

Concurrent Engineering – A Case Study involving University and Industry

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Abstract

Time to market, competition and manufacturing costs are only some of the reasons why concurrent engineering is an increasingly used methodology for product development. The present paper deals with a case study of university-industry cooperation to develop an improved part for an automotive application, with three main concerns: economic, performance and environmental. Four universities gathered to attack this problem with an automotive company, joined by a technology research center. The very short time span of the project called for the application of concurrent engineering project planning and execution. The brainstorming that ensued resulted in, among other significant outcomes, a new methodology for materials selection. Also, the application of concurrent engineering methods to university-industry collaboration was very successful, regardless of the usual different timings of industry and university.

Keywords

Product development, concurrent engineering, materials selection, manufacturing cost

1 Introduction

Nowadays, any innovation process and particularly product development is a concurrent effort involving engineers, business planners, marketing staff and environmental professionals functioning as integrated teams [Cooper, 2001]. Leading firms are introducing new products with high-perceived quality, forcing other companies to respond accordingly in order to maintain their competitiveness. This dynamic flow of new products is achieved by adopting new product development methods [Rouibah, Caskey, 2003]. Emerging in this context, Concurrent Engineering (CE) is a process in which a number of specialists from different areas work interactively to meet pre-determined targets [Hilmes, Schatz, 2004]. CE philosophy has been discussed since the beginning of the twentieth century, but only in the past decades it has become the main approach in product development, due to the fast development of science and technology and to the increasing multidisciplinary and interdisciplinary nature of current engineering problems [Jian, Oriet, 2005]. Within a product development context the main purposes for CE principles are the creation of products with shortened development process, lower costs and higher quality [Xu, Li, Li, Tang, 2004]. Many studies have been developed in this area; some are focused on information exchange between expertise areas [Yassine, Sreenivas, Zhu, 2006; Wognum, Bondarouk, 2003; Farinha, Gonçalves, Garção, 2003], some explore leadership and team management strategies [Lin, Chai, Wong, Brombacher, 2007; Stach, Pfennig, 2004] and others focus on applications and case studies involving concurrent engineering applied to product development [McBeth, Tennant, Neailey, 2005; Loh, 2005; Xiuchun, Ning, 2005]. Nevertheless, and whatever their approach is, all of them agree that the basic principles of CE rely on concurrent work-flow, cross-functional work teams and early involvement of constituencies, whose competences will be required or will be disturbed at some point along the product development process.

Concurrent Engineering Case Studies

Andrew Kusiak



Concurrent Engineering Case Studies:

Successful Implementation of Concurrent Engineering Products and Processes Sammy G. Shina,1993-12-16 This working guide shows how to put concurrent engineering principles into action using actual case examples from large and small companies The case study approach is augmented with detailed advice and techniques for measuring and analyzing product and process development data A must have reference for every designer and firm that plans or contemplates this efficient and profitable method

Challenges in Organizing and Managing Integrated Product Development Processes P. M. Wognum,P. C. de Weerd-Nederhof,H. Boer,1997 *Innovations in Competitive Manufacturing* Paul M. Swamidass,2012-12-06 *Innovations in Competitive Manufacturing* is an examination of manufacturing innovations both technical and knowledge based Over the recent past technology has created dramatic changes in manufacturing As a result the book focuses on the use of technology in gaining competitive advantage in global manufacturing Forty topics are surveyed in the book organized into thirteen chapters Each topic is a carefully written account by one or more leading researchers in that area This is the first systematic examination of the recent innovations in manufacturing strategy and technology In addition to providing an understanding of these manufacturing innovations the book underscores the strategic importance of creating and sustaining the technological resources to ensure a stable manufacturing economic base The book s purpose is to examine the elements that make today s manufacturers successful Many examples from industry throughout the book will enable the reader to appreciate and comprehend the concepts presented in the article In addition to the technical and innovative information implementation issues concerning new ideas and manufacturing practices are explored within the topical discussions Four in depth descriptions of real life cases provide illustration of key principles The book has been constructed as a reference tool for manufacturing researchers students and practitioners Hence after reading the introduction *Innovation in Competitive Manufacturing From JIT to E Business* any section or topic in the book can be consulted and or read in any sequence the reader may choose *Concurrent Engineering* John R. Hartley,2017-09-20 By simultaneously examining the concerns of design production purchasing finance and marketing from the very first stages of product planning concurrent engineering makes doing it right the first time the rule instead of the exception This should be the first book managers read when they are ready to eliminate waste in the product development process An introductory handbook it gives managers 16 clear guidelines for achieving concurrent engineering and contains abundant case studies of Japanese U S and European company success stories The book also Defines the concurrent engineering task force as a full time multidisciplinary unit of operation Discusses the necessary interdependence of concurrent engineering Quality Function Deployment Total Quality Control and CAD CAM Shows how concurrent engineering can be structured to fit your company and used to gain flexibility and efficiency

[Proceedings of the Second European Conference on Computer-Supported Cooperative Work](#) Liam Bannon, Mike Robinson, K. Schmidt,2012-12-06 **Encyclopedia of Production and**

Manufacturing Management Paul M. Swamidass, 2006-09-21 The Encyclopedia of Production and Manufacturing Management is an encyclopedia that has been developed to serve this field as the fundamental reference work Over the past twenty years the field of production and operations management has grown more rapidly than ever and consequently its boundaries have been stretched in all directions For example in the last two decades production and manufacturing management 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 and mass customization to name a few This explosive growth makes the need for this volume abundantly clear The manufacturing industry thinks and acts more broadly than it did several decades ago The most notable change has been the need for manufacturing managers to think in technological strategic and competitive terms This is a very favorable development and it leads to manufacturing success The entries in this encyclopedia include the most recent technical and strategic innovations in production and manufacturing management The encyclopedia consists of articles of varying lengths The longer articles on important concepts and practices range from five to fifteen pages There are about 100 such articles written by nearly 100 authors from around the world In addition there are over 1000 shorter entries on concepts practices and principles The range of topics and depth of coverage is intended to suit both student and professional audiences The shorter entries provide digests of unfamiliar and complicated subjects Difficult subjects are made intelligible to the reader without oversimplification The strategic and technological perspectives on various topics give this Encyclopedia its distinctiveness and uniqueness The world of manufacturing today is increasingly competitive It is apparent that manufacturers must respond to these competitive pressures with technical and strategic innovation This encyclopedia has been developed to help researchers students and those in the manufacturing industry to understand and implement these ongoing changes in the field

Concurrent Engineering Chanan S. Syan, Unny Menon, 1994 One Concurrent Engineering Concepts Definitions and Issues 1 Introduction to concurrent engineering 2 Concurrent engineering case studies lessons from Ford Motor Company experience Organizational and managerial issues Design maturity Two Essential Techniques for Concurrent Engineering 5 Quality function deployment an overview 6 Design for manufacture Design for assembly Rapid prototyping of physical parts Rapid prototyping of software and hybrid systems Three Product Design Support and Management Tools for Concurrent Engineering 10 Software tools for the product development process 11 The role of knowledge based systems in concurrent engineering 12 Software solutions for concurrent engineering II 13 Strategies for concurrent engineering and sources of further information

An Investigation of Schedule Reduction Techniques for the Engineering and Construction Industry Neil N. Eldin, 1996 *Concurrent Engineering* Andrew Kusiak, 1993-01-12 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 Strategic Management of the Manufacturing Value Chain Umit S. Bititci, Allan S. Carrie, 1998-08-31 Today the Scottish electronics industry employs 40 000 people directly and a further 30 000 in the supply infrastructure There are now more than 550 electronic manufacturing and supplier companies in Silicon Glen In terms of the contribution to the economy electronics is by far the most valuable industry Its value in 1996 was approximately 10 billion and accounted for more than half of Scotland's exports The major product groupings within the industry include PCs laptops and workstations Disk drives cable harnessing Printers keyboards and peripherals Semiconductor devices and PCBs TV VCRs CDs stereos and other consumer electronics Cellular phones and telecommunications products A TMs and funds transfer systems Networking and security systems Navigation and sonar systems Microwave products Power supplies Software and compilers Many of these companies are multi national OEMs who came to Scotland as inward investing companies Early inward investing companies were from USA followed by companies from Japan and more recently from Taiwan and Korea An important segment of the industry is involved in the manufacture of computers including IBM Compaq Digital and Sun In fact approximately 40% of the PCs sold in Europe are built in Scotland With five of the world's top eight computer manufacturers locating a manufacturing base in Scotland there has been an attraction for foreign companies keen to provide service for these multinationals In 1995 96 the supply base output was worth 1 *Flexible Automation and Integrated Manufacturing 1993* M Ahmad, William G. Sullivan, 1993-09-21 Proceedings of the Flexible Automation and Integrated Manufacturing Conference held in Limerick Ireland in June 1993 Fifth International Conference on Factory 2000 - the Technology Exploitation Process, 2-4 April, 1997, 1997 *IEEE/CHMT International Electronic Manufacturing Technology Symposium*, 1991 *Design for Manufacture* American Society of Mechanical Engineers. Winter Annual Meeting, 1992 *Program Manager*, 1990 **IEEE Autotestcon Proceedings**, 1989 *Simultaneous Engineering for New Product Development* Jack Ribbens, 2000-02-14 An integrated highly practical approach to product development using simultaneous engineering Industrial engineers and designers as well as managers working on new product development NPD typically do not have the time or the expertise to get involved in functions outside their immediate area Yet the very nature of NPD requires a number of functions and processes to be performed concurrently This is where simultaneous engineering comes in Simultaneous Engineering for New Product Development offers state of the art integrated coverage of these two hot topics in manufacturing Industry expert Jack Ribbens draws on firsthand experience with the successful application of simultaneous engineering in the automotive industry discussing how this approach can help streamline the entire development and production process resulting in high quality competitive goods He examines all phases of the process devoting a chapter to each key element from market research to design and engineering to manufacturing

selling and customer service and support And while most books on concurrent engineering stress the theoretical aspects of the field Ribbens s book is decidedly practical complete with case studies from the automotive aerospace heavy vehicle and electronic industries that can be applied to any manufactured product With mathematical model development as well as useful graphs checklists and references Simultaneous Engineering for New Product Development will help manufacturing professionals take advantage of new trends and technologies in manufacturing well into the twenty first century *The Structural Engineer* ,1997 **Conference Publication** ,1992 **Manufacturing Review** ,1994

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