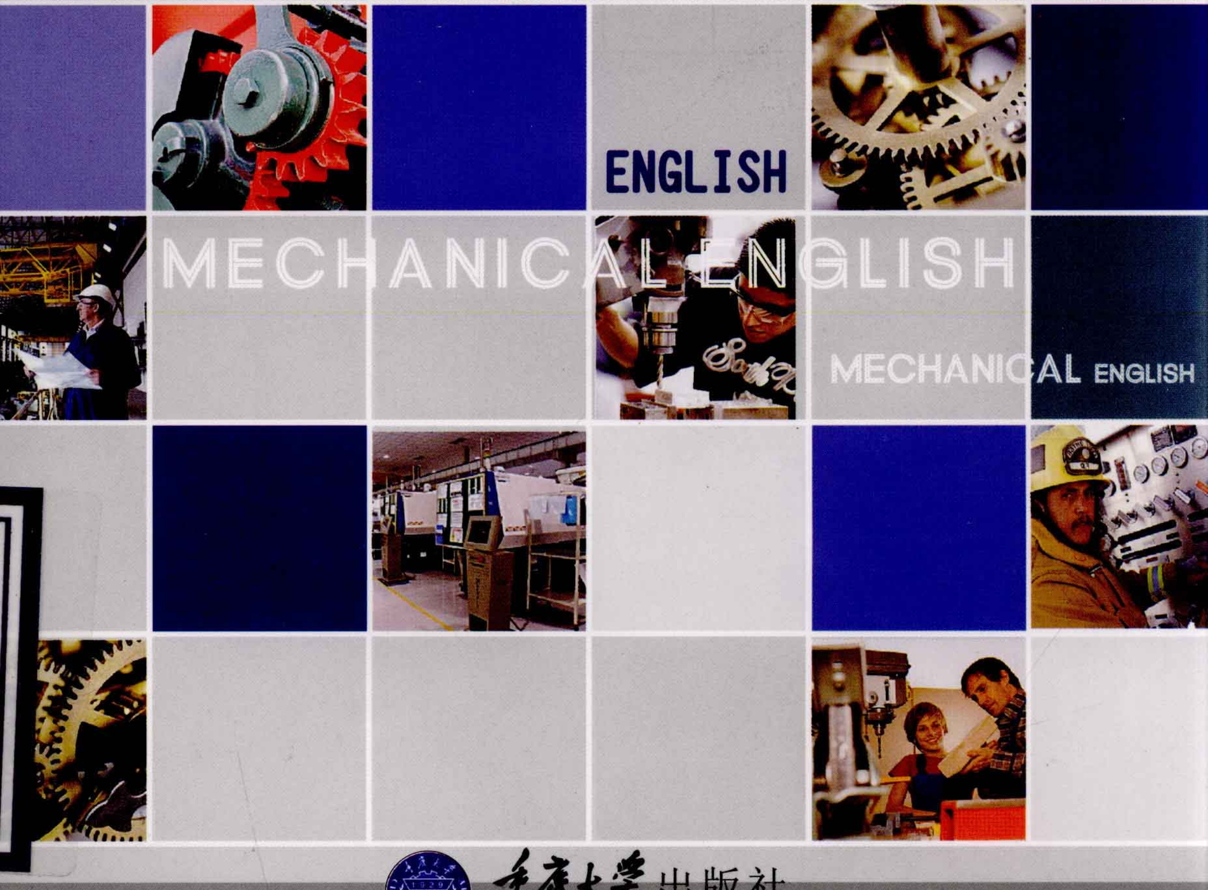
高职高专行业英语 ESP

机械英语

主编 方艺 朱成华



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机械英语

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内容提要

本书为高职高专行业英语系列丛书,是一本结合高职高专机械工程类专业实际的教材。本书共八个单元,分别介绍了工程材料、机械零件、加工工艺、加工机床、自动化、计算机辅助设计(CAD)和计算机辅助制造(CAM)以及常用软件的英文标识、数控机床和数控操作、柔性制造系统和工业机器人。教材编写以校企合作、工学结合培养高技能人才的要求为目标,注重能力本位的原则,内容具有较强的应用性和针对性。本书即可作为高等职业院校机械工程类专业学生学习行业英语的教材,也可作为其他专业读者了解机械原理的辅助读物。

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前　言

进入21世纪以来，随着世界范围内全球化进程的加快和中国经济的迅猛发展，许多国外的知名企业纷纷进驻中国，与此同时，国内许多实力雄厚的大公司也陆续走向世界。在这种形势下，大企业和公司对中高级技术人才的英语交际能力提出了新的更高的要求。传统的单向教学方式以及相对单一的英语教学环境等问题影响了高职高专院校英语教学的质量，行业英语课堂教学不能很好地激发学生自发应用所学知识，教学效果和职业教育的培养目标不相符合。现有的相关行业英语教材不管从难易程度还是从内容层次上大多不太适应高职高专行业英语的教学目标，教材编写的结构体系偏重理论性；练习活动设计单一，缺乏多维性；内容编写上缺乏实例性的讲解和对工作场景的模拟，不能反映一线岗位对相应知识和技能的要求。本教材是在目前高职高专倡导“就业导向”和“工学结合”理念指导下组织编写的，它根据机械工程专业大类的职业技能需要，结合高职高专院校学生的特点和学习需要，参考中外有关机械制造、数控加工和机械设备使用与维修专业的英语教材编写而成。

本教材面向机械工程专业大类全体学生专业英语学习和相关岗位人员培训，根据“实用为主，够用为度”的原则，从多方面灵活地讲授机械英语，激发他们的学习兴趣，提高他们的英语水平，为今后工作中的相关工作需要以及岗位可持续学习和发展打下扎实的基础。因此，本课程在教材的编写上力求打破传统的学科教材模式，采用生动、内容直观呈现为主的形式突出职业特点，不强调专业的系统性和完整性，部分文章主题和情景设置、课后练习和活动与机械行业的相关工作范围和流程密切相关，形式新颖、实用，从应用的角度学习词汇和语法，各章节内容选取符合时代特点，适当增加了相关领域的新知识和新技术。

本教材是一本通过校企联合编写的工学结合的教材。教材编写以校企合作、工

学结合培养高技能人才的要求为目标,注重能力本位的原则,内容具有较强的应用性和针对性。教学采用理论教学(教室)+现场教学(实训中心)的方式,可适当利用校内实习基地条件,使学生具有感性认识,调动他们学习英语的积极性。

为了帮助教师更好地使用本书,在此提供以下建议:

1. Listening and Speaking,对机械工程相关专业的学生英语口语的训练要求不能太高。可以允许学生按照他们的实际程度和已经掌握的语言结构来开展活动。能听懂中等难易程度的、语速适中的相关场景中的对话,让学生做 Role play,模仿并熟练掌握相关场景中的英语交流技巧,并按照所给的情景或自己设计的情景进行对话训练。这样有利于在没有压力的环境下培养他们的自信心和口语能力。

2. Text 和 Supplementary Reading,每个单元通过阅读有关机加工和相关行业知识的 500~600 词左右的两篇文章,使学生掌握相关词汇,熟悉本专业英语文体的特点。根据教学要求和学生水平情况,本部分可以采用泛读形式,部分习题可放在课后学生自行练习,每个学生应该对理解性问题写出准确、完整的书面回答。部分练习和活动尽量放在课堂进行,学生可以成对或分组比较并讨论他们的答案。

3. Grammar and Translation,共分为两部分。总结科技英语文体中常见语法现象并通过专项语法练习使学生能够学会基本的表达方式,能够基本读懂相关产品的英文说明书和使用维修手册。教师可灵活使用这些练习,让学生在课堂上做,也可作为课后作业。

本书由重庆大学出版社组织,重庆工业职业技术学院和成都电子机械高等专科学校共同编写,由方艺、朱成华担任主编,由周进民、王付军、方锐担任副主编,张晓妮、卿瑜等参加编写,在此一并表示衷心的感谢!

由于编者试图体现一种新的编写思想,因此在编写中,难免会有不当和疏漏之处,恳请使用者不吝赐教,惠予指出,便于我们及时修改。

编　者

2009 年 12 月于重庆

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CONTENTS

Unit 1 Engineering Materials

Part 1 Listening and Speaking

The Process of Interview

Place: Personnel Manager's Office in a company

Characters: (A: Interviewer) Mike Anderson, personnel manager of the company

(B: Applicant) Chen Zhuo

A: Come in, please. Good morning, I am Mike Anderson, personnel manager of our company.

B: How do you do? My name is Chen Zhuo.

A: Sit down please and make yourself at home.

B: Thank you very much.

A: As I know, you have applied to work in our company. Would you please introduce yourself?

B: I'm 23 years old and was born in Huangshi. I can speak and write English fluently and know how to operate the computer and NC machines. I have been an assistant engineer for half a year in a famous company since one year ago. So, I am sure that I am quite efficient in technical work, like NC programming, operation, maintenance and debugging.

A: OK, I would infer that you are an excellent student in your college. Could you tell me more details about your major and English courses?

B: All right. Though I am a student in the Department of Mechanical and Electrical Engineering, I studied many English courses including English Reading and Comprehension, Oral English, English Writing and Professional English. Most of the courses are taught in English, some are even taught by foreign teachers.

A: By the way, do you have any experience as a leader at the school?

B: Yes, I was the monitor of our class. I have organized many social activities.

A: Besides all these, what do you like to do in your spare time?

B: I have a great interest in travel, reading and sports such as swimming, tennis and so on.

A: I am very glad to hear that. Travel and sports are also my hobbies. Why do you choose our company?

B: Your company is one of the largest NC machine manufacturers in East China. As you see in my resume, I specialized in CAD/CAM in college, so I expect to develop my capabilities in your company. On the other hand, the position for which I applied is quite challenging. That's the reason why I like to come to your company. I hope to display my talents fully here.

A: If I accept you, how much do you expect to be paid?

B: At least ¥1,500 a month.

A: That will be no problem.

B: OK. When can I get the reply about my application?

A: I think you will know the final result within a week. It's my pleasure to have a talk with you.

B: Me too. It takes your much time. Good bye.

A: Good bye.

◆ NEW WORDS AND EXPRESSIONS

NC = Numerical Control			数字控制
NC programming			数控编程
maintenance	/ˈmeintinəns/	*n.*	维护,维修
debug	/diːˈbʌg/	*v.*	调试
challenging	/ˈtʃælindʒiŋ/	*a.*	具有挑战性的

◆ PRACTICE

1. Role play: make a dialogue with two students acting the parts of A and B.
2. Discuss the question: What's the important matter when you want to apply a job?

Part 2 Text

Types of Engineering Materials

All products that come out of industry consist of at least one and often many types of materials. The most obvious example is the automobile. A car contains a wide variety of materials, ranging from glass to steel to rubber, plus numerous other metals and plastics.

The number of materials which are available to the engineer in industry is almost infinite. The various compositions of steel alone run into the thousands. It has been said that there are more than equally great. In addition, several hundred new varieties of materials appear on the market each month. This means that individual engineers and technicians cannot hope to be familiar with all the properties of all types of materials in their numerous forms. All he can do is try to learn some principles to guide him in the selection and processing materials.

The properties of a material originate from the internal structure of that material. This is analogous to saying that the operation of a TV set spends on the components and circuits within that set. The internal structures of materials involve atoms, and the way atoms are associated with their neighbors into crystals, molecules, and microstructures.

It is convenient to divide materials into three main types: (1) metals, (2) plastics or polymers and, (3) ceramics.

Characteristically, metals are opaque, ductile, and good conductors of heat and electricity. Plastics (or polymers), which usually contain light elements, and therefore have relatively low density, are generally insulators, and are flexible and formable at relatively low temperatures. Ceramics, which contain compounds of both metallic elements, are usually relatively resistant to severe mechanical, thermal, and chemical conditions.

Metals are divided into ferrous and non-ferrous metals. The former contain iron and the latter do not contain iron. Certain elements can improve the properties of steel and are therefore added to it. For example, chromium may be included to resist corrosion and tungsten to increase hardness. Aluminum, copper, and the alloys, bronze and brass, are common non-ferrous metals.

Plastics and ceramics are non-metals; however, plastics may be machined like metals. Plastics are classified into two types—thermoplastics and thermosets. Thermoplastics can be shaped and reshaped by heat and pressure but thermosets cannot be reshaped because they undergo chemical changes as they harden. Ceramics are often employed by engineers when materials which can withstand high temperatures are needed.

◆ NEW WORDS AND EXPRESSIONS

variety	/vəˈraiəti/	*n.*	种类,品种
infinite	/ˈinfinit/	*a.*	无限的,无穷的,无边的
composition	/kɔmpəˈziʃən/	*n.*	合成(物)

property	/ˈprɔpəti/	*n.*	性能
principle	/ˈprinsəpl/	*n.*	原则,法则,准则
originate	/əˈridʒineit/	*v.*	起源,发生
internal	/inˈtəːnl/	*a.*	内部的,内在的
analogous	/əˈnæləgəs/	*a.*	类似的,相似的
component	/kəmˈpəunənt/	*n.*	零件,元件
crystal	/ˈkristl/	*n.*	晶体,石英
molecule	/ˈmɔlikjuːl, ˈməu-/	*n.*	分子,微小颗粒
microstructure	/ˌmaikrəuˈstrʌktʃə/	*n.*	微结构
convenient	/kənˈviːnjənt/	*a.*	方便的,合适的
polymer	/ˈpɔlimə/	*n.*	聚合物
ceramics	/siˈræmiks/	*n.*	陶瓷
characteristically	/ˌkæriktəˈristikəli/	*ad.*	特有地,表示特性地
opaque	/əuˈpeik/	*a.*	不透明的,无光的
ductile	/ˈdʌktail/	*a.*	有韧性的
conductor	/kənˈdʌktə/	*n.*	导体
insulator	/ˈinsjuleitə/	*n.*	绝缘体
flexible	/ˈfleksəbl/	*a.*	柔性的,易弯曲的
formable	/ˈfɔːməbl/	*a.*	易成型的
compound	/ˈkɔmpaund/	*n.*	化合物
metallic	/miˈtælik/	*a.*	金属的,金属性的
thermal	/ˈθəːməl/	*a.*	热(性)的
ferrous	/ˈferəs/	*a.*	铁的,含铁的
chromium	/ˈkrəumjəm/	*n.*	铬
corrosion	/kəˈrəuʒən/	*n.*	腐蚀
tungsten	/ˈtʌŋstən/	*n.*	钨
aluminum	/əˈljuːminəm/	*n.*	铝
thermo-	/θəːmə/		[构词成分]heat

consist of	由…组成
range from... to	[范围]从…至
run into	多达
associate with	与…相关

◆ POST-READING

Comprehension questions.

1. There are ________ varieties of glass and plastics.

   A. hundreds of　　B. more than 10,000

   C. thousands of　　D. more than 20,000

2. There are about as many varieties of plastics as those of ________.

   A. steel　　B. glass　　C. materials　　D. rubber

3. Which of the following is not a material?

   A. Metal.　　B. Plastics.　　C. Automobile.　　D. Glass.

4. A material has certain properties because of its ________.

   A. components　　B. circuits　　C. neighbors　　D. internal structure

5. According to the passage, materials are divided into three main types. They are ________.

   A. ceramics, polymers or plastics, and metals

   B. atoms, crystals or molecules, and microstructures

   C. metals, plastics or ceramics, and polymers

   D. internal structure, atoms or molecules, and metals

6. Plastics are generally insulators because ________.

   A. they are flexible and formable

   B. their elements are of low density

   C. they contain both metallic and nonmetallic elements

   D. their internal structures involve atoms

7. To make a steel harder, ________ should be added to it.

A. aluminum B. chromium C. tungsten D. ceramics

8. The material resistant to high temperatures and corrosion is ________.

A. polymers B. ceramics C. metals D. plastics

Part 3 Supplementary Reading

Iron-Carbon Alloys

Iron is by far the least expensive of all metals and, next to aluminum, the most plentiful. Iron and its many alloys constitute about 90 percent of the world's production of metals. Pure iron itself is used only for a relative few special applications. Most iron is used in the form of plain-carbon steels, which are alloys of iron and carbon with small amounts of other elements. The reasons for the importance of worked, machined, and heat-treated to a wide range of properties. Unfortunately, plain-carbon steel has poor atmospheric corrosion resistance. But it can easily be protected by painting, enameling, or galvanizing. No other engineering material offers such a desirable combination of properties at such a low cost as plain-carbon steel does.

Elemental Iron

Very pure iron is produced only in small quantities and is used principally for research purposes. By zone refining, it can be made more than 99.99 percent pure. The yield strength of this pure iron is very low, being about 7,500 psi. Small quantities of elements such as carbon, manganese, phosphorus, and sulfur produce great increase in the strength of elemental iron.

Pure iron exists in three allotropic forms: alpha (α), gamma (γ), and delta (δ). Fig. 1-1 shows an idealized cooling curve for pure iron, indicating the temperature ranges over which each of these crystallographic forms are stable at atmospheric pressure.

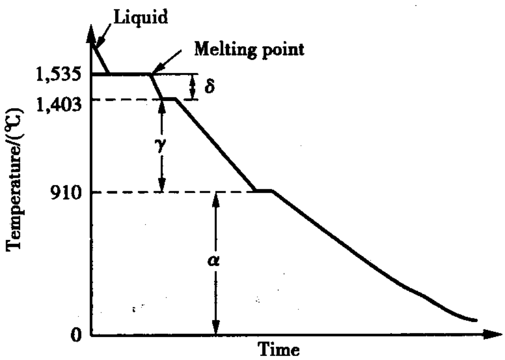

Fig. 1-1 Idealized Cooling Curve for Pure Iron at Atmospheric Pressure

The Fe-Fe_3C Alloy System

Fe-C alloys containing about 1.2% carbon and with only minor amounts of other elements are termed plain-carbon steels.

Fe-Fe_3C Phase Diagram

The phases present at various temperatures for very slowly cooled Fe-C alloys with up to 6.67% C are shown in the phase diagram of Fig. 1-2. This phase diagram is not a true equilibrium diagram since the intermetallic compound iron carbide (Fe_3C), or cementite as it is called, is not a true equilibrium phase. Under certain conditions cementite will decompose into the more stable phases of graphite and iron. However, once Fe_3C is formed, it is for all practical purposes very stable and therefore can be treated as an "equilibrium" phase. For this reason, the phase diagram shown in Fig. 1-2 is a metastable phase diagram.

Solid Phases in the Fe-Fe_3C Phase Diagram

The Fe-Fe_3C phase diagram contains four solid phases:

α Ferrite. The solid solution of carbon in α ferrite, or simply ferrite. This phase has a BCC (Body-Centered Cubic) crystal structure, and at 0% C it corresponds to α iron. The phase diagram indicates that carbon is only slightly soluble in ferrite since the maximum solid solubility of carbon in α ferrite is 0.02 percent at 723 ℃. The solubility

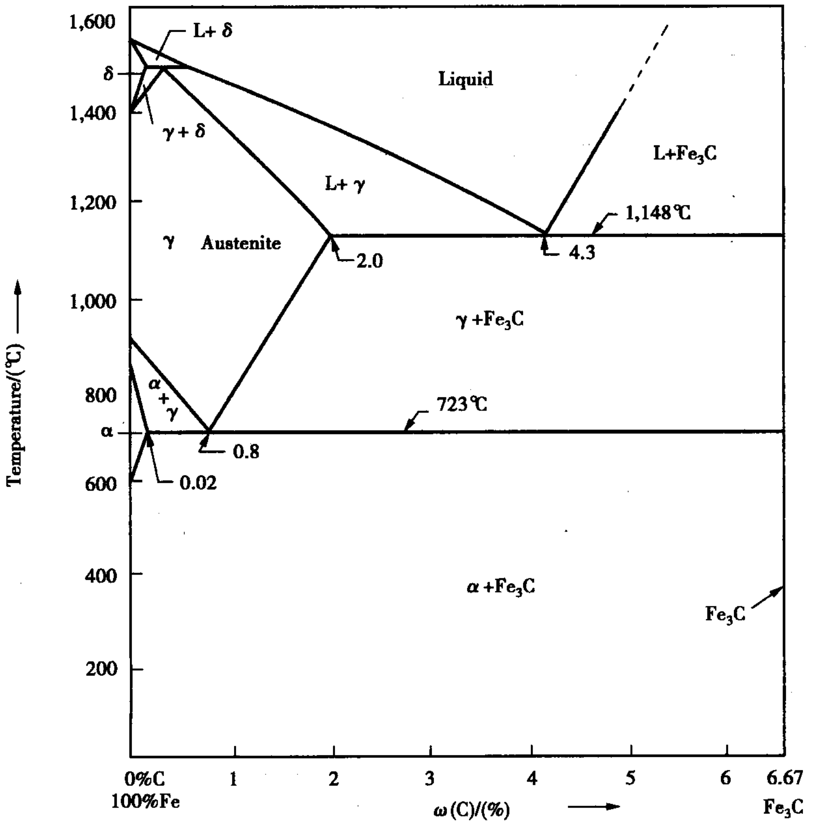

Fig. 1-2 The Fe-Fe_3C Metastable System

of carbon in α ferrite decreases with decreasing temperature until it is about 0.008 percent at 0 ℃. The carbon atoms, because of their small size, are located in the interstitial spaces in the iron crystal lattice.

Austenite. The solid solution of carbon in γ iron is designated austenite. It has a FCC (Face-Centered Cubic) crystal structure and a much greater solid solubility for carbon than α ferrite. The solubility of carbon in austenite reaches a maximum of 2.08 percent at 1,148 ℃ and then decreases to 0.8 percent at 723 ℃. As in the case of α ferrite, the carbon atoms are dissolved interstitially, but to a much greater extent in the FCC lattice. This difference in the solid solubility of carbon in austenite and α ferrite is the basis for the hardening of most steels.

Cementite. The intermetallic Fe-C compound Fe_3C is called cementite. Iron carbide (Fe_3C) has negligible solubility limits and contains 6.67% C and 93.3% Fe. Cementite, which is a hard and brittle compound, has an orthorhombic crystal structure with 12 iron atoms and 4 acrbon atoms per unit cell.

δ Ferrite. The solid solution of carbon in δ iron is called δ ferrite. It has a BCC crystal structure, but with a different lattice parameter than α ferrite. The maximum solid solubility of carbon in δ ferrite is 0.09 percent at 1,495 ℃.

Invariant Reactions in the Fe-Fe_3C Phase Diagram. The Fe_3C phase diagram has three invariant reactions, each of which occurs at constant temperature and involves three phases. These reactions are peritectic, eutectic, and eutectoid.

Peritectic Reaction. At the peritectic reaction point, liquid of 0.53% C combines with δ ferrite of 0.09% C to produce γ austenite. This reaction can be written as

$$\text{Liquid } (0.53\%\ C) + \delta(0.09\% C) \xrightarrow{1,495\ ℃} \gamma(0.17\% C)$$

Since this reaction occurs at such high temperatures, no δ ferrite will normally be present in plain-carbon steels at room temperature.

Eutectic Reaction. At the eutectic reaction point, liquid decomposes to produce γ austenite with 2.08% C and the intermetallic compound Fe_3C (cementite) with 6.67% C. This reaction can be written as

$$\text{Liquid } (4.3\% C) \xrightarrow{1,148\ ℃} \gamma \text{ austenite}(2.08\% C) + Fe_3C(6.67\% C)$$

Since plain-carbon steels do not contain more than about 1.2% C, the eutectic reaction will not be treated in steel. This reaction will, however, be important in the study of cast irons, which contain above 2% C.

Eutectoid Reaction. At the eutectoid reaction point, solid austenite of 0.8% C decomposes into α ferrite with 0.02% C and cementite with 6.67% C. This reaction can be written as

$$\gamma \text{ austenite } (0.8\% C) \xrightarrow{723\ ℃} \alpha \text{ ferrite } (0.02\% C) + Fe_3C(6.67\% C)$$