Managing the Engineering Driven Enterprise

Book Outline – Table of Contents

The book will focus on developing and sustaining an engineering driven enterprise (EDE) business approach in which a company designs, and manufacturers a product that require complex engineering analyses and development from concept design through the entire product lifecycle. This book has been designed to deliver a one semester course for either 4th year undergraduate engineering students or a course in M.Eng / MSc degree programmes. The EDE is unique due to the nature of the requirement for extensive upfront engineering design, development and analysis in the product development process. This initial lead-time is necessary to create either highly complex engineered products or unique, often one-of-a-kind end products. These are often referred to as Engineer-to Order (ETO) products. In many instances, the final product is something completely original that has never existed before and needs to be designed from scratch. Growing demand for these products are forcing manufacturing executives to find ways to expedite this process, reduce throughput and operational costs. Because the end product tends to be a complex engineered product, customers engage with the company throughout the entire design and manufacturing phases to ensure their specifications are met.

Typically with the engineered-to-order approach, production information and specifications are constantly moving between the EDE company and the customer. Because most product data (design specifications, requirement files, engineering changes, etc.) are often tossed back and forth several times between the EDE company and the customer, either party can become confused if the exchange of product information is poorly managed. For example, it might be difficult to answer questions like how much and what inventory should be lined up for production or how do we complete the project on time and within cost targets? **This course will work with industrial partners on a live project applying the theory learned in the course.**

Upon course completion, the participants will be able to apply the tools and methods of Engineering driven enterprise management science to:
1) To gain an understanding and appreciation of the principles and applications relevant to management of the Engineer-Driven Enterprise
2) To develop skills necessary to effectively analyze and synthesize the issues ETO companies must address to scale and advance their capabilities in the marketplace.
3) To acquire the analytical skills, tools and methods to scale the enterprise including lean design, lean engineering and manufacturing, voice of customer, process management, Integrated product development, group technology, concurrent engineering, programme management, phase/milestone, agility, knowledge based engineering, expert systems, and ERP for EDE environments.
4) To learn how to design and build a Lean EDE Enterprise Management System from order receipt to shipping, commissioning and ongoing customer support.
5) To understand how to **apply** Lean Engineering and Manufacturing systems are used in the EDE operations
6) To increase the knowledge, and broaden the perspective of the EDE world in which you will contribute your talents as leaders in EDE business operations.
7) To understand the various engineering career path options available in the EDE environment.

Book Structure and Content: Managing the Engineering Driven Enterprise – Tools and Methods is divided into three sections with 12 Chapterules and a fourth section with 3 chapters on collaboration between universities and industry on industrial based project assignments.

Book Chapters

Preface

Part 1–The Engineering Driven Enterprise in Context

Chapter 1 – The Characteristics of the EDE Environment

- Characteristics of the EDE Environments
- Engineer-To-Order Environments
- Strategic Thinking in EDE environments
- EDE Critical Success factors
- Integrated Bodies of Knowledge and Systems Thinking

Chapter 2 – Managing the EDE Fuzzy Front End

- Market Analysis and Segmentation
- Product Planning Brand Launch and Reuse
- Managing EDE new product launch
- EDE pipeline portfolio management

Chapter 3 – Concepts of Lean Engineering & Virtual Product Development (VPD)

- Integrated Product Development / Concurrent Engineering
- Lean Design and Engineering – Design for Manufacture and Assembly
- Virtual Product Development
- Knowledge Driven Engineering (KDE) Product Development

Part 2-EDE Business Processes & Programme Management

Chapter 4 – EDE Business Process Framework

- EDE NPDP Stage/Gate, Phase/Milestone
- EDE Work breakdown structure
- EDE Deliverables Architecture
- Roles and Responsibilities in EDE environments
- EDE metrics

Chapter 5- Project / Program Management Guidelines in EDE

- Programme Management Office
- IPD Task Management

- EDE Project / Programme structuring and planning
- Conducting EDE Programme / Project reviews

Chapter 6- EDE Agile & Lean Product Development

- Value Stream Mapping
- Lean Supply Chain
- Lean Metrics

Part 3 –EDE Value Management Tools and Techniques

Chapter 7 Lean Design and Value Engineering Analysis

- Virtual Product Development
- New Product Development Flow Process and Scheduling
- Design To Cost Methods - Target Costing
- Design For Manufacture / DFMA

Chapter 8– Voice of Customer / Product Management / Planning / QFD

- Rapid Prototyping
- Design Iteration
- House of Quality and OFD

Chapter 9 – Product Lifecycle Management EDE Environments

- PLM Systems and functionality
- Group Technology in Design and Manufacturing
- Engineering Change management

Part 4 – Sustaining an Innovation Culture in EDE Environments

Chapter 10 Organizing for Deployment and Sustaining the Innovative EDE

- EDE Leadership Requirements
- Empower The Team – Integrated Product / Project Team's
- Integrated Product / Project Teams and Collocation

Chapter 11- Managing Change in EDE Enterprise Environments

- The Engineer as Change Agent
- Change Leadership and Consensus Building
- Organizing for Continuous Change in EDE

Chapter 12 – Engineering Career Paths in EDE Enterprise Environments

- The transition from Engineer to Manager
- Engineering Education is a Way of Thinking
- Integrated Apprenticeship Degrees

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Part 5 Universities – Industry Collaboration in EDE Environments

Chapter 13 – The Need for Collaboration

Chapter 14 – Establishing and Collaborative Managing Projects

Chapter 15– Industry/University Collaboration Critical Success Factors.

Appendix

- Discussion Questions and Answers by Chapter
- Integrative Case Studies
- Lecture Enhancement Boxes
- Teaching Notes by Chapter