Concurrent Engineering Fundamentals

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An Elegant Puzzle Springer Science & Business Media

BACKGROUND There is an increasing awareness that 'time to market' is the key competitive issue in the manufacturing industry today. The global markets are demanding products that are well designed, are of high quality and are at low prices with ever decreasing lead times. Hence manufacturers are forced to utilize the best methods of technology with efficient control and management accompanied by suitably enabling organizational structures. Concurrent engineering (CE) is widely seen to be the methodology that can help satisfy these strenuous demands and keep the profitability and viability of product developers, manufacturers and suppliers high. There have been many reported successes of CE in practice. Rover were able to launch Land Rover Discovery in 18 months as compared with 48-63 months for similar products in Europe. Because of its early introduction to the market it became the best selling product in its class. AT&T report part counts down to one ninth of their previous levels and quality one hundred times (in surface defects) for VLSI (very improvements of large scale integration) circuits as a result of using the CE approach. WHO SHOULD READ THIS TEXT? This book will aim to provide a sound basis for the very diverse subject known as concurrent engineering. Concurrent engineering is recognized by an increasingly large proportion of the manufacturing industry as a necessity in order to compete in today's markets. This recognition has created the demand for information, awareness and training in good concurrent engineering practice.

Concurrent Engineering in the 21st Century John Wiley & Sons

Presenting a systematic approach to concurrent engineering (CE), this reference accommodates the small corporation's quest to incorporate better design management practices. The author provides an easy-to-follow methodology that eliminates the need for costly consultants and promotes environmentally friendly solutions and introduces three main design models to aid in new, evolutionary, and incremental product design. She examines how the adoption of CE practices improves overall performance. Topics include: engineering specifications for product parameters, conceptual and embodiment design, vendor selection and approval, prototyping, line and equipment installation, and more.

Concurrent Engineering Fundamentals: Integrated product and process organization John Wiley & Sons

This work offers a step-by-step approach to the overall concurrent engineering (CE) development process, presenting both fundamental principles and advanced concepts, while focusing on rapid product development and cost-effective designs. The book also provides an introduction to Cost Driven Design, with specific examples on how to minimize expenses by understanding the basis of product costs. The process of concurrent engineering is explained from initial planning to production start-up.

Social Manufacturing: Fundamentals and Applications Routledge

Increasing intensity surrounding globalization of manufacturing and its competitive environment force a much higher 'expectation' of design as falling within the 'optimum range of parameters.' This new book explains how the CE Design process provides a stable, repeatable process through which increased accuracy is achieved. Section I: The Business Environment Surrounding Concurrent Engineering Design includes an introduction, asks 'Why' CE Design, explains how CE Design can create a competitive advantage, and addresses CE Design as a world class manufacturing enabler. Section II: Concurrent Engineering Design Business Process Framework looks at CE DesignAs relationship to process management, the design process, and manufacturability process. Section III: Concurrent Engineering Design Architectural and Implementation Framework focuses on CE DesignAs automated infrastructure, and implementation planning for engineering design.

Concurrent Engineering Design Springer Science & Business Media

Concurrent Engineering Techniques and Applications reviews advances in concurrent engineering techniques and applications. An in-depth treatment of the quantitative and economic aspects of concurrent engineering is presented, with emphasis on techniques for measuring the performances of concurrent engineering and for comparing its economic effectiveness with that of traditional engineering. Open systems software standards in concurrent engineering are also discussed. Comprised of 12 chapters, this volume begins with an introduction to techniques for measuring the performances of concurrent engineering and for comparing its economic effectiveness with that of traditional engineering. The next chapter deals with open systems software standards and how to use open systems products effectively in concurrent engineering. The discussion then turns to concurrent product design and manufacturing; the essential issues involved in design-decision support in concurrent/simultaneous engineering; design for manufacturing and assembly and concurrent engineering in electro-optical systems; and the use of visualization in concurrent engineering. The use of multimedia presentation techniques and technology in the concurrent engineering process is also considered, along with techniques in technical documentation. This monograph will be useful to students, academicians, practicing professionals, and research workers.

Simultaneous Engineering for New Product Development Elsevier

These proceedings contain lectures presented at the NATO Advanced Study Institute on Concurrent Engineering Tools and Technologies for Mechanical System Design held in Iowa City, Iowa, 25 May -5 June, 1992. Lectures were presented by leaders from Europe and North America in disciplines contributing to the emerging international focus on Concurrent Engineering of mechanical systems. Participants in the Institute were specialists from throughout NATO in disciplines constituting Concurrent Engineering, many of whom presented contributed papers during the Institute and all of whom participated actively in discussions on technical aspects of the subject. The proceedings are organized into the following five parts: Part 1 Basic

Concepts and Methods Part 2 Application Sectors Part 3 Manufacturing Part 4 Design Sensitivity Analysis and Optimization Part 5 Virtual Prototyping and Human Factors Each of the parts is comprised of papers that present state-of-the-art concepts and methods in fields contributing to Concurrent Engineering of mechanical systems. The lead-off papers in each part are based on invited lectures, followed by papers based on contributed presentations made by participants in the Institute.

CE Series Springer

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Concurrent Engineering Routledge

A thorough, original guide to using Concurrent Engineering principles to develop products that meet customer needs -- and to do so as quickly and efficiently as possible.This book shows how CE encompasses manufacturing competitiveness, life-cycle management, process reengineering, cooperative workgroups, systems engineering, information modeling, and product, process and organization integration. This book also identifies, for the first time, 25 fundamental CE metrics and measures. These are categorized into four groups: simulations and analysis, product feasibility and quality assessment, design for X-ability assessment, and process quality assessment. The book describes the new process of Concurrent Function Deployment, which allows workgroups to work concurrently on conflicting values and compare notes and common checkpoints. Extensive exercises and illustrations are included throughout. Managers involved in any type of product development.

Intelligent Concurrent Design Society of Manufacturing Engineers

Presents a top-down approach to the design, development, testing and recyclability of products, components and systems across a wide range of industries. Starting with the desired result and working back through the details, it shows how to produce goods, taking into account the challenges of actual manufacture, what the reliability requirements should be, quality control, associated costs, customer needs and more. Additional features include case studies and team negotiating. Also well-illustrated with figures, photographs, charts and tables and includes an extensive bibliography.

Concurrent Engineering Lean Enterprise Institute

This book introduces social manufacturing, the next generation manufacturing paradigm that covers product life cycle activities that deal with Internet-based organizational and interactive mechanisms under the context of socio-technical systems in the fields of industrial and production engineering. Like its subject, the book's approach is multi-disciplinary, including manufacturing systems, operations management, computational social sciences and information systems applications. It reports on the latest research findings regarding the social manufacturing paradigm, the architecture, configuration and execution of social manufacturing systems and more. Further, it describes the individual technologies enabled by social manufacturing for each topic, supported by case studies. The technologies discussed include manufacturing resource minimalization and their socialized reorganizations, blockchain models in cybersecurity, computing and decision-making, social business relationships and organizational networks, open product design, social sensors and extended cyber-physical systems, and social factory and inter-connections. This book helps engineers and managers in industry to practice social manufacturing, as well as offering a systematic reference resource for researchers in manufacturing. Students also benefit from the detailed discussions of the latest research and technologies that will have been put into practice by the time they graduate.

Concurrent Engineering Springer Science & Business Media

The concurrent engineering (CE) approach to product design and development has two major steps: establishing the product realization process, or taxonomy, and applying this methodology to design and develop the total product system. This first volume of the two volume set articulates CE philosophy by illustrating the differences between the best methodologies and what is currently being practiced. Examines the Japanese transformation from rigid, culture-driven companies to world leaders in quality; offers an understanding of the eight primary components of concurrency and simultaneity; describes modeling the concurrent engineering environment and its five essential components; covers the development of a cooperative work-group environment spanned by four concurrent teams.

What Every Engineer Should Know about Concurrent Engineering Stripe Press

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Concurrent Engineering and Design for Manufacture of Electronics Products Prentice Hall

Introducing readers to the methodology of engineering design, the book shows how materials selection comes into play during the design of a component or a structure, and examines such engineering requirements as stress, mode of loading, corrosion, and performance efficiencies of materials. Readers are acquainted with the factors of costs and statuatory requirements, including environmental regulations and recycling, and case studies are integrated throughout to illustrate the selection process.

The Principles of Materials Selection for Engineering Design Springer Science & Business Media

This book is devoted to the most difficult part of concurrent programming, namely synchronization concepts, techniques and principles when the cooperating entities are asynchronous, communicate through a shared memory, and may experience failures. Synchronization is no longer a set of tricks but, due to research results in recent decades, it relies today on sane scientific foundations as explained in this book. In this book the author explains synchronization and the implementation of concurrent objects, presenting in a uniform and comprehensive way the major theoretical and practical results of the past 30 years. Among the key features of the book are a new look at lock-based synchronization (mutual exclusion, semaphores, monitors, path expressions); an introduction to the atomicity consistency criterion and its properties and a specific chapter on transactional memory; an introduction to mutex-freedom and associated progress conditions such as obstruction-freedom and wait-freedom; a presentation of Lamport's hierarchy of safe, regular and atomic registers and associated wait-free constructions; a description of numerous wait-free constructions of concurrent objects (queues, stacks, weak counters, snapshot objects, renaming

objects, etc.); a presentation of the computability power of concurrent objects including the notions of universal construction, consensus number and the associated Herlihy's hierarchy; and a survey of failure detector-based constructions of consensus objects. The book is suitable for advanced undergraduate students and graduate students in computer science or computer engineering, graduate students in mathematics interested in the foundations of process synchronization, and practitioners and engineers who need to produce correct concurrent software. The reader should have a basic knowledge of algorithms and operating systems.

Fundamentals of Engineering Mechanics Springer Science & Business Media

Manufacturers worldwide are faced with unprecedented challenges from international competition, changing production processes and technologies, shorter production life-cycles, market globalization and environmental requirements. Fundamental to meeting these challenges is the understanding and control of information across all stages of the Computer Integrated Manufacturing (CIM) process. Modern Manufacturing presents the state of the art in the information-oriented aspects of CIM and Intelligent Manufacturing Systems. Particular emphasis is placed on the impact of new software engineering technologies, the object-oriented approach, database design, hierarchical control and intelligent systems. The contributions are written by experts from Europe and the USA.

Concurrent engineering fundamentals Routledge

This book presents recent advances in the integration and the optimization of product design and manufacturing systems. The book is divided into 3 chapters corresponding to the following three main topics : - optimization of product design process (mechanical design process, mass customization, modeling the product representation, computer support for engineering design, support systems for tolerancing, simulation and optimization tools for structures and for mechanisms and robots), -optimization of manufacturing systems (multi-criteria optimization and fuzzy volumes, tooth path generation, machine-tools behavior, surface integrity and precision, process simulation), - methodological aspects of integrated design and manufacturing (solid modeling, collaborative tools and knowledge formalization, integrating product and process design and innovation, robust and reliable design, multi-agent approach in VR environment). The present book is of interest to engineers, researchers, academic staff, and postgraduate students interested in integrated design and manufacturing in mechanical engineering.

Concurrent Engineering Fundamentals: Integrated product and process organization New Academic Science Limited

A human-centric guide to solving complex problems in engineering management, from sizing teams to handling technical debt. There ' s a saying that people don ' t leave companies, they leave managers. Management is a key part of any organization, yet the discipline is often self-taught and unstructured. Getting to the good solutions for complex management challenges can make the difference between fulfillment and frustration for teams—and, ultimately, between the success and failure of companies. Will Larson ' s An Elegant Puzzle focuses on the particular challenges of engineering management—from sizing teams to handling technical debt to performing succession planning—and provides a path to the good solutions. Drawing from his experience at Digg, Uber, and Stripe, Larson has developed a thoughtful approach to engineering management for leaders of all levels at companies of all sizes. An Elegant Puzzle balances structured principles and human-centric thinking to help any leader create more effective and rewarding organizations for engineers to thrive in.

An Intelligent Negotation Based Framework to Support Concurrent Engineering Principles in the Engineering Desing of Process Plant CRC Press

This book is intended to introduce and familiarize design, production, quality, and process engineers, and their managers to the importance and recent developments in concurrent engineering (CE) and design for manufacturing (DFM) of new products. CE and DFM are becoming an important element of global competitiveness in terms of achieving high-quality and low-cost products. The new product design and development life cycle has become the focus of many manufacturing companies as a road map to shortening new product introduction cycles, and to achieving a quick ramp-up of production volumes. Customer expectations have increased in demanding high-quality, functional, and user-friendly products. There is little time to waste in solving manufacturing problems or in redesigning products for ease of manufacture, since product life cycles have become very short because of technological breakthroughs or competitive pressures. Another important reason for the increased attention to DFM is that global products have developed into very opposing roles: either they are commodities, with very similar features, capabilities, and specifications; or they are very focused on a market niche. In the first case, the manufacturers are competing on cost and quality, and in the second they are in race for time to market. DFM could be a very important competitive weapon in either case, for lowering cost and increasing quality; and for increasing production ramp-up to mature volumes.

The Principles and Applications of Concurrent Engineering John Wiley & Sons

"The P-51 Mustang—perhaps the finest piston engine fighter ever built—was designed and put into flight in just a few months. Specifications were finalized on March 15, 1940; the airfoil prototype was complete on September 9; and the aircraft made its maiden flight on October 26. Now that is a lean development process!" —Allen Ward and Durward Sobek, commenting on the development of the P-51 Mustang and its exemplary use of trade-off curves. Shingo Research and Professional Publication Award recipient, 2008 Despite attempts to interpret and apply lean product development techniques, companies still struggle with design quality problems, long lead times, and high development costs. To be successful, lean product development must go beyond techniques, technologies, conventional concurrent engineering methods, standardized engineering work, and heavyweight project managers. Allen Ward showed the way. In a truly groundbreaking first edition of Lean Product and Process Development, Ward delivered -- with passion and penetrating insights that cannot be found elsewhere -- a comprehensive view of lean principles for developing and sustaining product and process development. In the second edition, Durward Sobek, professor of Mechanical and Industrial Engineering at Montana State University—and one of Ward ' s premier students—edits and reorganizes the original text to make it more accessible and actionable. This new edition builds on the first one by: Adding five in-depth and inspiring case studies. Including insightful new examples and illustrations. Updating concepts and tools based on recent developments in product development. Expanding the discussion around the critical concept of set-based concurrent engineering. Adding a more detailed table of contents and an index to make the book more accessible and user-friendly. The True Purpose of Product Development Ward ' s core thesis is that the very aim of the product development process is to create profitable operational value streams, and that the key to doing so predictably, efficiently, and effectively is to create useable knowledge. Creating useable knowledge requires learning, so Ward also creates a basic learning model for development. But Ward not only describes the technical tools needed to make lean product and process development actually work. He also delineates the management system, management behaviors, and mental models needed. In this breakthrough text, Ward: Asks fundamental questions about the purpose and " value added " in product development so you gain a crystal clear understanding of essential issues. Shows you how to find the most common forms of " knowledge waste " that plagues product development. Identifies four " cornerstones " of lean product development gleaned from the practices of successful companies like Toyota and its partners, and explains how they differ from conventional practices. Gives you specific, practical recommendations for establishing your own lean development processes. Melds observations of effective teamwork from his military background, engineering fundamentals from his education and personal experience, design methodology from his research, and theories about management and learning from his study of history and experiences with customers. Changes your thinking forever about product development.

Implementing Concurrent Engineering in Small Companies American Society of Mechanical

Engineers

Das Konzept des Simultaneous Engineering (SE) besagt, da ß die Produktplanung alle Abteilungen eines Unternehmens sowie auch dessen Kundenvertreter mit einbezieht. Ziel ist der gemeinsame Informationsaustausch, um den Entwurfs-, Entwicklungs- und Produktionsproze ß des Produktes zu rationalisieren, damit das Endprodukt den Erwartungen und Bed ü rfnissen des Endverbrauchers entspricht. Die US-Automobilindustrie hat SE in den letzten 10 Jahren sehr erfolgreich eingesetzt, um die Kundenzufriedenheit f ü r ihre Produkte zu steigern. Ribbens zeigt anhand von Fallstudien und Anwendungsbeispielen in der Automobilindustrie, da ß SE und neue Produktentwicklungsverfahren auch in anderen Branchen Anwendung finden k ö nnen. Ein topaktuelles und praxisorientiertes Buch, das sich von der breiten Masse der theoretischen Literatur abhebt. (y03/00)