



# Engineering Management: Challenges in the New Millennium

*By C M Chang*

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**Engineering Management: Challenges in the New Millennium** By C M Chang

This easy-to-read book prepares engineers to fulfill their managerial responsibilities, acquire useful business perspectives, and take on the much-needed leadership roles to meet the challenges in the new millennium. The book is organized in three parts: Part I reviews the basic functions of engineering management; Part II provides backgrounds in cost accounting, financial analysis, financial management and marketing management; and Part III readies the reader for exercising leadership in managing technologies through discussions related to engineers as managers/leaders, ethics, web-based tools, globalization and engineering management in the decades to come. For engineering professionals who have an interest in becoming managers and/or leaders in their field.

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## **Engineering Management: Challenges in the New Millennium By C M Chang Bibliography**

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## **Editorial Review**

### Review

"The topic of the proposed book is interesting and I foresee its wide use as a textbook by numerous engineering programs. I do not recall seeing any other book that would compete with the proposed book. In fact, we have not been able to identify a suitable textbook for years. I like the writing style and the topical coverage. The coverage is well balanced. The author is well established in the area covered in the book. Examples are thoughtful." — Andrew Kusiak, *University of Iowa*

"It is my experience that those managers hailing from an engineering background have a higher failure rate in management than any other functional area. However, the demand for such will be increasing in the years ahead. I believe this text does a great job of clarifying this issue and the reasons for said failure, while simultaneously pointing out steps to guide the engineer for successful transition to management. Therefore, I applaud the author's effort." — Donald R. McNeeley, *Northwestern University*

"The author uses a lot of examples, mentions actual companies, etc. This is a big plus." — Paul R. McCright, *University of South Florida*

"The writing style is a definite strength ...Chang's book is very clear, easy to read, and easy to follow ...The book manages to very effectively cover, in a comprehensive manner, the multitude of concepts relevant to the engineering major." — Julie Dziekan, *University of Michigan - Dearborn*

"This is a well researched, book which appears to be aimed at covering the totality of Engineering Management in the new millennium...there are some very good examples to explain what is meant by the preceding concepts." — Will Lannes, *University of New Orleans*

"Writing style is very important ...the clarity and flow of the book are good...the book's strength is that it covers most of the basic topics in a single volume." — Hojjat Adeli, Lichtenstein Professor, *The Ohio State University*

"I am quite enthusiastic about this text and think it is better than those intro books now out there, especially with his new chapters at the end. His use of examples is very good." — Charles Elliott, *Arizona State University*

### From the Back Cover

***Engineering Management: Challenges in the Near Millennium*** prepares engineers to fulfill their managerial responsibilities, acquire useful business perspectives, and take on the much needed leadership roles to meet the new challenges in the decades ahead. These challenges will include satisfying customer demand with faster, cheaper and better products and services, managing an increasingly diversified workplace, creating and managing global supply chains, applying web-based management/engineering techniques to develop and sustain competitive advantages, and leading in creativity and innovation by transforming emerging technologies into business success.

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Engineers with excellent managerial skills and superior business acumen are needed to lead corporate America in the new century. As the economy grows increasingly global, technologies advance at a faster pace, and the marketplace becomes more dynamic. Consequently, countless industrial companies will need technically trained engineers to turn technological innovations into profitability.

The need for engineering management training is obvious from another point of view. The National Science Foundation estimated in 2000 that about 46 percent of American engineers and scientists were actively working in managerial and administrative capacities. This managerial percentage remained more or less constant across the age groups from under 35 to over 55 years old. As the trend continues, almost one out of every two engineers or scientists will be engaged in managing people, projects, teams, technology, and other resources to add value to their companies.

This book prepares engineers to fulfill their managerial responsibilities, acquire useful business perspectives, and take on much-needed leadership roles to meet the challenges in the new millennium.

A number of themes permeate the book. Value addition, customer focus, and business perspectives are emphasized throughout. Also underlined are discussions of leadership attributes, steps to acquire these attributes, the areas in which engineering managers are expected to add value, the Web-based tools that can be aggressively applied to develop and sustain competitive advantages, the vital tasks of e-transformation, the opportunities offered by market expansion into global regions, and the preparations required for engineering managers to become global leaders.

The book is intended for undergraduate seniors majoring in such disciplines as aerospace, biomedical, chemical, computer, electrical, mechanical, industrial, and systems engineering and for first-year graduate engineering students. The book may also be used as a self-study guide by engineering professionals who aspire to become managers. It should be of value to first-time engineering supervisors or managers who are interested in further advancing their careers along the managerial career path.

The book is organized to contain three major parts: (I) "Functions of Engineering Management," (II) "Business Fundamentals for Engineering Managers," and (III) "Engineering Leadership in the New Millennium."

Part I introduces the basic functions of engineering management such as planning, organizing, leading, and controlling. These functions provide engineers and engineering managers with foundation skills to manage themselves, staff, teams, projects, technologies, and global issues of importance.

Best practices are emphasized as pertinent standards for goal setting and performance measurement. Engineering managers solve problems and minimize conflicts to achieve the company's objectives. They make rational decisions and take lawful and ethical actions. They employ Monte Carlo methods to assess projects that involve risks and uncertainties. Engineering managers engage emerging technologies, motivate a professional workforce of diverse backgrounds, advance new generations of products and services in a timely manner, and constantly surpass the best practices in the industry.

Furthermore, in this book, the roles of engineering managers in strategic planning, employee selection, team building, delegating, decision making, and the management of creativity and innovation are explained. The development of managerial competencies is emphasized.

Part II covers the fundamentals of engineering management, including cost accounting, financial accounting and analysis, managerial finance, and marketing management. This part is constructed to enable engineers

and engineering managers to acquire a broadened perspective with respect to the business and stakeholders of the company and to facilitate their interaction with peer groups and units.

The book also prepares engineering managers to make decisions related to cost, finance, products, services, and capital budgets. Discounted cash flow and internal rate of return analyses are reviewed. These deliberations are of critical importance, as decisions made during the product-design phase typically determine up to 85 percent of the final costs of products. Additional deliberations are presented regarding activity-based costing (ABC) to define indirect costs related to products and services and economic value added (EVA) to determine the real profitability of an enterprise or project above and beyond the cost of capital deployed.

Also introduced is capital formation through equity and debt financing, along with resource allocation concepts based on adjusted present value (APV) for assets in place and option pricing for capital investment opportunities. By appreciating the project evaluation criteria and the tools of financial analyses, engineers and engineering managers will be in a better position to win project approvals. A critical step to developing technological projects is the acquisition and incorporation of customer feedback. For managers to lead, the foremost challenges are indeed the initiation, development, and implementation of major technological projects that contribute to the long-term profitability of the company.

The important roles and responsibilities of marketing in any profit-seeking enterprise are then clarified, along with the supporting contributions expected of engineering managers. Numerous progressive enterprises are increasingly concentrating on customer relationship management to grow their business. Such a customer orientation is expected to continue to serve as a key driving force for product design, project management, plant operations, manufacturing, customer service, and a variety of other engineering-centered activities.

Part III addresses five major topics: engineers as managers and leaders, ethics in engineering and business management, Web-based enablers for engineering and management, globalization, and engineering management in the new millennium. These discussions provide additional building blocks to enhance the preparation for engineers and engineering managers to assume technology leadership positions and to meet the challenges of the new millennium.

Engineers are known to possess a strong set of skills that enable them to do extraordinarily well in certain types of managerial work. However, some engineers may also exhibit weaknesses that prevent them from becoming effective leaders in engineering organizations or even from being able to survive as engineers in the industry. The expected norms of effective leaders are described. Steps enabling engineering managers to enhance their leadership qualities and attune themselves to the value-centered business acumen are explained. Certain outlined steps should be of great value to those engineering managers who want to become better prepared to build new products and services based on technology, to integrate technology into organizations, and to lead technology-based organizations.

Many tried-and-true rules are included that serve as suitable guidelines for engineering managers to become excellent leaders. Above all, engineering managers are expected to point the way with a vision of how to apply company core competencies to add value, to have insight into how to capture opportunities offered by the emerging technologies, and to be innovative in making products and services better, faster, and cheaper, so that they constantly improve customer satisfaction. Also deliberated are the concepts of value addition, customer focus, time to market, mass customization, supply chains, enterprise resources integration, and others.

Although engineers are known to be ranked high in trustworthiness and integrity (ahead of businessmen, bankers, certified public accountants, lawyers, and others), it is important for all engineers and engineering

managers to remain vigilant in observing a code of ethics, to uphold a high standard of honesty and integrity, and to become sensitive to other topics related to ethics.

The changes wrought by the Internet are transforming most aspects of company business, including information dissemination, product distribution, and customer service. As processor design, software programming, and transmission hardware technologies continue to advance, their roles in business will surely grow and affect various functions of engineering management in the future. Progressive engineering managers need to know what Web-based enablers of engineering and management are currently available and which ones can be applied effectually to promote product customization, expedite new products to market, align supply chains, optimize inventory, foster team creativity and innovation, and upgrade customer service. Presented in considerable detail is a comprehensive set of Web-based tools related to product design, manufacturing, project management, procurement, plant operations, knowledge management, and supply-chain management.

Globalization expands the perspectives of engineers and engineering managers further with respect to divergence in culture, business practices, and value. Globalization is a major business trend that will affect innumerable enterprises in the coming decades. Engineers and engineering managers must become sensitized to the issues associated with globalization. They must prepare themselves to contribute to those enterprises wishing to capture new business opportunities offered in the global emerging markets. They need to be aware of the potential effects of job migration due to globalization and to take steps to prepare themselves to meet such challenges. A useful contribution for engineers and engineering managers to make is to create global technical alliances to take advantage of new technological and business opportunities.

Engineering management will face external challenges in the new millennium. What these specific challenges are...

## **Users Review**

### **From reader reviews:**

#### **Anthony Chan:**

This book untitled Engineering Management: Challenges in the New Millennium to be one of several books that best seller in this year, that is because when you read this publication you can get a lot of benefit upon it. You will easily to buy this book in the book retailer or you can order it by way of online. The publisher on this book sells the e-book too. It makes you easier to read this book, because you can read this book in your Cell phone. So there is no reason for your requirements to past this guide from your list.

#### **William Chapman:**

Reading a reserve tends to be new life style in this era globalization. With studying you can get a lot of information which will give you benefit in your life. Having book everyone in this world can certainly share their idea. Publications can also inspire a lot of people. A lot of author can inspire their particular reader with their story or their experience. Not only situation that share in the guides. But also they write about advantage about something that you need instance. How to get the good score toefl, or how to teach children, there are many kinds of book that exist now. The authors these days always try to improve their proficiency in writing, they also doing some analysis before they write for their book. One of them is this Engineering Management: Challenges in the New Millennium.

**Rosa Crowe:**

The book Engineering Management: Challenges in the New Millennium has a lot details on it. So when you read this book you can get a lot of benefit. The book was compiled by the very famous author. The author makes some research previous to write this book. This kind of book very easy to read you will get the point easily after perusing this book.

**Christopher Gaul:**

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