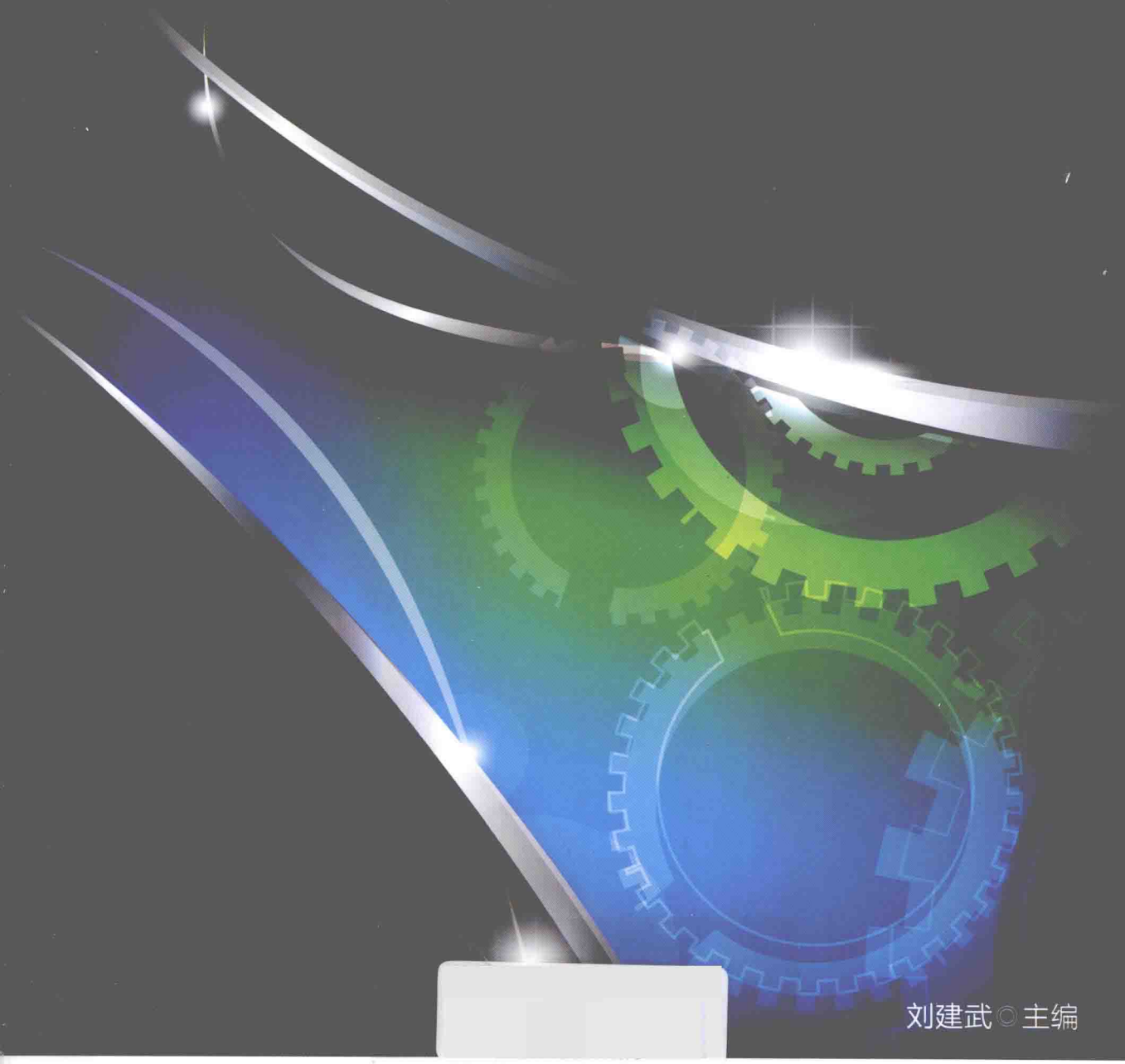

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机电专业英语

English Course for Mechanical &Electrical Engineering

西安交通大学出版社
XI'AN JIAOTONG UNIVERSITY PRESS

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内容简介

本书系高职机电专业英语教材，依据高度理论知识与较强技能相结合的培养原则，本书共五个项目，每个项目均包含与企业实际紧密结合的专业英语实例，突显实际工程应用情况，以工程实践中“会用、管用”为准。本书理论以“必需、够用”为度，并力求易懂、好学、用得上。另外，本书还对机电一体化技术专业英语中的高频词汇和语法做了一定的分析和讲解，并介绍了一些翻译技巧。

通过对本书的学习，读者可以在字典的帮助下读懂一般机电类英文文献。本书既可作为高职、成人高校及相关院校的专业英语教材，也可用作企业培训教材，及有关教师、学生和技术人员的参考用书。

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前　言

本书全面贯彻落实“以服务为宗旨，以就业为导向，以能力为本位”的职业教育办学指导思想，采用最新的项目教学法编写而成。本书综合考虑英语就业岗位多样化等多种因素以及职业教育英语课程的实际情况，结合机电行业工作岗位对专业英语的使用要求，具有良好的通用性，又注意实践性和针对性，按照技能培养的要求，将专业英语融入到机电专业所涉及的绝大多数领域，重复过程而不重复内容，循序渐进地培养学生的专业英语阅读和翻译能力，同时兼顾增强学生的机电专业素养。

本书具有如下特色：

（1）本书中的文章全部选自英美等以英语为母语的国家的专业文献著作。只做删节，不做改写，力求保持原著的语言风格、精神实质和原著作者对机电专业知识的理解，使学生原汁原味地接触专业英语。

（2）本书以能力培养为本位，以训练为手段，不仅在每个项目任务后都配有练习，而且在每篇文章的旁边都留有随堂笔记栏目，实现边记边学，切实提高读者阅读和理解机电类专业英语的能力。

（3）本书图文并茂，可以与实践类课程相结合进行教学，实现理论与实践相结合。

（4）本书文章主要以现代机电技术中的主流先进技术和产品为载体，体现时代性，也兼顾未来技术发展的趋势。

（5）本书中的文章短小精悍，便于教学。每单元又有一篇拓展学生知识面的课后阅读；又为了增强学生的翻译能力，每单元都安排介绍了一些翻译技巧。

本书由无锡职业技术学院刘建武老师任主编负责全书的统稿工作并编写了第五章，第一章由无锡职业技术学院向晓汉编写，第二章由无锡职业

技术学院黎雪芬编写，第三章由无锡职业技术学院赵翱东编写，第四章由无锡职业技术学院吕洁编写。无锡职业技术学院奚茂龙和郭琼审阅了全书，国家级名师黄麟教授对本书的顶层设计提出了很多宝贵建议，在此一并表示感谢。

编者

2014年

目录

Part 1 Fundamentals of Manufacturing

随堂笔记

Unit 1 Classification of Materials

Materials may be grouped in several ways. Scientists often classify materials by there state: solid, liquid, or gas. They also separate them into organic (once living) and inorganic (never living) materials. For industrial purposes, materials ale divided into engineering materials or nonengineering materials. Engineering materials are those used in manufacture and become parts of products. Nonengineering materials are the chemicals, fuels, lubricants, and other materials used in the manufacturing process which do not become part of the product.

Engineering materials may be classified into four groups: metals, ceramics, polymers, and composite materials.

1.Metals

Metals are generally defined as those elements whose hydroxides form bases (such as sodium or potassium). Metals may exist as pure elements. When two or more metallic elements are combined, they form a mixture called an alloy.

The term alloy is used to identify any metallic system. In metallurgy, it is a substance with metallic properties, that is composed of two or more elements, intimately mixed. Of these elements, one must be a metal. Plain carbon steel, in the sense, is basically an alloy of iron and carbon. Other elements are present in the form of impurities. However, for commercial purposes, plain carbon steel is not classified as an alloy steel.

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Metals and alloys, which include steel, aluminum, magnesium, zine, cast iron, titanium, copper, nickel, and many others, have the general characteristics of good electrical and thermal conductivity, relatively high strength, high stiffness, ductility or formability, and shock resistance. They are particularly useful for structural or load-bearing applications. Although pure metals are occasionally used, alloys are normally designed to provide improvement in a particular desirable property or permit better combinations of properties.

2.Ceramics

Ceramics, such as brick, glass, tableware, insulators, and abrasives, have poor electrical and thermal conductivity. Although ceramics may have good strength and hardness, their ductility, formability, and shock resistance are poor. Consequently, ceramics are less often used for structural or load-bearing applications than metals[1]. However, many ceramics have excellent resistance to high temperatures and certain corrosive media and have a number of unusual and desirable optical, electrical, and thermal properties.

3.Polymers

Polymers include rubber, plastics, and many types of adhesives. They are produced by creating large molecular structures from organic moleculars, obtained from petroleum or agricultural products, in a process known as polymerization[2]. Polymers have poor electrical and thermal conductivity, low strengths, and are not suitable for use at high temperatures. Some polymers have excellent ductility, formability, and shock resistance while others have the opposite properties. Polymers are lightweight and frequently have excellent resistance to corrosion.

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4.Composite Materials

Composite materials are formed from two or more materials, whose properties cannot be obtained by any single material[3]. Concrete, plywood, and fiberglass are typical, although crude, examples of composite materials. With composite materials, we can produce lightweight, strong, ductile, high heat-resistant materials that are otherwise unobtainable, or produce hard yet shock resistant cutting tools that would otherwise shatter.

New Words and Phrases

lubricant ['lu:brikənt] *n*. 润滑剂

ceramic [sə'ræmik] *n*. 陶瓷，陶瓷制品

polymer ['pɔlimə(r)] *n*. 聚合物

composite ['kɔmpəzit] *adj*. 合成的，复合的，混合物

sodium ['səudiəm] *n*. 钠

Potassium [pə'tæsiəm] *n*. 钾

zinc [ziŋk] *n*. 锌

cast iron 铸铁

titanium [tai'teiniəm] *n*. 钛

nickel ['nikl] *n*. 镍

stiffness [stifnəs] *n*. 硬度，刚度

ductility [dʌk'tiliti] *n*. 韧性，可延展性

formability [fɔ:mə'biliti] *n*. 可成型性

shockresistance [ʃɔkri'sistəns] *n*. 抗冲击性

load-bearing 承载

tableware ['teiblweə(r)] *n*. 餐具

abrasive [ə'breisiv] *n*. 研磨剂，磨料(具)；*adj*. 研磨的

thermal conductivity 导热性

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adhesive [əd'hi:siv] *n*. 黏结剂，黏胶剂

molecular [mə'lekjələ(r)] *adj*. 分子的

molecule ['mɔlikju:l] *n*. 分子

polymerization ['pɔlimərai'zeiʃn] *n*. 聚合

corrosion [kə'rəuʒn] *n*. 腐蚀

plywood ['plaiwud] *n*. 夹板

fiberglass ['faibəglɑ:s] *n*. 玻璃纤维

crude [kru:d] *adj*. 天然的，未经加工的

heat-resistant material 耐热材料

shatter['ʃætə(r)] *v*. 粉碎，破坏

be used for… 用于……

be formed from… 由……组成

Notes

[1] Consequently, ceramics are less often used for structural or load-bearing applications than metals.

因此，与金属相比，陶瓷很少用于结构件或承载件。

less…than=not so…as 比……少

be used for… 是用于……的

例如:A hammer is used for driving in nails。

[2] They are produced by creating large molecular structures from organic molecules, obtained from petroleum or agricultural products, in a process known as polymerization.

它们是由来自石油或农产品的有机分子通过聚合形成的巨大分子结构所产生的。

[3] Composite materials are formed from two or more materials, whose properties cannot be obtained by any single material.

复合材料由两种或两种以上的材料组成，其性能绝非任何一种

单一材料所能拥有。

"whose properties cannot be obtained by any single material"的"whose"指的是复合材料，即，该句为"composite materials"的定语从句。

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Exercises

Ⅰ. Answer the following questions according to the text.

a)What is metal? Try to describe it using the words in this passage or of your own.

b)What is polymer? Try to describe it using the words in this passage or of your own.

Ⅱ. Decide whether the following statements are true (T) or false (F) and put "T" or "F" in the brackets according to the text.

a)Materials are classified into five groups: metals, nonmetals, ceramics, polymers, and composite materials. ( )

b)Metals and alloys have relatively high strength, high stiffness, ductility or formability, but low shock resistance. ( )

c)Ceramics have poor electrical and thermal conductivity, ( ) may have high strength and hardness ( ), and have high ductility, formability, and shock resistance. ( )

d)Polymers are lightweight ( ) and frequently have poor resistance to corrosion. ( )

Unit 2 Metals

As we have seen, ferrous metals are alloys of iron with carbon, these alloys may contain also some other elements such as silicon(Si), phosphorus(P), etc., but carbon is the most important of all elements present in ferrous alloys [1].

Ferrous metals are used in industry in two general forms: cast

随堂笔记

iron and steel. These two ferrous alloys are usually produced from pig iron, and they have different carbon content. Steel is iron containing from 0.0218 to 2.11 percent carbon, while cast iron is an alloy of iron and carbon with the carbon content more than 2.11 percent[2]. Pure iron is not used in industry because it is too soft.

Steel is an alloy of iron and carbon with other elements added to produce specific properties[3].The various types of steel can be grouped under two major headings:

(1)Carbon steel. Steel in which the main alloying element is carbon. Carbon steels are further divided into three groups.

a. Low carbon steel. This steel has a carbon content of less than 0.30 percent. It is the most common type and is often called mild steel. It is relatively inexpensive, ductile, soft, and is easily machined and forged. Mild steel cannot be heat-treated(hardened). Low carbon steel is a general purpose steel.

b. Medium carbon steel. This steel has a carbon content between 0.30 percent and 0.80 percent. Harder and stronger than mild steel, it can be hardened by heat treating. Medium carbon steel is most commonly used for forgings, castings, and machined parts for automobiles, agricultural equipment, machines, and aircraft.

c. High carbon steel. This type of steel is easily heat-treated to produce a strong, tough part. The material has a carbon content above 0.80 percent. It finds wide use in hand tools, cutting tools, springs, and piano wire.

(2)High alloy steel. These steels contain significant amounts of other elements in addition to carbon. The common high alloy steels are:

a. Stainless steel which is produced by using chromium as a

significant alloying element along with nickel and other metals. The result is a tough, hard, corrosion-resistant metal.

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b. Tool steel which is a special group of high carbon steels produced in small quantities to high quality specifications. Tool steels are used for a wide range of cutting tools and forming dies.

c. Manganese steel which is an alloy containing 12 percent manganese and one percent carbon. This metal is used in mining, railroad, and construction equipment because of its high tensile strength.

Mechanical properties are the characteristic responses of a material to applied forces. These properties fall into five broad categories: strength, hardness, elasticity, ductility, and toughness.

(1)**Strength** is the ability of a material to resist applied forces. Bridge girders, elevator cables, and building beams all must have this property.

A material can be subjected to a number of different types of forces. They may be tension, shear, torsion, compression, or a combination of these forces. Each possible force causes a material to respond in a different way. A material has several different mechanical strengths. The strength depends on the force applied.

The most common mechanical strengths are:

a. Tensile strength: the maximum tension loads a material can withstand before fracturing. Tensile strength is the easiest strength to measure and, therefore, is widely used.

b. Compression strength: the ability to resist forces which tend to squeeze the material into a new shape. It is basically the opposite of tensile strength. Excessive compression force will cause the material to rupture(buckling and splitting).

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c. Shear strength: the ability to resist fracture under shear forces. The shear force is caused by offset forces applied in opposite directions. These forces cause the grains or molecules of the material to slide by one another and eventually fracture.

d. Torsion strength: the ability to resist twisting forces. Forces which exceed the torsion strength (modulus of rupture) will cause the material to rupture.

(2)**Hardness** is the resistance of a material to penetration or scratching, it accounts for abrasion resistance as well as resistance to denting. Hardness is also directly related to strength. The harder a material the stronger it is. Metallic materials are almost always harder and stronger than polymeric materials. A number of different testers have been designed to test the hardness of a variety of materials. Cutting tools, files, and drills must resist abrasion, or wear. Armor plate, crushing machinery,and metal rolls for steel mills all must resist penetration.

(3)**Elasticity** is the ability to spring back to original shape. Auto bumpers and all springs should have this quality.

As stress is applied, the material first resists permanent deforming. This area is in the material's elastic range. This is a range in which the material will return to its original length when the force is released.

Applying additional stress(force) will bring the material to its yield point. At this point, additional strain(elongation) occurs without additional force(stress) being applied. Strain above this point is produced with smaller amounts of force [4]. The force also produces permanent changes in the length of the material.

This elongation which is above the material's elastic limit (point at

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which the material will not return to its original length) is called plastic deformation.

(4) **Ductility** is the plastic flow characteristic of a material under normal temperature. The higher the ductility of a material the greater is its ability to be formed without fracturing. Highly ductile materials can be easily bent, drawn into wire, or extruded. Modern, deep-formed auto bodies and fenders, and other stamped and formed products must have this property.

(5)**Toughness** is the ability to absorb mechanically applied energy. Strength and ductility determine a material's toughness. Toughness is needed in railroad cars, automobile axles, hammers, rails, and similar products.

New Words and Phrases

ferrous ['ferəs] *adj*. 含铁的

alloy ['ælɔi] *n*. 合金; *v*. 合铸，熔成合金

element ['elimənt] *n*. 元素，成分，元件

silicon ['silikən] *n*. 硅

phosphorus ['fɔsfərəs] *n*. 磷

industry ['indəstri] *n*. 工业，行业

form [fɔ:m] *v*. 形成，构成 *n*. 类型

cast iron 铸铁

pig iron 生铁

content ['kɔntent] *n*. 含量，内容

carbon content 含碳量

pure [pjuə(r)] *adj*. 纯的，完美的，十足的

pure iron 纯铁

carbon steel 碳钢

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mild steel 低碳钢，软钢

forge [fɔ:dʒ] *v*. 锻造，仿造 *n*. 熔铁炉，铁匠铺

spring [spriŋ] *n*. 弹簧，发条，跳跃

piano wire 钢丝，钢琴丝

chromium ['krəum:əm] *n*. 铬

nickel ['nikl] *n*. 镍，五分镍币

specifications [spesifi'keiʃnz] *n*. 规格，规范，说明书，技术规格

manganese ['mæŋgəni:z] *n*. 锰

mining ['mainiŋ] *n*. 采矿(业)

tensile ['tensail] *adj*. 拉力的，张力的

strength [streŋθ] *n*. 强度，力，优点

tensile strength 拉伸强度，抗拉强度

hardness [hɑ:dnəs] *n*. 硬度，硬性，难度

elasticity [ˌi:læ'stisəti] *n*. 弹性，弹力，弹性力学

ductility [dʌk'tiliti] *n*. 延展性，韧性，柔软性

toughness [tʌfnəs] *n*. 韧性，刚性

compression [kəm'preʃn] *n*. 压缩，挤压，(内燃机的)压缩冲程

compression strength 压缩强度

buckling ['bʌkliŋ] *n*. 屈曲，挠曲

shear [ʃiə(r)] *n*. 剪切，切变，修剪 *v*. 剪(羊毛)

shear strength 剪切强度

offset ['ɔfset] *n*. 偏移，偏移量 *v*. 抵消，补偿

grains [greinz] *n*. 晶粒，焊粉粒度

molecule ['mɔlikju:l] *n*. 分子，微小颗粒，微量

torsion ['tɔ: ʃn] *n*. 扭转，转矩

torsion strength 扭转强度