Cellular Manufacturing Systems Design Planning And Control

Group Technology and Cellular Manufacturing (GT/CM) have been widely-researched areas in the past 15 years and much progress has been made in all branches of GT/CM. Resulting from this research activity has been a proliferation of techniques for part-machine grouping, engineering data bases, expert system-based design methods for identifying part families, new analytical and simulation tools for evaluating performance of cells, new types of cell incorporating robotics and flexible automation, team-based approaches for organizing the work force and much more; however, the field lacks a careful compilation of this research and its outcomes. The editors of this book have commissioned leading researchers and implementers to prepare specific treatments of topics for their special areas of expertise in this broad-based philosophy of manufacturing. The editors have sought to be global both in coverage of topic matters and contributors. Group Technology and Cellular Manufacturing addresses the needs and interests of three groups of individuals in the manufacturing field: academic researchers, industry practitioners, and students. (1) The book provides an up-to-date perspective, incorporating the advances made in GT/CM during the past 15 years. As a natural extension to this research, it synthesizes the latest industry practices and outcomes to guide research to greater real-world relevance. (2) The book makes clear the foundations of GT/CM from the core elements of new developments which are aimed at reducing developmental and manufacturing lead times, costs, and at improving business quality and performance. (3) Finally, the book can be used as a textbook for graduate students in engineering and management for studying the field of Group Technology and Cellular Manufacturing.

The need for increasing productivity in batch manufacturing has led to the concepts of group technology (GT) and cellular manufacturing (CM). Cellular Manufacturing is the application of Group Technology. The advantages derived from cellular manufacturing include reduced number of setups, reduced material handling costs, decreased work-in-process inventories, improved work space utilization and simplified planning and scheduling. In this book the following three problems are dealt with new approaches considering more practical information. (1) Design of part families based on design features - (FAFF) (2) Complete design of cellular manufacturing system, along with best layouts - (DECEMOS) (3) Detailed schedules of operations in the cellular manufacturing system - (SICEM) These methods were applied to two companies and found satisfactory results. They were also applied to bench mark problems and found better results. A new criterion named "family index" is suggested in this book, to measure the goodness of part families.

Cellular manufacturing (CM) is the grouping of similar products for manufacture in discrete multi-machine cells. It has been proven to yield faster production cycles, lower in-process inventory levels, and enhanced product quality. Pioneered on a large scale by Russian, British, and German manufacturers, interest in CM methods has grown steadily over the past decade. However, there continues to be a dearth of practical guides for industrial engineers and production managers interested in implementing CM techniques in their plants. Bringing together contributions by an international team of CM experts, the Handbook of Cellular Manufacturing Systems bridges this gap in the engineering literature.

"Engineering Design and Rapid Prototyping" offers insight into the methods and techniques that allow for easily implementing engineering designs by incorporating advanced methodologies and technologies. This book contains advanced topics such as feature-based design and process planning, modularity and rapid manufacturing, along with a collection of the latest methods and technologies currently being utilized in the field. The volume also: -Provides axiomatic design and solution methodologies for both design and manufacturing -Discusses product life cycle development and analysis for ease of manufacture and assembly -Offers applied methods and technologies in rapid prototyping, tooling and manufacturing "Engineering Design and Rapid Prototyping" will be extremely valuable for any engineers and researchers and students working in engineering design.

Modular products are products that fulfill various overall functions through the combination of distinct building blocks or modules, in the sense that the overall function performed by the product can be divided into sub-functions that can be implemented by different modules or components. An important aspect of modular products is the creation of a basic core unit to which different components (modules) can be fitted, thus enabling a variety of versions of the same module to be produced. The core should have sufficient capacity to cope with all expected variations in performance and usage. Components used in a modular product must have features that enable them to be coupled together to form a complex product. Modularity will promote: reduction in product development time; customization and upgrades; cost efficiencies due to amortization; quality design standardization; and reduction in order lead time. The purpose of this book is to develop a structured approach to the design of products using the concept of modularity, assembly, and manufacturability. The book has proposed and developed a structured and systematic approach to product and systems design using the modularity concept. Mathematical and genetic algorithm models are developed to support the developed methodology.

Evolving technologies in mass production have led to the development of advanced techniques in the field of manufacturing. These technologies can quickly and effectively respond to various market changes, necessitating processes that focus on small batches of multiple products rather than large, single-product lines. Formal Methods in Manufacturing Systems: Recent Advances explores this shifting paradigm through an investigation of contemporary manufacturing techniques and formal methodologies that strive to solve a variety of issues arising from a market environment that increasingly favors flexible systems over traditional ones. This book will be of particular use to industrial engineers and students of the field who require a detailed understanding of current trends and developments in manufacturing tools. This book is part of the Advances in Civil and Industrial Engineering series collection.

The book develops manufacturing concepts and applications beyond physical production and towards a wider manufacturing value chain incorporating external stakeholders that include suppliers of raw materials and parts, customers, collaborating manufacturing companies, manufacturing service providers, and environmental organisations. The focal point of the value chain remains as a manufacturing system and its operations whiles flows of parts/materials and information and services across the supply/value chain tiers are taken into account. The book emphasises on the two innovative paradigms of Reconfigurable Manufacturing Systems (RMS) and the 4th industrial revolution (Industry 4.0) along with their incorporated development. RMS, as a relatively new paradigm, has been introduced to meet the requirements of ‘the factories of the future’, which is aimed by Industry 4.0, though introducing greater responsiveness and customised flexibility into production systems, in which changes in product volumes and types occur regularly. Manufacturing responsiveness can be achieved by RMS through reconfiguring the production facilities according to changing demands of products and new market conditions. The book addresses challenges of mass-customisation and dynamic changes in the supply-chain environment by focusing on developing new techniques related to integrability, scalability and re-configurability at a system level and manufacturing readiness in terms of financial and technical feasibility of RMS. It demonstrate the expected impacts of an RMS design on operational performance and its supply/value chain in the current/future manufacturing environment facing dynamic changes in the internal/external circumstances. In order to establish a circular economy through the RMS value chain, an integrated data-based reconfiguration link is introduced to incorporate information sharing amongst the value chain stakeholders and facilitate grouping products into families with allocation of the product families to the corresponding system configurations with optimal product-process allocation. Decision support systems such as multi criteria decision making tools are developed and applied for the selection of product families and optimising product-process configuration. The proposed models are illustrated through real case studies in applicable manufacturing firms.

The biggest challenge in any marketplace is uncertainty. The major changes taking place in world economies, politics, and demographics has raised market uncertainty to its highest level in the past 50 years. However, with new markets opening up in emerging and developing economies, the opportunities have never been better. To compete in this challenging atmosphere, product design/redesign and manufacturing must be integrated to produce better quality products faster and cheaper. Design Synthesis: Integrated Product and Manufacturing System Design provides a conceptual framework and methodologies to do just that. The book explains how to integrate innovative product design with the design of a batch manufacturing system. It covers the technical and social aspects of integration, presents research and best practices, and embeds integration within a framework of sustainable development. It covers the two methods for achieving design synthesis: integration and harmonisation. Product, manufacturing system, and social system architectures are integrated (united or combined to form a whole that is greater than the sum of the parts). The concurrent processes to design the architectures are harmonised (made compatible or coincident with one another). Wide in scope, the book supplies a multi-disciplinary perspective and an extensive discussion on how to maintain integrity during the design process. The authors present research and practices that are difficult or almost impossible to find. They describe the different types of system lifecycles and include guidelines on how to select the appropriate lifecycle for a specific design situation.

“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.

Readers will learn how to integrate quality and reliability control, machine tool maintenance, production and inventory control, and suppliers into the linked-cell system for one-piece parts movement within cells and small-lot movement between cells.

Written by leading authors in the field. Packed with original cases that connect key concepts, this book provides students with core tools and techniques to enable them to design and implement a successful operations strategy. Built on sound academic research and industry best-practice this is an invaluable resource for all students.

Proceedings of China Modern Logistics Engineering covers nearly all areas of logistics engineering technology, focusing on the latest findings and the following theoretical aspects: Logistics Systems and Management Research; Green Logistics and Emergency Logistics; Enterprise Logistics; Material Handling; Warehousing Technology Research; Supply Chain Management; Logistics Equipment; Logistics Packaging Technology; Third-party Logistics, etc. The book will help readers to grasp the relevant aspects of the theory involved, research and development trends, while also offering guidance for their work and related studies. It is intended for researchers, scholars and graduate students in logistics management, logistics engineering, transportation, business administration, E-commerce and industrial engineering.

This book gathers the peer-reviewed papers presented at the 8th edition of the International Workshop “Service Orientation in Holonic and Multi-Agent Manufacturing – SOHOMA’18” held at the University of Bergamo, Italy on June 11–12, 2018. The objective of the SOHOMA annual workshops is to foster innovation in smart and sustainable manufacturing and logistics systems by promoting new concepts, methods and solutions that use service orientation of agent-based control technologies with distributed intelligence. Reflecting the theme of SOHOMA’18: “Digital transformation of manufacturing with agent-based control and service orientation of Internet-scale platforms”, the research included focuses on how the digital transformation, as advocated by the “Industry 4.0”, “Industrial Internet of Things”, “Cyber-Physical Production Systems” and “Cloud Manufacturing” frameworks, improves the efficiency, agility and sustainability of manufacturing processes, products, and services, and how it relates to the interaction between the physical and informational worlds, which is implemented in the virtualization of products, processes and resources managed as services.

This is an invaluable five-volume reference on the very broad and highly significant subject of computer aided and integrated manufacturing systems. It is a set of distinctly titled and well-harmonized volumes by leading experts on the international scene.The techniques and technologies used in computer aided and integrated manufacturing systems have produced, and will no doubt continue to produce, major annual improvements in productivity, which is defined as the goods and services produced from each hour of work. This publication deals particularly with more effective utilization of labor and capital, especially information technology systems. Together the five volumes treat comprehensively the major techniques and technologies that are involved.

A technological book is written and published for one of two reasons: it either renders some other book in the same field obsolete or breaks new ground in the sense that a gap is filled. The present book aims to do the latter. On my return from industry to an academic career, I started writing this book because I had seen that a gap existed. Although a great deal of information appeared in the published literature about various technical aspects of advanced manufacturing technology (AMT), surprisingly little had been written about the systems con text within which the sophisticated hardware and software of AMT are utilized to increase efficiency. Therefore, I have attempted in this book to show how structured approaches in the design and evaluation of modern manufacturing plant may be adopted, with the objective of improving the performance of the factory as a whole. I hope this book will be a contribution to the newly recognized, multidisciplinary engineering function known as manufacturing sys tems engineering. The text has been designed specifically to demonstrate the systems aspects of modern manufacturing operations, including: systems con cepts of manufacturing operation; manufacturing systems modelling and evalua tion; and the structured design of manufacturing systems~ One of the major difficulties associated with writing a text of this nature stems from the diversity of the topics involved. I have attempted to solve this problem by adopting an overall framework into which the relevant topics are fitted.

This book provides the latest up-to-date documentation on the scope of research in Group Technology (GT) and Cellular Manufacturing (CM). It is a comprehensive listing of the methodologies, techniques, algorithms and tools used for practical implementation of the concepts of GT and CM.

Batch manufactcring is a dominant manufacturing activity in the world, generating a great deal of industrial output. In the coming years, we are going to witness an era of mass customization of products. The major problems in batch manufacturing are a high level of product variety and small manufacturing lot sizes. The product variations present design engineers with the problem of designing many different parts. The decisions made in the design stage significantly affect manufacturing cost, quality and delivery lead times. The impacts of these product variations in manufacturing are high investment in equipment, high tooling costs, complex scheduling and loading, lengthy setup time and costs, excessive scrap and high quality control costs. However, to compete in a global market, it is essential to improve the productivity in small batch manufacturing industries. For this purpose, some innovative methods are needed to reduce product cost, lead time and enhance product quality to help increase market share and profitability. What is also needed is a higher level of integration of the design and manufacturing activities in a company. Group technology provides such a link between design and manufacturing. The adoption of group technology concepts, which allow for small batch production to gain economic advantages similar to mass production while retaining the flexibility of job shop methods, will help address some of the problems.

Planning, Design, and Analysis of Cellular Manufacturing SystemsNewnes

When it comes to facilities planning, engineers turn to this book to explore the most current practices. The new edition continues to guide them through each step in the planning process. The updated material includes more discussions on economics, the supply chain, and ports of entry. It takes a more global perspective while incorporating new case studies to show how the information is applied in the field. Many of the chapters have been streamlined as well to focus on the most relevant topics. All of this will help engineers approach facilities planning with creativity and precision.

Essential reading on the latest advances in virtual prototyping and rapid manufacturing. Includes 110 peer reviewed papers covering: 1. Biomanufacturing, 2. CAD and 3D data acquisition technologies, 3. Materials, 4. Rapid tooling and manufacturing, 5. Advanced rapid prototyping technologies and nanofabrication, 6. Virtual environments and

The three volumes IFIP AICT 438, 439, and 440 constitute the refereed proceedings of the International IFIP WG 5.7 Conference on Advances in Production Management Systems, APMS 2014, held in Ajaccio, France, in September 2014. The 233 revised full papers were carefully reviewed and selected from 271 submissions. They are organized in 6 parts: knowledge discovery and sharing; knowledge-based planning and scheduling; knowledge-based sustainability; knowledge-based services; knowledge-based performance improvement, and case studies.

Fierce global competition in manufacturing has made proficient facilities planning a mandatory issue in industrial engineering and technology. From plant layout and materials handling to quality function deployment and design considerations, Manufacturing Facilities: Location, Planning, and Design, Third Edition covers a wide range of topics crucial to the efficiency of a well-planned facility. Proper Planning Thoroughly updated and revised, the third edition of this classic volume provides the information and analytical tools necessary to move from product designs to production plans and then details all of the planning techniques needed to build a manufacturing facility where safety, efficiency, and profit are interdependent. Divided into two parts, the first section describes all the factors involved in setting up a manufacturing plant. It covers product design, the choice of manufacturing processes, and plant layout, as well as production, material-handling, and storage systems. The author also highlights the importance of the selection of labor resources. Proper Location The second part examines subjective aspects, such as how to maximize efficiency and save resources. It discusses how to choose the best location and how to assign customers to each facility to minimize the overall cost of operation. It also reviews the process of selecting sites for proximity to emergency service facilities, and explains how to determine the best layout within a building for tool rooms, materials, machining, shipping, inspection, and other departments. Proper Attitude Wise planning results in efficient allocation of available resources for any project. This comprehensive reference empowers engineers, facility planners, and students in manufacturing programs to effectively develop both the method and the mindset required to create an efficient and integrated production facility.

To date, reconfigurable manufacturing systems (RMSs) are among the most effective manufacturing styles that can offer manufacturers an alternative way of facing up to the challenges of continual changes in production requirements within the global, competitive and dynamic manufacturing environments. However, availability of optimal process plans that are suitable for reconfigurable manufacturing is one of the key enablers - yet to be fully unlocked - for realizing the full benefits of true RMSs. To unlock the process planning key and advance the state of art of reconfigurable manufacturing in the manufacturing industry, a number of questions need to be answered: (i) what decision making models and (ii) what computational techniques, can be applied to provide optimal manufacturing process planning solutions that are suitable for logical reconfiguration in manufacturing systems? To answer these questions, you must understand how to model reconfigurable manufacturing activities in an optimization perspective. You must also understand how to develop and select appropriate optimization techniques for solving process planning problems in manufacturing systems. To this end, Process Planning Optimization in Reconfigurable Manufacturing Systems covers: the design and operation of RMSs, optimal process planning modelling for reconfigurable manufacturing and the design and implementation of heuristic algorithm design techniques. The author explores how to: model optimization problems, select suitable optimization techniques, develop optimization algorithms, comparatively analyze the performance of candidate metaheuristics and how to investigate the effects of optimal process planning solutions on operating levels in manufacturing systems. This book delineates five alternative heuristic algorithm design techniques based on simulated annealing, genetic algorithms and the boltzmann machine that are tasked to solve manufacturing process planning optimization problems in RMSs. After reading this book, you will understand: how a reconfigurable manufacturing system works, the different types of manufacturing optimization problems associated with reconfigurable manufacturing, as well as the

conventional and intelligent techniques that are suitable for solving process planning optimization problems. You will also be able to develop and implement effective optimization procedures and algorithms for a wide spectrum of optimization problems in design and reconfigurable manufacturing."

Production and manufacturing management since the 1980s has absorbed in rapid succession several new production management concepts: manufacturing strategy, focused factory, just-in-time manufacturing, concurrent engineering, total quality management, supply chain management, flexible manufacturing systems, lean production, mass customization, and more. With the increasing globalization of manufacturing, the field will continue to expand. This encyclopedia's audience includes anyone concerned with manufacturing techniques, methods, and manufacturing decisions.

Agile manufacturing is defined as the capability of surviving and prospering in a competitive environment of continuous and unpredictable change by reacting quickly and effectively to changing markets, driven by customer-designed products and services. Critical to successfully accomplishing AM are a few enabling technologies such as the standard for the exchange of products (STEP), concurrent engineering, virtual manufacturing, component-based hierarchical shop floor control system, information and communication infrastructure, etc. The scope of the book is to present the undergraduate and graduate students, senior managers and researchers in manufacturing systems design and management, industrial engineering and information technology with the conceptual and theoretical basis for the design and implementation of AMS. Also, the book focuses on broad policy directives and plans of agile manufacturing that guide the monitoring and evaluating the manufacturing strategies and their performance. A problem solving approach is taken throughout the book, emphasizing the context of agile manufacturing and the complexities to be addressed.

Winner of the 2003 Shingo Prize! Reorganizing work processes into cells has helped many organizations streamline operations, shorten lead times, increase quality, and lower costs. Cellular manufacturing is a powerful concept that is simple to understand; however, its ultimate success depends on deciding where cells fit into your organization, and then applying the know-how to design, implement and operate them. Reorganizing the Factory presents a thoroughly researched and comprehensive "life cycle" approach to competing through cellular work organizations. It takes you from the basic cell concept and its benefits through the process of justifying, designing, implementing, operating, and improving this new type of work organization in offices and on the factory floor. The book discusses many important technical dimensions, such as factory analysis, cell design, planning and control systems, and principles for lead time and inventory reduction. However, unique to the literature, it also covers in depth the numerous managerial issues that accompany organizing work into cells. In most implementations, performance measurement, compensation, education and training, employee involvement, and change management are critically important. These issues are often overlooked in the planning process, yet they can occupy more of the implementation time than do the technical aspects of cells. Includes: Why do cells improve lead time, quality, and cost? Planning for cell implementation Justifying the move to cells, strategically and economically Designing efficient manufacturing and office cells Selecting and training cell employees Compensation system for cell employees Performance and cost measurement Planning and control of materials and capacity Managing the change to cells Problems in designing, implementing, and operating cells Improving and adapting existing cells Structured frameworks and checklists to help analysis and decision-making Numerous examples of cells in various industries

If one accepts the premise that there is no wealth without production, whether at the individual or national level, one is immediately led to the conclusion that the study of productive systems lies at the forefront of subjects that should be intensively, as well as rationally and extensively, studied to achieve the desired 'sustainable growth' of society, where the latter is defined as growth in the quality of life that does not waste the available resources in the long run. Since the end of World War II there has been a remarkable evolution in thinking about production, abetted to a large measure by the nascent field of informatics: the computer technology and the edifices that have been built around it, such as information gathering and dissemination worldwide through communication networks, software products, peripheral interfaces, etc. Additionally, the very thought processes that guide and motivate studies in production have undergone fundamental changes which verge on being revolutionary, thanks to developments in operations research and cybernetics.

Sustainability is increasingly becoming a crucial concern in many aspects of life. Even though, there is a relatively growing interest from both academic researchers and practitioners in various design aspects of sustainability, one can see that design issues of sustainable manufacturing systems have not received adequate attention. Through an extensive literature review on design for sustainability and sustainability issues, it is observed that, attaining sustainability in manufacturing needs a huge amount of effort and needs to take into consideration many aspects from different perspectives. These include considering the sustainability in both the closed loop supply chain (CLSC) and the manufacturing system levels simultaneously, considering Cellular Manufacturing Systems (CMSs), considering reconfigurability for the production systems, considering Hybrid Manufacturing-Remanufacturing Systems as well as considering the recovery options such as recycling and remanufacturing. This research presents a simultaneous investigation of Reconfigurable Cellular Manufacturing Systems and Hybrid Manufacturing-Remanufacturing Systems (HMRSs), and proposes an integrated approach in design optimization, analysis, and process planning aspects as an attempt to address to a large number of design issues for Sustainable Manufacturing Systems, while the options of remanufacturing, recycling, and disposing are introduced. Four mathematical model have been developed. Third part cellular remanufacturing systems design are considered within the first model, which is initially formulated as a mixed integer non-linear program that incorporates multi-period production planning, dynamic system reconfiguration, and workforce management with deterministic production requirements. It consists the costs of machines maintenance and overhead, relocation costs for machines installation and removal, part holding cost, workers' costs of salary, hiring, and firing, part intercellular movement cost, machine procurement cost, internal production cost, machine operating cost, the cost of acquiring the returned products, setup cost for disassembly operations, disassembly cost, the inventory cost of the returned products, parts disposal cost. Linearization procedures are proposed to convert it into a linearized mixed integer programming formulation. This linearized mixed integer program is solved using an exact solution (ES) procedure through the simplex-based branch and cut procedure of CPLEX software. The second model considered the design of cellular hybrid manufacturing-remanufacturing system, where manufacturing new products using an outsourced parts and remanufacturing using returned products are performed in the same facility by using shared resources. The overall objective of the model is to minimize the total cost of the three main categories of costs; 1) Machine cost: maintenance and overhead costs, relocation costs of installation and removal of machines, machine

procurement costs, and machine operating costs, 2) Costs associated with manufacturing and remanufacturing: production costs for both new and remanufactured components, holding cost for new components, holding cost for remanufactured components, setup cost for new components, setup cost for remanufactured components, 3) Costs associated with returned products for remanufacturing: cost of acquiring the returned products, setup cost for disassembly operations, disassembly cost, and inventory cost of the returned products. Computational results and sensitivity analysis for an important design features are also reported.The third model addresses the same attributes as the second one but an important extension is the introduction of recycling (for the end-of-life parts) and disposing of the parts with no further use. In addition, the new parts production in the third model are totally depends on the recycled parts coming from the recycling center, wherein the second model it depends on the raw material purchasing from outsourcing. As the third model is the most comprehensive one, which considers a closed loop supply chain starts from a cellular hybrid manufacturing-remanufacturing system and ends with the customer zone, through the introducing of different centers like, collection, disassembly, and recycling centers, and in order to have one more step toward the design of sustainable closed loop supply chain, the fourth model are formulated. The fourth model is designed to minimize the carbon foot prints and the total cost which contains the opening costs for different centers and the transportation costs between these centersKeywords: Sustainability, Sustainable manufacturing system, cellular manufacturing systems design, Reconfigurable manufacturing system, mixed integer programming, Hybrid manufacturing-remanufacturing system, Closed loop supply chain, Reverse logistics, Carbon footprints, Facility location.

Leading researchers in the field of cellular manufacturing systems from academia and industry have contributed to this volume. The book aims to report the latest developments and address the central issues in the design and implementation of cellular manufacturing systems. Cellular Manufacturing (CM) is one of the major concepts used in the design of flexible manufacturing systems. CM, also known as group production or family programming, can be described as a manufacturing technique that produces families of parts within a single line or cell of machines. The first part of the book describes various techniques for design and modeling of cellular manufacturing systems. The second part is concerned with performance measure and analysis, followed by a section which presents the applications of artifical intelligence and computer tools in cellular manufacturing systems.

In today’s business world, competitiveness defines the industrial leading edge. Organizations and businesses of all sizes are adopting Lean manufacturing practices to increase efficiency and address worries about their bottom lines. In a detailed review of this staple of Lean manufacturing, Cellular Manufacturing: Mitigating Risk and Uncertainty outlines how cellular manufacturing can do just that. It demonstrates how this approach can help you and your teams build a variety of products with as little waste as possible. The book begins by presenting a survey of the current state of existing methods that can best be used in the handling of the bottleneck machines and parts problem, which results from the cellular manufacturing system design. It then explores how decision making under risk is used to help the designer select the best cell arrangement in case of probabilistic production volume and maximize the profit imposed by resource capacity constraints. The author then presents a method for the system design of a manufacturing cell that aims for profit maximization over a certain period of time. He also discusses robust design, illustrated with a real application. Put simply, cellular manufacturing integrates machinery and a small team of staff, directed by a team leader, so all the work on a product or part can be accomplished in the same cell eliminating resources that do not add value to the product. A concise yet unique reference, this book incorporates decision making under risk into cellular manufacturing. The text makes the link that ties cellular manufacturing to the bottom line. It helps you recognize savings opportunities from elimination of downtime between operations, decreased material handling costs, decreased work-in-progress inventory and associated costs, reduced opportunity for handling errors, decreased downtime spent waiting for supplies or materials, and reduced losses from defective or obsolete products.

The book includes papers on a wide range of emerging research topics spanning theory, systems and applications of computing and communication technologies viz. Nonlinear Dynamics in Cryptography, Discrete domain Swarm Robotics, Machine Learning, Facility Layout Problem, Crowdfunding Projects, Deep Learning, MHD Nanofluid Flow, Medical Diagnostics, Human Computer Interface, Social Networking, System Performance, Wireless Sensor Networks, Cognitive Radio Networks, Antenna Design etc.; presented at the 11th International Conference on Advanced Computing and Communications Technologies (11th ICACCT 2018) held on 17-18 February, 2018 at Asia Pacific Institute of Information Technology, Panipat, India.

The chapters included in this book represent the work from the US, Canada, Japan, China, India, Iran, Netherlands, Turkey, Slovakia, and Portugal. The book attempts to cover the cellular manufacturing area from various angles. In terms of solution techniques, different approaches such as heuristics, mathematical models, networks models, genetic algorithm approaches, artificial neural networks, knowledge-based algorithms, a space search algorithm, simulated annealing, fuzzy concepts, analytic hierarchy processes and simulation are included in the book. As for performance measures, most chapters target a single objective whereas some others cover multiple objectives. In terms of the complexity of the problems, the authors divide them into simpler single phase problems versus more complex problems that require multiple-phase solutions. Most of the chapters discuss deterministic problems. On the other hand, a few of the chapters focus on stochastic cases. There are many new concepts and solution approaches covered in this book. The details of the material coverage is listed in the following paragraphs. The book starts with the evolution of cellular manufacturing. In terms of design-related issues, it covers the application of math modeling for cell formation, family and subfamily formation, production system selection, formation and evaluation of design alternatives, machine layout, dynamic cells, virtual cells, cell formation considering alternative routes, remainder cells, cell formation with product of life cycle considerations, demand-variability based cell formation, layered cellular design, assembly cells and a recent Japanese proposition called SERU cells. All types of cells, namely labor-intensive cells, machine-intensive cells and robotic cells are covered in the book. In terms of operational and control issues, human skills, manpower allocation, cell size determination, dispatching rules, parallel machine scheduling, flowshop scheduling, re-entrant flowshop scheduling, flexible job shop scheduling, assembly line balancing, process planning and scheduling, multiple-resource scheduling, cell loading and cell scheduling, synchronized flow, planning concepts such as period batch control, polka, Kanban, conwip and more are discussed. Cases studies include electromechanical assembly, bicycle manufacturing, igniter assembly system, jewelry manufacturing and semi-conductor industry. We believe that this book will be of value to students, researchers, academicians and practitioners.

"This book explores the recent advancements in the areas of lean production, management, and the system and layout design for manufacturing environments, capturing the building blocks of

lean transformation on a shop floor level"--
"This book presents advancements in the field of operations management, focusing specifically on topics related to layout design for manufacturing environments"--Provided by publisher.