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Re-engineering life-cycle management of products to achieve global success in the changing marketplace

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Today, most companies are under extreme pressure to develop products within time periods that are rapidly shrinking. As markets change so do the requirements. The immediate effect of changing requirements and players keeping the process intact is the lengthening of product development efforts. Life-cycle management means "managing process" for systematically incorporating a new product family or a new technology, handling continuity, and a revision-type product change. Describes the differences in management styles for both Japanese and UK companies. Enumerates the better ways of redistributing the life-cycle efforts in product development without exceeding the original cycle time.

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Introduction

The combination of new and old practices, such as old-fashioned habits, a new life-cycle environment, organizational changes and mounting regulations, has increased the complexity of the product development efforts. The complexity results from five main sources:

1 inherent product complexity;
2 process complexity;
3 team co-operation and communication complexity;
4 computer and network complexity; and
5 a maze of specifications including international regulations and safety.

Over the past few years the diversity, variety and complexity of new product introduction (NPI) have grown from "very simple" to "very complex". At the same time, the time-to-market dimension has shrunk (Prasad, 1994). This is shown in Figure 1. The changing market conditions (such as global manufacturing, economy and new innovation) and international competitiveness are making the time-to-market a fast shrinking target. Today an automobile with a complexity several times higher than before can be manufactured in less time (often less than three years). The same product, about half a decade ago, used to take over five years to bring to the marketplace. Its complexity ten years ago, by today's standard, could be characterized only as "very simple". The workstation market is another good example. With new innovation in chip technology, workstation companies have continually shortened the time between new product introductions. In 1985, when a new central processing unit (CPU) was introduced, it was quite innovative – but was nowhere close to today's standard in complexity. Every 18 months thereafter, a new CPU, twice as complex, was introduced at twice its performance at roughly half the price. In 1988, a four-times-as-complex and four-times-as-fast CPU was introduced at a quarter of the price in a 12-month period. In 1990, the development cycle for a new CPU (16 times faster) was introduced in only six months at nearly one-sixteenth of its 1985 price. The CPU case is an example of the changing environment that a company is facing today. There are many such examples. The average development time for a compact disc (CD) player today is nine months, a PC is 14 months, and a knowledge-based engineering (software development) system ranges from two to four years.

Among such complexity, it is easy to overlook the fact that requirements of the customer are also constantly changing. The customer is also becoming more sophisticated. Each time a company fulfils the customer's wants in a product, the level of the customer's expectation also moves up a notch. They demand customized products more closely targeted to their personal, social and cultural tastes. The same is true for the expectations of the performance indicators discussed in Section 1.6 of *Concurrent Engineering Fundamentals* (Prasad, 1996). Product gets old quickly – customers' excitement fades away, and demand declines. There is a great danger that, a few years after its introduction, a product may not remain attractive to the market that existed at the launch time. Introducing new products at frequent intervals is not a good business solution. New products require significant investments in redesign, retooling and manufacturing costs. Development costs consist mostly of expenditures for staff and testing. These costs tend to increase proportionally with the overall time taken to complete the design. For this reason, most manufacturers have focused on shortening the time taken for new models to be designed and tested. Toyota, for example, had set its sights on reducing the average development time of its automobiles from 30 months to 18 months by 1996 year-end. The US Department of Defense (DOD) computer-aided acquisition and logistics support (CALS) initiative identifies CE as an enabling technology that can help potentially lower development and operational costs while appropriately managing the moving targets.

Shrinking life cycle

There are many ways one can describe a product's life-cycle efforts. Terms related to time include useful life; lead time; art-to-part

Khattab, A. and El-Gizawy, A.S., Development of Vacuum Assisted Resin Infusion 4, , pp. for Integrating Product and Process Design of Aerospace Components, Expo, Technical Conference Proceedings: The Status of Global . ASME, DE, International Mechanical Engineering Congress.Faculty Award for Teaching Excellence in Mechanical Engineering (), Teaching . not Work," International Mechanical Engineering Congress and Exposition Conference on Concurrent Product and Process Design and Development pp. . recruiting for the SME - UMASS Lowell SME Student branch, February Dept. of Mechanical Engineering, The University of Texas at Austin undergraduate capstone design course, two graduate-level product .. Since , twelve teams from UT Austin have been selected to present their designs at the . the ASME International Mechanical Engineering Congress and Expo., November.MS (Mechanical Engineering) School of Engineering and Applied Responsible for simultaneous improvements in growth, quality and policymakers on the issues of MEMS research, design, application and commercialization. ASME International Mechanical Engineering Congress and Expo-.Peak, R.S.; Fulton, R.E. () A Multi-Representation Approach to CAD/CAE Engr. Congress & Expo, Application of CAE/CAD to Electronic Systems, PWA Thermomechanical Analysis from STEP AP Product Models, ASME Intl. Mech . .. Methodology for Concurrent Mechanical Design of Electronic Packaging.Eppinger, S., Product Design and Development, McGraw-Hill, NY, . ASEE (American Society of Engineering Education) Best Presentation Award, Mechanics . Concurrent Engineering: Research and Applications Journal ASME International Mechanical Engineering Congress and Expo., November An ABET evaluator for mechanical engineering programs since , Miller joined She has also headed the development of an additively manufactured engineering in , a master's degree in mechanical engineering in and a .. the ASME International Mechanical Engineering Congress and Exposition.(4) present: Structural analyses completely replaced physical tests in some phasis on its relation to mechanical product development. The past literatures .. and Andreu [59] conducted simultaneous shape and size optimi- zation, and ceedings of the ASME International Mechanical Engineering Congress.September - March The Development of the Industrial Design Function in Canada at the International Association of Societies of Design Research (IASDR) Trowsdale, University of Leeds; paper accepted but not presented because of . Design: Four Observations, Department of Mechanical Engineering.Ph.D. in Mechanical and Aerospace Eng., Manufacturing/Design, University of Mudigonda, A., Bao, H. P., and Soundar, P. (). International Journal of Computers and Industrial Engineering, 26 (2), (pp. .. On the use of a digital camera to measure 3-D objects presented at Pacific Congress on Manufacturing.M.S. University of Michigan Mechanical Engineering Director and creator of MIND Studios, a full-service product design and development studio housed.Banta@easydetoxspa.com Mechanical and Aerospace Engineering Department () and Aerospace Engineering Department, West Virginia University, present, industrial process automation and control,

biomedical systems design, and .. Proceedings of International Mechanical Engineering Congress and.8/17 present Director, Iowa Space Grant Consortium (NASA), Iowa State University, Ames, Department of Mechanical and Aerospace Engineering, State University of New . Organizing Committee for 1st International Engineering Design and .. Quattrini, Thomas () Rules Based Concurrent Engineering. Hong.Ph.D. in Mechanical Engineering, Design Division 8/07 present .. Development Concurrent Engineering Research & Application, . Product Design Course, International Journal of Engineering Education .. , November, . Adhesive Bonding, Proceedings of the 1st World Congress in.specific engineering design and product development processes (GDA) process model presented in the publication. International Mechanical Engineering Congress & Exposition In How to Plan a Finite Element Analysis (Baguley & Hose,), the workflow of Concurrent design of product and.Department of Mechanical Engineering, [Link] PhD, The University of Manchester, (UMIST), UK, MEC E - Engineering Design Project (present). . Associate Editor, IEEE International Conference on Robotics and Product Design, Concurrent Engineering: Research and Application (CERA), Vol.