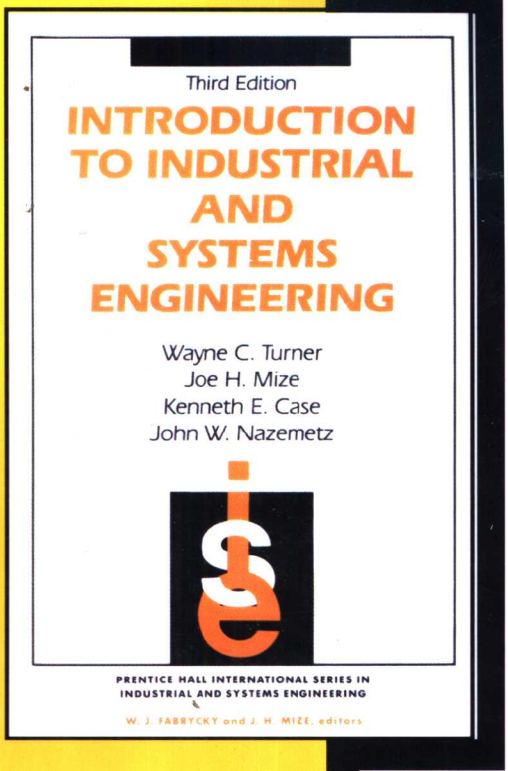
国外大学优秀教材——工业工程系列（影印版）

Wayne C. Turner , Joe H. Mize
Kenneth E. Case , John W. Nazemetz

工业与系统工程概论

（第3版）



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Introduction to Industrial and Systems Engineering

THIRD EDITION

工业与系统工程概论

（第3版）

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Forward

This textbook series is published at a very opportunity time when the discipline of industrial engineering is experiencing a phenomenal growth in China academia and with its increased interests in the utilization of the concepts, methods and tools of industrial engineering in the workplace. Effective utilization of these industrial engineering approaches in the workplace should result in increased productivity, quality of work, satisfaction and profitability to the cooperation.

The books in this series should be most suitable to junior and senior undergraduate students and first year graduate students, and to those in industry who need to solve problems on the design, operation and management of industrial systems.

Gavriel Salvendy

Department of Industrial Engineering, Tsinghua University

School of Industrial Engineering, Purdue University

April, 2002

前　言

本教材系列的出版正值中国学术界工业工程学科经历巨大发展、实际工作中对工业工程的概念、方法和工具的使用兴趣日渐浓厚之时。在实际工作中有效地应用工业工程的手段将无疑会提高生产率、工作质量、合作的满意度和效果。

该系列中的书籍对工业工程的本科生、研究生和工业界中需要解决工程系统设计、运作和管理诸方面问题的人士最为适用。

加弗瑞尔·沙尔文迪
清华大学工业工程系
普渡大学工业工程学院（美国）
2002 年 4 月

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Preface

This book provides an introduction to industrial and systems engineering. It is especially designed for use as a text in an introduction to industrial engineering course. The purpose is to define industrial and systems engineering, describe its place in the business world, and give a broad picture of the functional areas with some solution techniques. The book is also useful to anyone desiring an overview of industrial engineering.

This book is not a detailed text for any of the individual techniques presented, but it does show what an industrial and systems engineer is capable of doing in a wide variety of organizations. Special attention is given to describing situations in which the tools or techniques may be applied. Instead of taking the classical "technique looking for a problem approach," the problems are first described and then the technique(s) applicable to the problems is (are) discussed.

The book is divided into three parts. In Part 1 the history of engineering in general and industrial engineering specifically is given in an attempt to show the range and growth of the discipline's objectives. Then, a modern definition and discussion of industrial and systems engineering are given. They define the purpose and objectives of the discipline and show areas where it is applicable. Part 1 discusses the place of industrial and systems engineering in an organization and how to manage and control the function. Finally, Part 1 introduces the concepts of elementary systems theory and feedback.

Part 2 constitutes the largest portion of the book, with a chapter devoted to each of the major methodologies of the discipline of industrial and systems engineering. For each general area of industrial and systems engineering, a typical problem is presented to provide a concrete framework, and then the tools and techniques appropriate for that situation are developed. The purpose in this approach is to emphasize the proper use of the various techniques. Since modern computing methods have had a significant effect on industrial and systems engineering, almost all chapters in Part 2 discuss computerization of the techniques. Included in Part 2 are some of the newer tools, such as CAD/CAM, robotics, and resource management, as well as tools that have been around for many years. The relationship of industrial engineering to such areas as operations research and ergonomics is emphasized.

Part 3, Integrated Systems Design, is intended to show how the I.E. must bring together all the detailed pieces into an integrated system. Elementary concepts from systems engineering are used as a vehicle for portraying the complex interactions among system components. A chapter is included on computers and information systems because of their critical importance in the design of integrated systems.

Those familiar with the second edition of this book will notice that we have added a new chapter on simulation. All chapters have been thoroughly updated, with some being completely revised. Also, other chapters have been combined and rearranged for a more effective organization of topics.

We are very grateful to our many colleagues who, having taught from the first and second editions of this book, provided many helpful suggestions for the third edition. We have incorporated most of their suggestions, and we feel that the book is stronger because of them. We would also like to thank the following reviewers: Avinash Waikar, Louisiana State University; Roger Berger, Iowa State University; Paul McCright, Kansas State University; Sabah U. Randhawa, Oregon State University; Chris Styliandis, North Dakota State University; John R. English, Texas A & M University; Robert L. Williams, Ohio University; Jill A. Swift, University of Miami; and Timothy J. Greene, Virginia Polytechnic University. We also wish to acknowledge the useful comments offered by many students who have studied using this text.

In using the book at Oklahoma State University for many years, we have found that the course is greatly enhanced through the use of a workbook containing laboratory exercises, which give the students hands-on experience in applying the concepts covered in the text. This workbook is now available from Prentice Hall. We wish to acknowledge the help of our colleagues Pat Koelling and Jim Shamblin in preparing the workbook.

W. C. TURNER
J. H. MIZE
K. E. CASE
J. W. NAZEMETZ

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