

Chapter 12

Sustainability and Optimization of Green and Lean Manufacturing Processes Using Machine Learning Techniques

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ABSTRACT

The chapter introduces the concepts of sustainability, green manufacturing, and lean manufacturing, emphasizing their importance in the manufacturing industry. It then highlights the relevance of machine learning techniques in supporting sustainable manufacturing practices. It focuses on the application of machine learning in sustainable manufacturing, presenting case studies that illustrate the use of machine learning algorithms in optimizing energy consumption, reducing waste, and improving process efficiency. It also discusses the challenges and limitations of implementing machine learning techniques in sustainable manufacturing, as well as potential future advancements. Machine learning techniques can be used to achieve sustainable and efficient manufacturing operations, providing valuable insights for researchers, practitioners, and policymakers.

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Agile Manufacturing Systems K Hans Raj,2011-12-17 Agility has become very important for the industries today as the lifetimes of the products are continuously shrinking This book provides an excellent opportunity for updating understanding of agile methods from the design manufacturing and business process perspectives whether one is an industrial practitioner academic researcher engineer or business graduate student This volume is a compilation of various important aspects of agility consisting of systemic considerations in manufacturing agile software systems agile business systems agile operations research flexible manufacturing systems advanced manufacturing systems with improved materials and mechanical behavior of products agile aspects of design clean and green manufacturing systems environment agile defence systems

Sustainable Manufacturing Systems: An Energy Perspective Lin Li,MengChu Zhou,2022-11-03 Sustainable Manufacturing Systems Learn more about energy efficiency in traditional and advanced manufacturing settings with this leading and authoritative resource Sustainable Manufacturing Systems An Energy Perspective delivers a comprehensive analysis of energy efficiency in sustainable manufacturing The book presents manufacturing modeling methods and energy efficiency evaluation and improvement methods for different manufacturing systems It allows industry professionals to understand the methodologies and techniques being embraced around the world that lead to advanced energy management The book offers readers a comprehensive and systematic theoretical foundation for novel manufacturing system modeling analysis and control It concludes with a summary of the insights and applications contained within and a discussion of future research issues that have yet to be grappled with Sustainable Manufacturing Systems answers the questions that energy customers managers decision makers and researchers have been asking about sustainable manufacturing The book s release coincides with recent and profound advances in smart grid applications and will serve as a practical tool to assist industrial engineers in furthering the green revolution Readers will also benefit from A thorough introduction to energy efficiency in manufacturing systems including the current state of research and research methodologies An exploration of the development of manufacturing methodologies including mathematical modeling for manufacturing systems and energy efficiency characterization in manufacturing systems An analysis of the applications of various methodologies including electricity demand response for manufacturing systems and energy control and optimization for manufacturing systems utilizing combined heat and power systems A discussion of energy efficiency in advanced manufacturing systems like stereolithography additive manufacturing and cellulosic biofuel manufacturing systems Perfect for researchers undergraduate students and graduate students in engineering disciplines especially for those majoring in industrial mechanical electrical and environmental engineering Sustainable Manufacturing Systems will also earn a place in the libraries of management and business students interested in manufacturing system cost performance and energy management *Glocalized Solutions for Sustainability in Manufacturing* Jürgen Hesselbach,Christoph

Herrmann,2011-03-19 The 18th CIRP International Conference on Life Cycle Engineering LCE 2011 continues a long tradition of scientific meetings focusing on the exchange of industrial and academic knowledge and experiences in life cycle assessment product development sustainable manufacturing and end of life management The theme Glocalized Solutions for Sustainability in Manufacturing addresses the need for engineers to develop solutions which have the potential to address global challenges by providing products services and processes taking into account local capabilities and constraints to achieve an economically socially and environmentally sustainable society in a global perspective Glocalized Solutions for Sustainability in Manufacturing do not only involve products or services that are changed for a local market by simple substitution or the omitting of functions Products and services need to be addressed that ensure a high standard of living everywhere Resources required for manufacturing and use of such products are limited and not evenly distributed in the world Locally available resources local capabilities as well as local constraints have to be drivers for product and process innovations with respect to the entire life cycle The 18th CIRP International Conference on Life Cycle Engineering LCE 2011 serves as a platform for the discussion of the resulting challenges and the collaborative development of new scientific ideas

Innovation and Sustainable Manufacturing Carolina Machado,J. Paulo Davim,2022-09-29 Innovation and Sustainable Manufacturing Research and Development addresses the manufacturing sustainability challenge from different points of view drawing on research from different disciplines to shed light on the latest green technologies green product design methods and materials Addressing the needs of practitioners as well as academics this book examines a range of important themes such as environmental impacts and how to assess them how to set boundary conditions to include or exclude downstream supply chains how to improve sustainability without sacrificing productivity the cost benefits of sustainability and how to trace impacts in manufacturing By providing a thorough review of global research in this field Innovation and Sustainable Manufacturing acts as an ideal entry point into this discipline for researchers and a guide to the latest developments for forward thinking practitioners Covers how different stages of the manufacturing supply chain can impact on sustainability Combines research from a variety of disciplines to provide a comprehensive coverage of this complex subject Explores the relationship between sustainability and other goals such as productivity quality and profitability

14th International Symposium on Process Systems Engineering Yoshiyuki Yamashita,Manabu Kano,2022-06-24 14th International Symposium on Process Systems Engineering Volume 49 brings together the international community of researchers and engineers interested in computing based methods in process engineering The conference highlights the contributions of the PSE community towards the sustainability of modern society and is based on the 2021 event held in Tokyo Japan July 1 23 2021 It contains contributions from academia and industry establishing the core products of PSE defining the new and changing scope of our results and covering future challenges Plenary and keynote lectures discuss real world challenges globalization energy environment and health and contribute to discussions on the widening scope of PSE versus the consolidation of the

core topics of PSE Highlights how the Process Systems Engineering community contributes to the sustainability of modern society Establishes the core products of Process Systems Engineering Defines the future challenges of Process Systems Engineering Process Systems Engineering for Biofuels Development Adrian Bonilla-Petriciolet, Gade Pandu Rangaiah, 2020-07-23 A comprehensive overview of current developments and applications in biofuels production Process Systems Engineering for Biofuels Development brings together the latest and most cutting edge research on the production of biofuels As the first book specifically devoted to process systems engineering for the production of biofuels Process Systems Engineering for Biofuels Development covers theoretical computational and experimental issues in biofuels process engineering Written for researchers and postgraduate students working on biomass conversion and sustainable process design as well as industrial practitioners and engineers involved in process design modeling and optimization this book is an indispensable guide to the newest developments in areas including Enzyme catalyzed biodiesel production Process analysis of biodiesel production including kinetic modeling simulation and optimization The use of ultrasonification in biodiesel production Thermochemical processes for biomass transformation to biofuels Production of alternative biofuels In addition to the comprehensive overview of the subject of biofuels found in the Introduction of the book the authors of various chapters have provided extensive discussions of the production and separation of biofuels via novel applications and techniques

Green Manufacturing Processes and Systems Paulo Davim J, 2012-10-30 This book provides the recent advances on green manufacturing processes and systems for modern industry Chapter 1 provides information on sustainable manufacturing through environmentally friendly machining Chapter 2 is dedicated to environmentally friendly machining vegetable based cutting fluids Chapter 3 describes environmental friendly joining of tubes Chapter 4 contains information on concepts methods and strategies for zero waste in manufacturing Finally chapter 5 is dedicated to the application of hybrid MCDM approach for selecting the best tyre recycling process This book serves as a research book for students at final undergraduate engineering course or at postgraduate level It is a reference for professionals in industries related to manufacturing and new green jobs green products renewable energy green services and environmental conservation

Industrial Resource Utilization and Productivity Anil Mital, Ph.D., 2010-08-16 This new compendium of recent advances in the use of modern technology and management concepts from distributed virtual manufacturing enterprises to integrating green technology in a cost effective manner to materials and energy savings will offer engineers and technical managers the needed insight to plan for future growth and success Greater utilization and availability of resources in the workplace are directly related to better design and better engineering in the manufacturing economy The book will explore how energy efficient smart materials and structures hold tremendous potential for realizing cost savings and improving energy use in the modern industrial workplace It will also show how industrial engineers have developed a variety of analytical and computer based tools and technologies for planning forecasting and scheduling resources including time labor and more recently

energy Readers will also find New trends in i Manufacturing Finding optimal ways to distribute goods and services Human Resources Management in the context of efficient manufacturing Resources Planning Forecasting and Scheduling Distribution Logistics and Supply Chain Optimization Green Design and Manufacturing **Mechanical Engineering** ,2008

RTD Info ,2002 **Governance of Innovation Systems: Case studies in cross-sectoral policy** Organisation for Economic Co-operation and Development,2005 This book provides lessons from case studies in policy governance for the information society and sustainable development It highlights important lessons from these policy areas for the governance of innovation policy and illustrates mechanisms and practices for better co ordination and integration across policy areas

Maynard's Industrial and Systems Engineering Handbook, Sixth Edition Bopaya Bidanda,2022-09-16 The classic industrial engineering resource fully updated for the latest advances Brought fully up to date by expert Bopaya M Bidanda this go to handbook contains exhaustive application driven coverage of Industrial Engineering IE principles practices materials and systems Featuring contributions from scores of international professionals in the field Maynard s Industrial Engineering Handbook Sixth Edition provides a holistic view of exactly what an Industrial Engineer in today s world needs to succeed All new chapters and sections cover logistics probability and statistics supply chains quality product design systems engineering and engineering management Coverage includes Productivity Engineering economics Human factors ergonomics and safety Compensation management Facility logistics Planning and scheduling Operations research Statistics and probability Supply chains and quality Product design Manufacturing models and analysis Systems engineering Engineering management The global Industrial Engineer IE application environments **Energy Efficiency in Strategy of Sustainable Production Vol. II** Jörg Franke,Sven Kreitlein,2016-11-10 Selected peer reviewed papers from the 3rd Green Factory Bavaria Colloquium 2016 November 30 December 1 2016 Convention Center Nuremberg Germany **Governance of Innovation Systems: Volume 3: Case Studies in Cross-Sectoral Policy** Organisation for Economic Co-operation and Development Staff,2005 **Web-based Green Products Life Cycle Management Systems** Hsiao-Fan Wang,2009-01-01 Despite being a relatively new field of research and development green management has drawn much attention from researchers and practitioners Facing critical impacts to its environment a strategic change to integrate supply chain management on green products needs a solid base for decision making Web Based Green Products Life Cycle Management Systems Reverse Supply Chain Utilization provides a comprehensive review of current and potential research in green management and control A unique collection in the growing field of green products this book is a must have for new and experienced researchers as well as practitioners and academicians alike **Sustainable Industries Journal** ,2008

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