool service and energy efficiency assessment Explains everything needed to understand and implement digital twin models for service, including frameworks, theories and technologies Explores future challenges for research in this area, including the ongoing standardization of digital twin technology

Digital Twin Driven Smart Manufacturing Universities Press

This monograph covers different aspects related to utilization of alternative fuels in internal combustion (IC) engines with a focus on biodiesel, dimethyl ether, alcohols, biogas, etc. The focal point of this book is to present engine combustion, performance and emission characteristics of IC engines fueled by these alternative fuels. A section of this book also covers the potential strategies of utilization of these alternative fuels in an energy efficient manner to reduce the harmful pollutants emitted from IC engines. It presents the comparative analysis of different alternative fuels in a variety of engines to show the appropriate alternative fuel for specific types of engines. This book will prove useful for both researchers as well as energy experts and policy makers.

Automotive Electrical and Electronics NestFame Creations Pvt Ltd.

This book focuses on advanced techniques to reduce the impact of the transport sector and, more specifically, of Spark-Ignition (SI) Internal Combustion Engines (ICEs) on atmospheric air pollution and climate change. Hybrid vehicles represent the most suitable option for addressing these issues in the medium term, since hybridization allows us to overcome the major disadvantages of ICEs, electric units, and energy storage devices and merge their respective benefits. In this scenario, ICEs will remain the core component of automotive propulsion systems in the years to come. Of course, further efforts to improve the efficiency and reduce the pollutant and CO 2 emissions of ICEs are necessary.

Digital Twins National Academies Press

The process of fuel injection, spray atomization and vaporization, charge cooling, mixture preparation and the control of in-cylinder air motion are all being actively researched and this work is reviewed in detail and analyzed. The new technologies such as high-pressure, common-rail, gasoline injection systems and swirl-atomizing gasoline fuel injections are discussed in detail, as these technologies, along with computer control capabilities, have enabled the current new examination of an old objective; the direct-injection, stratified-charge (DISC), gasoline engine. The prior work on DISC engines that is relevant to current GDI engine development is also reviewed and discussed. The fuel economy and emission data for actual engine configurations have been obtained and assembled for all of the available GDI literature, and are reviewed and discussed in detail. The types of GDI engines are arranged in four classifications of decreasing complexity, and the advantages and disadvantages of each class are noted and explained. Emphasis is placed upon consensus trends and conclusions that are evident when taken as a whole; thus the GDI researcher is informed regarding the degree to which engine volumetric efficiency and compression ratio can be increased under optimized conditions, and as to the extent to which unburned hydrocarbon (UBHC), NOx and particulate emissions can be minimized for specific combustion strategies. The critical area of GDI fuel injector deposits and the associated effect on spray geometry and engine performance degradation are reviewed, and important system guidelines for minimizing deposition rates and deposit effects are presented. The capabilities and limitations of emission control techniques and after treatment hardware are reviewed in depth, and a compilation and discussion of areas of consensus on attaining European, Japanese and North American emission standards presented. All known research, prototype and production GDI engines worldwide are reviewed as to performance, emissions and fuel economy advantages, and for areas requiring further development. The engine schematics, control diagrams and specifications are compiled, and the emission control strategies are illustrated and discussed. The influence of lean-NOx catalysts on the development of late-injection, stratified-charge GDI engines is reviewed, and the relative merits of lean-burn, homogeneous, direct-injection engines as an option requiring less control complexity are analyzed.

MANAGING INTELLECTUAL PROPERTY : The Strategic Imperative SAE International

The book presents a comprehensive treatment of Intellectual Property concepts and its applications in Indian industry. Now, in its Third Edition, it includes a new chapter on Valuation of Intellectual Property and numerous cases/caselets in most of the chapters. It provides a strategic framework for IP management, leading to competitive advantage for a business enterprise. Besides explaining the conceptual framework and practices of IP management, the book discusses IP as a strategic tool, its commercial exploitation and strategies for risk management of IP. Web-based material comprising chapter-wise PowerPoint Presentations (PPTs) and multiple choice questions is available at www.phindia.com/sople This book is primarily intended as a text for postgraduate students of management, students of engineering and those who are pursuing certificate, postgraduate diploma or degree courses in IPR. In addition, professionals and corporate decision-makers should find the text very valuable. KEY FEATURES : Discusses IPs such as Patents, Copyrights, Trademarks, Trade Secrets, Designs, Semiconductor Circuit Layouts and Geographical Indications, etc. Treats IPRs and Cyber Space and Pharmaceutical sector in separate chapters. Classifies systems in practice for various IPs. Provides IPRs legal provision in Indian context. Includes a comprehensive glossary of important terms.

Product Lifecycle Management in the Digital Twin Era PHI Learning Pvt. Ltd.

This book contains the theory and computer programs for the simulation of spark ignition (SI) engine processes. It starts with the fundamental concepts and goes on to the advanced level and can thus be used by undergraduates, postgraduates and Ph. D. scholars.

Digital Twin Springer Nature

This book presents selected proceedings of the International Conference on Advances in Mechanical Processing and Design (ICAMPD 2019). The contents highlight latest research in next-generation mechanical systems design, thermal and fluid systems design, materials and smart manufacturing processes, and industrial engineering. Some of the topics covered include smart materials, materials processing and applications, smart machinery and machine design, system dynamics and simulation, biomimetics, energy systems, micro- and nano-scale transport, automotive engineering, advance material characterization and testing, and green and sustainable manufacturing. Given the scope of the contents, this book can be of interest to students, researchers as well as industry professionals.