21世纪高职高专规划教材

电子信息基础系列


# 机电专业英语

蔡战朝 主编　王治刚 黄 星 副主编

清华大学出版社

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北京

## 内容简介

本书内容涉及机械材料的检测和加工、机床及数控机床、计算机辅助工艺设计及制造、工业控制过程及设备、工业控制仪表的使用、控制电路的设计、电路定律、集成电路、模拟和数字传感器、频率-电压转换器、开环和闭环控制、反馈及其作用、计算机接口应用、可编程逻辑控制器、数控机床的操作、数控零件编程、数控机床的维护、数控机床的诊断与维修、汽车基本原理及构造。

全书共18单元，每单元由课文A、课文B和应用文写作三大部分组成。课文A和应用文写作设计为课堂学习，课文B设计为课后阅读。课文A后的练习题量较大，课文B后的练习题量较小。

本书是专门为学过一年以上大学英语或高职英语的学生编写的，可供机电专业学生使用一学期或一年。由于本书涉及面较广，读者可以根据实际情况选用适合本专业的某些单元。



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# 出版说明

高职高专教育是我国高等教育的重要组成部分，担负着为国家培养并输送生产、建设、管理、服务第一线高素质技术应用型人才的重任。

进入21世纪后，高职高专教育的改革和发展呈现出前所未有的发展势头，学生规模已占我国高等教育的半壁江山，成为我国高等教育的一支重要的生力军；办学理念上，“以就业为导向”成为高等职业教育改革与发展的主旋律。近两年来，教育部召开了三次产学研交流会，并启动四个专业的“国家技能型紧缺人才培养项目”，同时成立了35所示范性软件职业技术学院，进行两年制教学改革试点。这些举措都表明国家正在推动高职高专教育进行深层次的重大改革，向培养生产、服务第一线真正需要的应用型人才的方向发展。

为了顺应当前我国高职高专教育的发展形势，配合高职高专院校的教学改革和教材建设，进一步提高我国高职高专教育教材质量，在教育部的指导下，清华大学出版社组织出版了“21世纪高职高专规划教材”。

为推动规划教材的建设，清华大学出版社组织并成立了“高职高专教育教材编审委员会”，旨在对清华版的全国性高职高专教材及教材选题进行评审，并向清华大学出版社推荐各院校办学特色鲜明、内容质量优秀的教材选题。教材选题由个人或各院校推荐，经编审委员会认真评审，最后由清华大学出版社出版。编审委员会的成员皆来源于教改成效大、办学特色鲜明、师资实力强的高职高专院校、普通高校以及著名企业，教材的编写者和审定者都是从事高职高专教育第一线的骨干教师和专家。

编审委员会根据教育部最新文件和政策，规划教材体系，比如部分专业的两年制教材；“以就业为导向”，以“专业技能体系”为主，突出人才培养的实践性、应用性的原则，重新组织系列课程的教材结构，整合课程体系；按照教育部制定的“高职高专教育基础课程教学基本要求”，教材的基础理论以“必要、够用”为度，突出基础理论的应用和实践技能的培养。

本套规划教材的编写原则如下：

(1) 根据岗位群设置教材系列，并成立系列教材编审委员会；

(2) 由编审委员会规划教材、评审教材；

(3) 重点课程进行立体化建设，突出案例式教学体系，加强实训教材的出版，完善教学服务体系；

(4) 教材编写者由具有丰富教学经验和多年实践经历的教师共同组成，建立“双师

型”编者体系。

本套规划教材涵盖了公共基础课、计算机、电子信息、机械、经济管理以及服务等大类的主要课程，包括专业基础课和专业主干课。目前已经规划的教材系列名称如下：

**· 公共基础课**

公共基础课系列

**· 计算机类**

计算机基础教育系列
计算机专业基础系列
计算机应用系列
网络专业系列
软件专业系列
电子商务专业系列

**· 电子信息类**

电子信息基础系列
微电子技术系列
通信技术系列
电气、自动化、应用电子技术系列

**· 机械类**

机械基础系列
机械设计与制造专业系列
数控技术系列
模具设计与制造系列

**· 经济管理类**

经济管理基础系列
市场营销系列
财务会计系列
企业管理系列
物流管理系列
财政金融系列
国际商务系列

**· 服务类**

艺术设计系列

本套规划教材的系列名称根据学科基础和岗位群方向设置，为各高职高专院校提供“自助餐”形式的教材。各院校在选择课程需要的教材时，专业课程可以根据岗位群选择系列；专业基础课程可以根据学科方向选择各类的基础课系列。例如，数控技术方向的专业课程可以在“数控技术系列”选择；数控技术专业需要的基础课程，属于计算机类课程的可以在“计算机基础教育系列”和“计算机应用系列”选择，属于机械类课程的可以在“机械基础系列”选择，属于电子信息类课程的可以在“电子信息基础系列”选择。依此类推。

为方便教师授课和学生学习，清华大学出版社正在建设本套教材的教学服务体系。本套教材先期选择重点课程和专业主干课程，进行立体化教材建设：加强多媒体教学课件或电子教案、素材库、学习盘、学习指导书等形式的制作和出版，开发网络课程。学校在选用教材时，可通过邮件或电话与我们联系获取相关服务，并通过与各院校的密切交流，使其日臻完善。

高职高专教育正处于新一轮改革时期，从专业设置、课程体系建设到教材编写，依然是新课题。希望各高职高专院校在教学实践中积极提出意见和建议，并向我们推荐优秀选题。反馈意见请发送到 E-mail：gzgz@tup.tsinghua.edu.cn。清华大学出版社将对已出版的教材不断地修订、完善，提高教材质量，完善教材服务体系，为我国的高职高专教育出版优秀的高质量的教材。

高职高专教育教材编审委员会

# 前 言



20世纪80年代以来，机电一体化技术发展迅猛，很多前沿的技术来自发达国家，均为英文资料。相当一部分设备是进口设备，技术文档和操作说明也是英文资料。掌握并应用机电专业英语已经成为机电一体化领域技术人才必备的技能，这些技能包括阅读、翻译和写作等能力。如果参与国际化竞争，掌握机电专业英语就更加重要。随着我国经济的发展，参与国际化竞争已经成为必然趋势，这需要大量具有专业英语读、译、写能力的人才。本教材正是为满足这一需求编写的。

本书编者在多年的工程技术教学及科研中，积累了大量的经验。根据实践的需要，针对专业英语阅读能力和写作能力的提高，收集了大量的原文资料。这些资料具有一定的先进性和代表性。本书中的文章均选自国外的最新教材、专著及国际著名公司网站提供的技术资料。选材时尽量兼顾本学科的各个领域，不但对学生的英语水平提高有一定的帮助，还将拓宽学生的视野，加深学生对机电一体化技术的认识。为了使学生能够更好地学习，由行业专家在原文的基础进行了相应的修改和难度调整，全书内容努力做到简明、连贯、准确，给学生提供一个提高英语水平和专业技能的平台。

本书从多角度对专业英语进行了列举、分析和讲解，包括专业理论知识、说明书、实际操作等。在选编材料时，尽量保证学生利用既有专业知识理解课文的内容，并使学生通过学习加深和扩展相关专业知识。编排的内容既有专业基础知识，也有专业知识，又对基础知识有所拓宽和延伸，尽可能体现机电一体化技术的现状和发展趋势。通过本书的学习，学生应基本具备阅读专业书刊、阅读和翻译引进设备技术文件、用英语撰写专业论文等能力。本书的每个单元都由课文、生词和短语、注释、练习、阅读材料(课文B)、英语应用文写作等部分组成。本书的译文和答案，请上清华大学出版社网站(www.tup.com.cn)下载。

课文侧重讲解机电一体化领域的核心和关键技术。课文注释主要侧重讲解课文中英语语言难点和专业知识难点。练习题对课文的内容进行相应的训练，以便加深对课文的

掌握。阅读材料则着力介绍本专业中的实用技术、前沿领域及发展趋势等，以扩大学生的知识面。

由于编者水平有限，书中难免有疏漏和错误之处，恳请广大读者批评指正。

编　者

2007 年 7 月

# 目 录

机电专业英语

# Unit 1

## Text A Engineering Materials

Engineering materials play a very important role in engineering field because the properties of the products are directly determined by the materials from which they are made. And most products are made from many different kinds of materials in order to satisfy the needs of the products.

The study of engineering materials encompasses the use properties, which are concerned with mechanical properties, physical properties and chemical properties, and the processing properties, which are involved with casting, welding, forging, and cutting properties.

The most convenient way to study the properties and uses of engineering materials is to classify them into "families". Generally, in the light of their internal structures, engineering materials are classified as metallic materials, inorganic nonmetallic materials, organic polymers, and composites. Some details are described as follows.

### Metallic

Metallic is also called metals. They are normally combinations of "metallic elements". Metals are subdivided into two general types—ferrous and nonferrous. Ferrous metals are those which contain iron in some form. Nonferrous metals are those which do not contain iron. (Some nonferrous metals may contain a small amount of iron as an impurity.)

As a practical matter, ferrous alloys fall into two broad categories based on the carbon in their composition. They are steel and cast iron.

According to their chemical composition, the steels can be divided into two kinds, one is plain carbon steel, and the other is alloy steel.

The plain carbon steels include low-carbon, medium-carbon and high-carbon steels. Low-carbon steels are usually used for low-strength parts requiring a great deal of forming. Medium-carbon steels are used for forgings and other applications where increased strength and a certain amount of ductility are necessary. High-carbon steels are used for high-strength parts such as springs, tools and dies.

Alloy steels are metals formed by the addition of one or more of the following elements: nickel(Ni), chromium(Cr), molybdenum(Mo), vanadium(V), tungsten(W), manganese(Mn), silicon(Si), and small amounts of other alloy elements, in order to improve the properties. By controlling the amount of carbon and other alloy elements and by subjecting the steel to various heat treatments, we can obtain a wide range of steels with various physical properties, such as structural alloy steels, tool alloy steels, and specific characteristic alloy steels.

Cast iron are used for the heavy parts of many machines. They are the most common materials for making castings. Cast iron is low in cost and wears well. However, it is very brittle and cannot be hammered or formed. The basic kinds of cast irons are gray iron, malleable iron, and nodular cast iron.

Non-ferrous alloys play a large and indispensable role in current designs. Among non-ferrous alloys, aluminum(Al) alloys are best known for their attractive features and appearance, such as low density, corrosion resistance, electrical conductivity, ease of fabrication, etc. Magnesium(Mn) alloys have even lower density than aluminum and as a result, appear in numerous structural applications such as aerospace designs. Titanium (Ti) alloys, although more dense than Al and Mg, lower dense than iron, have a distinct advantage of retaining strength at moderate service temperatures, leading to numerous aerospace design applications. Copper (Cu) alloys possess a number of superior properties. Their excellent electrical conductivity, thermal conductivity and corrosion resistance make copper alloys more useful.

## Inorganic Nonmetallic

Such materials comprise silicate materials and advanced inorganic materials. Silicate materials are generally compounds between metallic and nonmetallic elements and include such compounds as oxides, nitrides, and carbides.

Ceramics refer to all silicate materials in general, including glass, cement, calcareousness, tile, and fire-resistant materials besides pottery and porcelain. Engineering ceramics can be divided into two main parts: traditional ceramics and advanced ceramics.

Traditional ceramics are made by fusing clays and other "earthy" materials which

usually contain silicon and oxygen in various compositions with other materials. They are hard, strong, brittle, and heat-and corrosion-resistant and are electrical insulators. They are used when these properties are important, particularly heat and corrosion resistance and electrical non-conductivity.

Advanced ceramics include advanced structural ceramics, piezoelectric ceramics, conductive ceramics, etc. The advanced ceramics serve as structural members, often being subjected to mechanical loading. The piezoelectric ceramics are materials that generate a voltage when they are subjected to mechanical pressure, conversely, when subjected to an electromagnetic field, they exhibit a change in dimension. The conductive ceramics are excellent conductors of electricity whose properties are modified through precise control over their fabrication from powders into products.

## Organic Polymers

Such materials are generally organic compounds based upon carbon and hydrogen. They consist of long, chain-like molecules made up of multiple repeating units. A common synonym for polymers is "plastic", a name derived from the deformability associated with the fabrication of most polymeric products.

Usually they are low density and are not stable at high temperatures. Compared to the inorganic materials (metals, ceramics and glass), the structural features of resulting polymers are unique. In general, the melting point and rigidity of polymers increase with the extent of polymerization and the complexity of the molecular structure.

According to the heated behaviors, the polymers can be divided into two main categories: thermosetting polymers and thermoplastic polymers. Thermosetting polymers are cured, set, or hardened into a permanent shape upon heating. Thermoplastics differ from thermosetting in that they do not cure or set under heat. They merely soften, when heated, to deformable state in which under pressure they can be forced or transferred from a heated cavity into a cool mold. Upon cooling in a mold, thermoplastics harden and take the shape of the mold.

Plastics are polymeric materials that have the capability of being molded or shaped, usually by the application of heat and pressure. This property of plasticity, often found in combination with other special properties such as low density, low electrical conductivity, transparency, and toughness, allows plastics to be made into a great variety of products.

Elastomers are elastic polymers, permitting extreme reversible extensions to take place at normal temperature.

## Composites

Composites consist of more than one material type. These materials involve some combination of two or more components from the "fundamental" material types. The property averaging that occurs as a result of combining more than one component in a composite material is highly dependent on the micro-structural geometry of the composite. A classic example is fiberglass. The strength of small diameter glass fibers is combined with the ductility of the polymeric matrix. The combination of these two components provides a product superior to either component alone. Many composites, such as fiberglass, involve combinations that cross over the boundaries of different kinds of materials. Others, such as concrete, involve different components from within a single material type.

The internal structures and their interactions are responsible for the behaviors of materials. This has been promoting the study and development of engineering materials. It is perfectly clear that with the continual study of materials new and more attractive engineering materials will be possible as time goes on.

**New Words**

| | |
|---|---|
| property ['prɔpəti] | n. 特性,性能 |
| encompass [in'kʌmpəs] | v. 包围,环绕 |
| casting ['kɑ:stiŋ] | n. 铸造,铸件 |
| welding ['weldiŋ] | n. 焊接法,定位焊接 |
| forging ['fɔ:dʒiŋ] | n. 锻造(法),锻件 |
| classify ['klæsifai] | v. 把……分类,把……分等级 |
| family ['fæmili] | n. 类 |
| internal [in'tə:nl] | adj. 内部的,国内的 |
| metallic [mi'tælik] | adj. 金属(性)的 |
| inorganic [inɔ:'gænik] | adj. 无生物的,无机的 |
| nonmetallic ['nɔnmi'tælik] | adj. 非金属的 |
| organic [ɔ:'gænik] | adj. 有机体的,有机物的 |
| polymer ['pɔlimə] | n. 聚合体 |
| composite ['kɔmpəzit] | n. 合成物 |
| subdivide [sʌbdi'vaid] | v. 再分,细分 |
| ferrous ['ferəs] | adj. 铁的,亚铁的 |
| impurity [im'pjuəriti] | n. 杂质,混杂物 |

alloy ['ælɔi] n. 合金
nickel(Ni) ['nikl] n. 镍
chromium(Cr) ['krəumiəm] n. 铬
molybdenum(Mo) [mə'libdinəm] n. 钼
vanadium(V) [və'neidiəm] n. 钒，铅矿
tungsten(W) ['tʌŋstn] n. 钨
manganese(Mn) ['mæŋgəni:z] n. 锰
silicon(Si) ['silikən] n. 硅，硅元素
brittle [britl] adj. 易碎的，脆弱的
malleable ['mæliəbl] adj. 有延展性的，可锻的，柔顺的
nodular ['nɔdjulə(r)] adj. 小节的
indispensable [indis'pensəbl] adj. 不可缺少的
density ['densəti] n. 密度
corrosion [kə'rəuʒn] n. 锈，腐蚀，侵蚀
conductivity [ˌkɔndʌk'tiviti] n. 传导性，传导率
fabrication [ˌfæbri'keiʃən] n. 制作，构成，伪造物
aluminum(Al) [ˌælju'miniəm] n. 铝
magnesium(Mg) [mæg'ni:zjəm] n. 镁
aerospace ['əəuspeis] adj. 航天的，太空的
titanium(Ti) [tai'teiniəm] n. 钛
retain [ri'tein] v. 保持，保留
thermal ['θə:məl] adj. 热的，热量的
comprise [kəm'praiz] v. 包含，由……组成
silicate ['silikit] n. 硅酸盐
oxide ['ɔksaid] n. 氧化物
nitride ['naitraid] n. 氮化物
carbide ['kɑ:baid] n. 碳化物
pottery ['pɔtəri] n. 陶器
porcelain ['pɔ:səlin] n. 瓷器
ceramic [si'ræmik] adj. 陶器的
fuse [fju:z] v. 熔化，使融合，合并
clay [klei] n. 粘土，泥土
insulator ['insjuleitə] n. 绝缘体
piezoelectric [paiˌi:zəui'lektrik] adj. 压电的

| | |
|---|---|
| voltage ['vəultidʒ] | n. 电压 |
| conversely ['kɔnvə:sli] | adv. 相反地 |
| electromagnetic [ˌilektrəumæg'netik] | adj. 电磁的 |
| modify ['mɔdifai] | v. 更改,修改 |
| precise [pri'sais] | adj. 精确的,准确的 |
| hydrogen ['haidrədʒən] | n. 氢 |
| molecule ['mɔlikju:l] | n. 分子 |
| synonym ['sinənim] | n. 同义字 |
| derive [di'raiv] | v. 得到,取得 |
| deformity [di'fɔ:miti] | n. 变形,破相 |
| associate [ə'səuʃiət] | v. 发生联系 |
| stable ['steibl] | adj. 稳定的,坚固 |
| rigidity [ri'dʒidəti] | n. 僵硬,不易弯 |
| transparency [træns'peərənsi] | n. 透明,透明度 |
| toughness ['tʌfnis] | n. 韧性,坚强 |
| fundamental [ˌfʌndə'mentl] | adj. 基础的,十分重要的 |
| diameter ['daimitə] | n. 直径 |
| fiberglass ['faibəglɑ:s] | n. 玻璃纤维 |
| thermosetting [ˌθə:mə'setiŋ] | adj. 热固(的),热硬性 |
| elastomer [i'læstəmə(r)] | n. 弹性体,人造橡胶 |
| matrix ['meitriks] | n. 模子,基质 |

**Phrases and Expressions**

| | |
|---|---|
| in the light of | 按照,根据 |

**Notes to the Text**

1. Engineering materials play a very important role in engineering field because the properties of the products are directly determined by the materials from which they are made.

工程材料在工程领域中起着重要作用,因为产品的性能直接由其原材料决定。

from which 引导的是定语从句,修饰 material。

2. The study of engineering materials encompasses use properties, which are concerned with mechanical properties, physical properties and chemical properties, and processing properties, which are involved with casting, welding, forging, and cutting properties.

对工程材料的研究包括使用性能和工艺性能。使用性能包括力学性能、物理性能和化学性能。工艺性能则是指铸造性能、焊接性能、锻造性能和切割性能。

两个 which 引导非限定性定语从句，分别修饰 use properties(使用性能)和 processing properties(工艺性能)。

3. Low-carbon steels are usually used for low-strength parts requiring a great deal of forming. Medium-carbon steels are used for forgings and other applications where increased strength and a certain amount of ductility are necessary. High-carbon steels are used for high-strength parts such as springs, tools, and dies.

低碳钢通常用于需要多次造型的低强度零件。中碳钢用于锻造以及需要增加强度并具备一定柔性的场合。高碳钢则用于高强度件，如弹簧、工具和模具。

## Exercises

**Ⅰ. Find the descriptions in Column B to fit the words in Column A.**

| A | B |
|---|---|
| 1. fuse | a. the state or quality of being plastic |
| 2. indispensable | b. the quality of being dense |
| 3. plasticity | c. the state of being transparent |
| 4. transparency | d. that can not dispensed with |
| 5. metallic | e. of or like metal |
| 6. alloy | f. thing that has been fabricate |
| 7. rigidity | g. a metal made by mixing together |
| 8. fiberglass | h. material made from glass |
| 9. fabrication | i. melt in great heat |
| 10. density | j. not bending or yielding |

**Ⅱ. Fill in the blanks with the words given below. Change the form where necessary.**

| | | | | |
|---|---|---|---|---|
| deform | encompass | process | precise | classify |
| transparency | modify | stable | fuse | associate |

1. Unloading the goods is a slow _____.
2. The glass of the car lost its _____.
3. The badly milk powder may cause _____ babies.
4. They _____ two pieces of wire together.
5. American laws have had to be _____ as a result of this.