

普通高等院校机电工程类规划教材

机械零件设计(双语对照版)

Design of Machine Elements

潘承怡 向敬忠 宋欣 主编

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内 容 简 介

本书采用中、英文对照编排形式,结合近年来“机械设计”课程教学改革的特点编写而成,立足培养面向 21 世纪的高级工程应用型人才,并紧紧围绕以“学”为中心,以“素质提高”为目的的指导思想,力求简明精练、覆盖面广。

本书可以作为普通高等院校机械类本科生或者专科生的双语教材,也可供工程技术人员学习和参考。

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Foreword

The bilingual teaching is becoming a trend for our higher education to interface with the world and to face various challenges of the new century. The reform in bilingual teaching is a strategic choice for our higher education in the twenty-first century. This book provides a solid base for bilingual teaching and meets the immediate needs of our higher education reform for interfacing with the world.

This book was written based on the current practices and needs of education reform in teaching machine design. It targets for fostering application-oriented talents for the twenty-first century. The development of the book is focused on center learning activities and aims at quality education. The contents of the book cover selected topics simplified and extracted for a wide range of readers. The book has the following characteristics:

(1) The bilingual edition represents the outcomes of higher education reform in teaching materials and curriculum development for the 21st century. It emphasizes on the training of application-oriented talents with international views and quality education in basic engineering subjects.

(2) This book is targeted for practical applications with a particular emphasis on the applicability. It emphasizes on basic theory closely related to practical engineering applications. At the end of each chapter, a typical example of design is given. It also emphasizes on comprehensive training in the development of methodologies, bilingual capability and quality education.

(3) The book adopts the newly published national standards.

The figures quoted by the Chinese part of this book are not drawn repeatedly. Please refer to the corresponding English part.

The authors of this book are: PAN Chengyi (Chapter 1, Chapter 2, Chapter 3, Chapter 5, Chapter 6, Chapter 7, Chapter 11, Chapter 12, Chapter 13, Chapter 14 and Appendix), XIANG Jingzhong (Chapter 4 and Chapter 10) and SONG Xin (Chapter 8 and Chapter 9).

Due to various limitations, this book may contain mistakes and all critics and corrections from all experts and readers are welcome.

前 言

双语教学是我国高等教育与国际接轨、迎接新世纪挑战和教育改革发展的必然趋势,也是中国高等教育在 21 世纪必须作出的战略选择。本教材的编写为双语教学创造了一个良好的条件,及时地满足了高等教育与国际接轨这一教育改革形式发展的需要。

本书是结合近年来“机械设计”课程教学改革的特点编写而成的。它立足培养面向 21 世纪的高级工程应用型人才,紧紧围绕以“学”为中心,以“素质提高”为目的的指导思想,力求简明精练、覆盖面广。本教材具有如下特点:

(1) 采用中、英文对照编排形式,充分体现高等教育面向 21 世纪教学内容和课程体系改革的成果,立足于与国际接轨的高级应用型人才培养的特点,重视基本工程素质教育。

(2) 以实用为主导,突出实用性,重点突出了与工程应用密切相关的基本理论,每章末都提供了典型设计例题,重视方法、双语能力、技能等综合素质的培养。

(3) 全书采用了最新颁布的国家标准。

本书中文部分所引插图没有另行绘制,均请参照相应英文部分。

本书的作者有:潘承怡(第 1 章、第 2 章、第 3 章、第 5 章、第 6 章、第 7 章、第 11 章、第 12 章、第 13 章、第 14 章及附录),向敬忠(第 4 章、第 10 章),宋欣(第 8 章、第 9 章)。

由于编者水平有限,书中难免有错误和疏漏,敬请各位专家及广大读者批评指正。

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Chapter 1 Introduction

1.1 Subjects of This Course

Machines consist of parts. Machine parts are components of machines that are manufactured without resorting to assembly operations, such as gears, band pulleys, bolts, nuts, shafts, keys and springs. There may be dozens of parts in a complex machine and even hundreds of thousands. For example, automobiles have over 15 000 parts.

Some parts are united insofar as they usually serve a single purpose. These parts operate together and structurally make up a unit, and are called units or assemblies. Typical examples of such units are couplings, clutches and bearings in their own housings.

Most types of parts are common to all machinery, and called common elements. Few parts considered as specifically designed for the machines of various purposes in which they are found, are called specific parts.

The subjects of the course “Design of Machine Elements” are the basic or more common elements. This book deals with the design and necessary calculations of components of machinery for general engineering application, as well as with certain general problems of machine design.

1.2 Features of This Course

The main features of this course are the following:

(1) Cross nature This course is a cross disciplinary subject that integrates engineering drawing, mathematics, engineering-mechanics science, materials science, machine theory, fits and tolerances, manufacturing technology, etc.

(2) Engineering nature It is an engineering subject which has a close connection with mechanical engineering, and requires continuous integration with engineering regulations and methodologies. Through the learning of the knowledge of this course, one is trained with serious working attitude, meticulous working style and their persistence in complying with related national standards.

(3) Practice nature It is a widely used practical subject integrating both theory and engineering practices. The study enables students to develop their spirit of exploration and innovation, and abilities in design with creativity.

(4) Design nature Machine design is an iterative process. Because of the many affecting factors and the complex calculations, the design cannot be solved directly. Thus it