

# Preface

Today engineering and technology have become important factors in global competitiveness. Under a fierce competitive environment, engineering and technology managers are forced to achieve marketable results by focusing on areas such as speed, quality, and cost. This can only be achieved through effective planning, organization, and integration of rather complex multidisciplinary activities across functional lines, a great amount of people skills, and effective integration of new knowledge. More specifically, it basically means that an effective knowledge of engineering and technology management is absolutely essential for the survival of business and the maintenance of national prosperity in today's fiercely competitive global economy.

Today, there are a large number of books available on engineering management and technology management, but—to the best of my knowledge—there is none that emphasizes tools and applications such as concurrent engineering, reengineering, value engineering, reverse engineering, *total quality management* (TQM), configuration management, software engineering management, and *information technology* (IT) management. Knowledge in these areas is considered essential for engineers and other technical professionals to manage today's business activities effectively.

Currently, information on these areas is mostly available either in specialized books or in articles but not in a single volume. Thus, the main purpose of this book is to satisfy this vital need. This book generally focuses on the structure of concepts rather than the minute details. The sources of much of the material are given in references at the end of each chapter, which will

be useful to readers who desire to delve deeper into specific areas. The book is composed of 17 chapters.

Chapter 1 presents various introductory aspects of engineering and technology management, including history of management, management characteristics and functions, engineering and technology management challenges and skill needs, useful information on engineering and technology management, and scope of the book. Chapter 2 is devoted to organization and the human element and covers topics such as methods of organization, span of control, functions of engineering departments, qualities and activities of engineering managers, and committees and staff meetings.

Chapter 3 presents important tools for making effective engineering and technology management decisions, including decision trees, optimization techniques, discounted cash flow analysis, learning curve analysis, depreciation analysis, fault tree analysis, and forecasting methods. Chapter 4 covers various topics concerning project selection and management. Some of these topics are project selection methods and models, project management techniques, and project manager's responsibilities, qualifications, selection, and reporting.

Chapter 5 is devoted to the management of engineering design and product costing and includes topics such as design types and approaches, engineering design manpower, design reviews and design review team, reasons for product costing, product life cycle costing, and new product pricing. Chapter 6 presents the management of proposals and contracts. This chapter covers topics such as technical proposal types, proposal development procedure, proposal elements, engineering specifications, contract types, contractor selection factors, the contract negotiation approach, and mathematical models for contracting.

Chapters 7 and 8 are devoted to creativity and innovation and concurrent engineering, respectively. Some of the topics covered in Chapter 7 are creativity methods, the creative problem-solving process, and barriers to creative thinking. Chapter 8 includes topics such as concurrent engineering objectives and concepts, the concurrent engineering team, and the concurrent engineering process related methodologies and techniques.

Chapter 9 presents various aspects of value engineering ranging from value engineering objectives to value engineering phases and techniques. Reverse engineering is presented in Chapter 10. This chapter covers topics such as reverse engineering objectives, reverse engineering methods, software reverse engineering, and the reverse engineering team.

Chapter 11 is devoted to configuration management and covers topics such as reasons for having a configuration management system, configuration

management plan and disciplines, the configuration management organization, and software configuration management. Chapter 12 presents various aspects concerning TQM, including TQM principles and elements, TQM methods and techniques, and barriers to TQM success.

Chapter 13 presents maintenance management. This chapter covers topics such as maintenance department functions and organization, a maintenance management approach, effective maintenance management elements, and performance measurement indexes. Chapter 14 is devoted to warranties, ethics, and legal factors and presents topics such as reasons for the warranty needs, warranty types, warranty components and management, need for ethics, general guidelines for ethical behavior, product liability and patents, and copyrights and trademarks.

Chapters 15 and 16 are devoted to two important topics: reengineering and IT management, respectively. Some of the topics covered in Chapter 15 are reengineering facts and figures, the reengineering process, reengineering tools, the reengineering team and manpower, and reengineering guidelines. Chapter 16 includes topics such as IT management–related facts and figures, IT manpower, network management, the client-server system, and human factors in information systems.

Chapter 17 presents various aspects concerning software engineering management. Some of the topics covered are software facts and figures, software engineering project management, useful models for software engineering management, software engineer's functions and skills, and software engineering management standards.

The book will be useful to many individuals including senior level undergraduates and graduate students in engineering or technology management, industrial engineering, manufacturing engineering, production engineering, engineering in general, college and university level teachers, engineering or technology managers, and professional and nonprofessional engineers and technologists.