

Changeable And Reconfigurable Manufacturing Systems

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Download Free Changeable And Reconfigurable Manufacturing Systems

“Changeable and Reconfigurable Manufacturing Systems” discusses key strategies for success in the changing manufacturing environment. Changes can often be anticipated but some go beyond the design range, requiring innovative change enablers and adaptation mechanisms. The book presents the new concept of Changeability as an umbrella framework that encompasses paradigms such as agility, adaptability, flexibility and reconfigurability. It provides the definitions and classification of key terms in this new field, and emphasizes the required physical/hard and logical/soft change enablers. The book presents cutting edge technologies and the latest research, as well as future directions to help manufacturers stay competitive. It contains original contributions and results from senior international experts, together with industrial applications. The book serves as a comprehensive reference for professional engineers, managers, and academics in manufacturing, industrial and mechanical engineering.

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This proceedings volume presents the latest research from the worldwide mass customization & personalization (MCP) community bringing together new thoughts and results from various disciplines within the field. The chapters are based on papers from the MCPC 2017. The book showcases research and practice from authors that see MCP as an opportunity to extend or even revolutionize current business models. The current trends of Industrie 4.0, digital manufacturing, and the rise of smart products allow for a fresh perspective on MCP: Customization 4.0. The book places a new set of values in the centre of the debate: a world with finite resources, global population growth, and exacerbating climate change needs smart thinking to engage the most effective capabilities and resources. It discusses how Customization 4.0 fosters sustainable development and creates shared value for companies, customers, consumers, and the society as a whole. The chapters of this book are contributed by a wide range of specialists, offering cutting-edge research, as well as insightful advances in industrial practice in key areas. The MCPC 2017 has a strong focus on real life MCP applications, and this proceedings volume reflects this. MCP strategies aim to profit from the fact that people are different. Their objective is to turn customer heterogeneities into opportunities, hence addressing “long tail” business models. The objective of MCP is to provide goods and services that best serve individual customers’ needs with near mass production efficiency. This proceedings volume highlights the interdisciplinary work of thought leaders, technology developers, and researchers with corporate entrepreneurs putting these strategies into practice. Chapter 24 is open access under a CC BY 4.0 license via link.springer.com.

The first Digital Enterprise Technology (DET) International Conference was held in Durham, UK in 2002 and the second DET Conference in

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Seattle, USA in 2004. Sponsored by CIRP (College International pour la Recherche en Productique), the third DET Conference took place in Setúbal, Portugal in 2006. Digital Enterprise Technology: Perspectives and Future Challenges is an edited volume based on this conference. Topics include: distributed and collaborative design, process modeling and process planning, advanced factory equipment and layout design and modeling, physical-to-digital environment integrators, enterprise integration technologies, and entrepreneurship in DET.

In the last decade, the production of mechanical components to be assembled in final products produced in high volumes (e.g. cars, mopeds, industrial vehicles, etc.) has undergone deep changes due to the overall modifications in the way companies compete. Companies must consider competitive factors such as short lead times, tight product tolerances, frequent market changes and cost reduction. Anyway, companies often have to define production objectives as trade-offs among these critical factors since it can be difficult to improve all of them. Even if system flexibility is often considered a fundamental requirement for firms, it is not always a desirable characteristic of a system because it requires relevant investment cost which can jeopardize the profitability of the firm. Dedicated systems are not able to adapt to changes of the product characteristics while flexible systems offer more flexibility than what is needed, thus increasing investment and operative costs. Production contexts characterized by mid to high demand volume of well identified families of products in continuous evolution do not require the highest level of flexibility; therefore, manufacturing system flexibility must be rationalized and it is necessary to find out the best trade-off between productivity and flexibility by designing manufacturing systems endowed with the right level of flexibility required by the production problem. This new class of production systems can be named Focused Flexibility Manufacturing Systems-FFMSs. The flexibility degree in FFMSs is related to their ability to cope with volume, mix and technological changes, and it must take into account both present and future changes. The required level of system flexibility impacts on the architecture of the system and the explicit design of flexibility often leads to hybrid systems, i.e. automated integrated systems in which parts can be processed by both general purpose and dedicated machines. This is a key issue of FFMSs and results from the matching of flexibility and productivity that respectively characterize FMSs and Dedicated Manufacturing Systems (DMSs). The market share of the EU in the machine tool sector is 44%; the introduction of focused flexibility would be particularly important for machine tool builders whose competitive advantage is based on the ability of customizing their systems on the basis of needs of their customers. In fact, even if current production contexts frequently present situations which would fit well with the FFMS approach, tradition and know-how of machine tool builders play a crucial role. Firms often agree with the focused flexibility vision, nevertheless they decide not to pay the risk and efforts related to the design of this new system architecture. This is due also to the lack of well-structured design approaches which can help machine tool builders to configure innovative systems. Therefore, the FFMS topic is studied through the book chapters following a shared mission: "To define methodologies and tools to design production systems with a minimum level of flexibility needed to face, during their lifecycle, the product and process evolution both in the technological and demand aspects. The goal is to find out the optimal trade-off between flexibility and productivity". The book framework follows the architecture which has been developed to address the FFMS Design problem. This architecture is both broad and detailed, since it pays attention to all the relevant levels in a firm hierarchy which are involved in the system design. Moreover, the architecture is innovative because it models both the point of view of the machine tool builder and the point of view of the system user. The architecture starts analyzing Manufacturing Strategy issues and generating the possible demand scenario to be faced. Technological aspects play a key role while solving process plan problems for the products in the part family. Strategic and technological data becomes input when a machine tool builder performs system

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configuration. The resulting system configurations are possible solutions that a system user considers when planning its system capacity. All the steps of the architecture are deeply studied, developing methods and tools to address each subproblem. Particular attention is paid to the methodologies adopted to face the different subproblems: mathematical programming, stochastic programming, simulation techniques and inverse kinematics have been used. The whole architecture provides a general approach to implement the right degree of flexibility and it allows to study how different aspects and decisions taken in a firm impact on each other. The work presented in the book is innovative because it gives links among different research fields, such as Manufacturing Strategy, Process Plan, System Design, Capacity Planning and Performance Evaluation; moreover, it helps to formalize and rationalize a critical area such as manufacturing system flexibility. The addressed problem is relevant at an academic level but, also, at an industrial level. A great deal of industrial sectors need to address the problem of designing systems with the right degree of flexibility; for instance, automotive, white goods, electrical and electronic goods industries, etc. Attention to industrial issues is confirmed by empirical studies and real case analyses which are presented within the book chapters.

This proceedings volume presents the latest research from the worldwide mass customization, personalization and co-creation (MCPC) community bringing together new thoughts and results from various disciplines within the field. The chapters are based on papers from The MCPC 2015 Conference where the emphasis was placed on “managing complexity.” MCPC is now beginning to emerge in many industries as a profitable business model. But customization and personalization go far beyond the sheer individualization of products and become an extension of current business models and production styles. This book covers topics such as complexity management of knowledge-based systems in manufacturing design and production, sustainable mass customization, choice navigation, and product modeling. The chapters are contributed by a wide range of specialists, offering cutting-edge research, as well as insightful advances in industrial practice in key areas. The MCPC 2015 Conference had a strong focus on real life MCPC applications, and this proceedings volume reflects this. MCPC strategies aim to profit from the fact that people are different. Their objective is to turn customer heterogeneities into profit opportunities, hence addressing the current trend of long tail business models. Mass customization means to provide goods and services that best serve individual customers’ personal needs with near mass production efficiency. This book brings together the latest from MCPC thought leaders, entrepreneurs, technology developers, and researchers that use these strategies in practice.

The changing manufacturing environment requires more responsive and adaptable manufacturing systems. The theme of the 4th International Conference on Changeable, Agile, Reconfigurable and Virtual production (CARV2011) is “Enabling Manufacturing Competitiveness and Economic Sustainability”. Leading edge research and best implementation practices and experiences, which address these important issues and challenges, are presented. The proceedings include advances in manufacturing systems design, planning, evaluation, control and evolving paradigms such as mass customization, personalization, changeability, re-configurability and flexibility. New and important concepts such as the dynamic product families and platforms, co-evolution of products and systems, and methods for enhancing manufacturing systems’ economic sustainability and prolonging their life to produce more than one product generation are treated. Enablers of change in manufacturing systems, production volume and capability scalability and managing the volatility of markets, competition among global enterprises and the increasing complexity of products, manufacturing systems and management strategies are

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discussed. Industry challenges and future directions for research and development needed to help both practitioners and academicians are presented.

Knowledge-intensive product realization implies embedded intelligence; meaning that if both theoretical and practical knowledge and understanding of a subject is integrated into the design and production processes of products, this will significantly increase added value. This book presents papers accepted for the 9th Swedish Production Symposium (SPS2020), hosted by the School of Engineering, Jönköping University, Sweden, and held online on 7 & 8 October 2020 because of restrictions due to the Corona virus pandemic. The subtitle of the conference was Knowledge Intensive Product Realization in Co-Operation for Future Sustainable Competitiveness. The book contains the 57 papers accepted for presentation at the conference, and these are divided into nine sections which reflect the topics covered: resource efficient production; flexible production; virtual production development; humans in production systems; circular production systems and maintenance; integrated product and production development; advanced and optimized components, materials and manufacturing; digitalization for smart products and services; and responsive and efficient operations and supply chains. In addition, the book presents five special sessions from the symposium: development of changeable and reconfigurable production systems; smart production system design and development; supply chain relocation; management of manufacturing digitalization; and additive manufacturing in the production system. The book will be of interest to all those working in the field of knowledge-intensive product realization.

The CIRP Encyclopedia covers the state-of-art of advanced technologies, methods and models for production, production engineering and logistics. While the technological and operational aspects are in the focus, economical aspects are addressed too. The entries for a wide variety of terms were reviewed by the CIRP-Community, representing the highest standards in research. Thus, the content is not only evaluated internationally on a high scientific level but also reflects very recent developments.

This book develops innovative techniques from operational research and management science for the design and implementation of a reconfigurable manufacturing system (RMS), and subsequently analyzes and assesses their performance. A reconfigurable manufacturing system (RMS) is a paradigm that can address many of the challenges posed by the modern market. Accordingly, substantial research is now being conducted on RMS, focusing on various levels of decision-making (strategic, tactical and operational). However, as a relatively new research area, there are still only very few books and articles available on reconfigurable manufacturing system design and management. In addition to filling that gap, this book provides a forum for investigating, exchanging ideas on, and disseminating the latest advances in the broad area of RMS applications in today's industry. Gathering contributions by experts from academia, industry and policy-making, it represents an essential contribution to the existing literature on manufacturing and logistics in general and industry 4.0 in particular.

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