全国高等职业教育专业英语系列规划教材

机电专业英语

丛书总主编　沈言锦
主　　编　周美蓉

机械工业出版社
CHINA MACHINE PRESS

www.cmpedu.com
赠电子课件

全国高等职业教育专业英语系列规划教材

机电专业英语

丛书总主编　沈言锦
主　编　周美蓉
副主编　吕孟春　蒋晓斌　向清然
参　编　肖佐无　洪美琴　余东满
主　审　刘海渔

机械工业出版社

本书共分4个模块，17个单元，分别介绍了机电基础、机械加工、机电技术和机电应用等方面的专业英语知识。本书内容全面、精炼，选材新颖，所有的知识点都是围绕机电技术展开，难度适中，且每单元的课文后都附有新单词和短语的解释、重点和难点句子的注释、全文翻译。

本书可作为高职高专及大学本科机电专业的英语教材，也可作为机电技术培训教材，还可以供从事相关工作的工程技术人员使用。

为方便教学，本书配备电子课件等教学资源。凡选用本书作为教材的教师均可登录机械工业出版社教材服务网 www. cmpedu. com 免费下载。如有问题请致信 cmpgaozhi@ sina. com，或致电 010-88379375 联系营销人员。

图书在版编目（CIP）数据

机电专业英语/周美蓉主编. —北京：机械工业出版社，2011.8
全国高等职业教育专业英语系列规划教材
ISBN 978-7-111-34794-1

Ⅰ.①机… Ⅱ.①周… Ⅲ.①机电工业—英语—高等职业教育—教材
Ⅳ.①H31

中国版本图书馆 CIP 数据核字（2011）第 172718 号

机械工业出版社（北京市百万庄大街22号 邮政编码100037）
策划编辑：刘子峰 责任编辑：于 雷
封面设计：赵颖喆 责任印制：乔 宇
北京瑞德印刷有限公司印刷（三河市胜利装订厂装订）
2011年9月第1版第1次印刷
184mm×260mm · 13.75印张 · 340千字
0001—3000册
标准书号：ISBN 978-7-111-34794-1
定价：26.00元

凡购本书，如有缺页、倒页、脱页，由本社发行部调换

电话服务
社服务中心：（010）88361066
销售一部：（010）68326294
销售二部：（010）88379649
读者购书热线：（010）88379203

网络服务
门户网：http：//www. cmpbook. com
教材网：http：//www. cmpedu. com

前　言

本书是按照高等职业教育机电专业教学规范、培养方案和课程教学大纲的要求，由长期在一线从事教学工作、经验丰富的老师编写而成。

本书在编写过程中采用了模块式结构和开放型体系，共分4个模块，包括机电简介篇、机械加工篇、机电技术篇和机电应用篇。各模块之间既相互独立，又依次递进。全书共17个单元，每个单元又配有新单词和短语、重点和难点句子注释、练习题以及拓展阅读等内容。书后附录中配有参考译文、习题答案以及词汇表，方便读者自学。

本书具有以下几个特点：

1. 图文并茂，力求增强教学的直观性，降低学习难度，提高趣味性。

2. 强调词汇积累，淡化语法教学。

3. 引用最新应用实例，体现教学内容的实时性。

为了使读者能在较短的时间内达到阅读机电专业英语资料的能力，本书在内容编排上力求密切联系实际，所选的题材、词汇尽可能与机电专业相结合，由浅入深，循序渐进。读者可根据专业趋向差异，有方向性地选择学习内容。

本书由永州职业技术学院的周美蓉担任主编，永州职业技术学院的吕孟春、湖南化工职业技术学院的蒋晓斌、衡阳技师学院的向清然担任副主编，参加编写的还有株洲职业技术学院的肖佐无、洪美琴和河南工业职业技术学院的余东满。株洲职业技术学院的刘海渔对全部书稿进行了审阅，提出了许多宝贵意见，在此表示衷心的感谢。

由于编者水平有限，书中疏漏和错误之处在所难免，恳请广大读者批评指正。

编　者

Contents

Part Ⅲ Mechanical and Electrical Engineering Technology

Part Ⅳ Mechanical and Electrical Applied

Part I Electromechanical Introduction

Unit 1

Text

What Is Mechatronics?

In the mid-1980s, mechatronics came to mechanical engineering that is the boundary between mechanics and electronics. Today, the term encompassed a large array of technologies, many of which have become well-known in their own right. Each technology still has the basic element of the merging of mechanics and electronics but now may also involve much more, particularly software and information technology[1]. The relationship of mechatronics among the disciplines is illustrated in Figure 1-1.

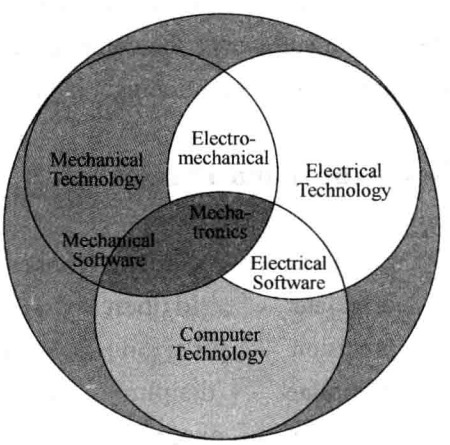

Figure 1-1 The Relationship of Mechatronics Among the Disciplines

For example, many early robots resulted from mechatronics development. As robot systems become smarter, software development, in addition to the mechanical and electrical system, became central to mechatronics.

Mechatronics gained legitimacy in academic circles in 1996 with the publication of the first referred journal: IEEE/ASME[2] Transactions on Mechatronics. In the premier issue, the authors worked to define mechatronics. After acknowledging that many definitions have circulated, they selected the following for articles to be included in transactions: "the synergistic integration of mechanical engineering with electronics and intelligent computer in the design and manufacturing of industrial products and processes." The authors suggested 11 topics that should fall, at least in part under the general category of mechatronics:

1. modeling and design
2. system integration
3. actuators and sensors
4. intelligent control

5. robotics
6. manufacturing
7. motion control
8. vibration and noise control
9. micro-device and optoelectronic systems
10. automotive systems
11. other application

A mechatronics design is a control system. One or more inputs are fed to a microcontroller. These inputs may have to undergo some signal conditioning before being read by the microcontroller. The microcontroller then implements a control algorithm that interprets the various inputs into the appropriate output or outputs[3]. Again, signal conditioning may be necessary on the output side of the system before driving an actuator or display. In a closed loop system, feedback is received so that the microcontroller is able to monitor and adjust the output as necessary. Providing power to the microcontroller is the last piece of the mechatronic system. In summary, the components of a mechatronic system are input, output, a control algorithm, signal conditioning (if necessary), and power.

New Words and Phrases

mechatronics [ˌmekəˈtrɔniks] *n.* 机电一体化
originate [əˈridʒineit] *vi.* 起源，发生
precision [priˈsiʒən] *n.* 精确，精密
discipline [ˈdisiplin] *n.* 学科
expertise [ˌekspəˈtiːz] *n.* 专业技术
weapon [ˈwepən] *n.* 武器
microprocessor [ˌmaikrəuˈprəusesə] *n.* [计] 微处理器
incorporation [inˌkɔːpəˈreiʃən] *n.* 结合，合并
boundary [ˈbaundəri] *n.* 边界，分界线
encompass [inˈkʌmpəs] *v.* 包围，环绕，包含或包括某事物
merge [məːdʒ] *v.* 合并，结合，融合
legitimacy [liˈdʒitiməsi] *n.* 合法（性），正统（性），正确（性），合理（性）
academic [ˌækəˈdemik] *a.* 学院的，理论的
journal [ˈdʒəːnəl] *n.* 定期刊物，杂志
transaction [trænˈzækʃən] *n.* 会报，学报
definition [ˌdefiˈniʃən] *n.* 定义，解说
synergistic [ˈsinədʒistik] *a.* 增效的，协作的，互相作用（促进）的
integration [ˌintiˈgreiʃən] *n.* 综合

actuator [ˈæktʃueitə] *n.* 执行器，执行机构
robotics [rəuˈbɔtiks] *n.* 机器人技术，机器人学
vibration [vaiˈbreiʃən] *n.* 振动
optoelectronic [ˌɔptəuiekˈtrɔnik] *a.* 光电子的
automotive [ɔːtəˈməutiv] *a.* 汽车的，自动推进的
microcontroller [ˌmaikrəukənˈtrəulə] *n.* 微控制器
implement [ˈimplimənt] *vt.* 贯彻，实现，执行
feedback [ˈfiːdbæk] *n.* 反馈
algorithm [ˈælgəriðəm] *n.* [数] 运算法则

Notes

[1] Each technology still has the basic element of the merging of mechanics and electronics but now may also involve much more, particularly software and information technology

每一项技术仍然基于机械工程与电子工程的融合，同时又融入了很多新的技术，尤其是软件和信息技术。

[2] IEEE *abbr.* Institute of Electrical and Electrics Engineers

电气与电子工程师协会

ASME *abbr.* American Society of Mechanical Engineers

美国机械工程师协会

[3] The microcontroller then implements a control algorithm that interprets the various inputs into the appropriate output or outputs.

然后微控制器进行控制运算，将各种输入信号转化为合适的输出信号。

interpret：解释，说明

Exercises

Ⅰ. Choose the best answer according to the text.

1. Mechatronics originated in _____.
   A. United States B. Japan C. United Kingdom
2. Mechatronics merges such technologies as _____ technology.
   A. mechanical and electronical B. electronical and computer
   C. mechanical and computer D. mechanical, computer and electronical
3. Mechatronics system is composed of _____ components
   A. 2 B. 3 C. 4 D. 5
4. When did mechatronics gain legitimacy in academic circles?
   A. Since World War Ⅱ. B. In the mid-1980s.

C. In 1996.

Ⅱ. Fill in the blanks with the proper words according to the text.

1. Each technology still has the basic element of the merging of mechanics and electronics but now may also involve much more, particularly software and _____.

2. As robot systems become smarter, _____, in addition to the mechanical and _____, became central to mechatronics.

3. These inputs may have to undergo _____ before being read by the _____.

4. In summary, the components of a mechatronic system are _____, _____, _____, _____, _____, and _____.

Ⅲ. Translate the last paragraph into Chinese.

Translating Skills 

科技英语翻译方法与技巧——专业英语简介

在人类社会进入信息时代的今天，科技技术飞速发展，各国技术情报资料大量涌现，国际学术交流日益频繁。由于历史的原因，目前国际上科技情报资料的交流主要是使用英语。对于计算机等电子类专业而言，85% 以上的专业资料都是以英文形式出现的。英语也是目前我国科技工作中的首选外语，它已经成为一种强大的工具，在社会交往、信息传播、文化交流、科技发展中起到了极大的作用。

作为科技工作者，熟悉和掌握相关专业英语，了解科技英语结构，在科学技术上与世界同步，跟上社会前进的步伐，抢占科学技术的制高点。

一、专业英语的特点

专业英语（English for Special Science and Technology or English for Specific Purpose）与普通英语（Common English or General English or Ordinary English）既有联系，又有区别。

普通英语着重学习英语语法和句型结构，学习掌握宽泛的英语单词。在阅读方面，注重课堂上的精读（Intensive Reading），学习重点在于“word by word”，“sentence by sentence”，注重句子结构分析、语法词汇分析，这些都是学习英语所必需的。

专业英语的主要特点在于：它具有很强的专业性，懂专业的人用起来得心应手，不懂专业是人用起来则困难重重。由于各个领域的专业英语都以表达科技概念、理论和事实为主要目的，因此，它们必然存在许多共同的特点。与普通英语相比，专业英语更注重客观事实和真理，并且要求语言逻辑性强，条理规范，表达准确、精炼、正式。其特点主要表现为两方面：一方面，专业英语的词汇和短语包含大量的专业术语、名词性词组、介词短语、合成新词、非限定性词组；另一方面，在句子结构方面，专业英语中经常出现长句、无主语句型结构、被动语态、虚拟语气句、祈使句，其中祈使句被广泛使

用于说明书和手册中。此外，在专业英语中，插图、插画、表格、公式、数字所占比例较大。

专业领域中更多地注重泛读（Extensive Reading）：通过阅读各种典型的应用文体，扩大专业词汇量及知识面，理解词汇的发展、变异和使用灵活度，从而提高专业英语的阅读、翻译、写作、听说的能力。

公共英语与专业英语这两者不是截然脱节的，而是并驾齐驱的。学习专业英语时，既要掌握扎实的普通英语知识，又要注重结合专业技术知识的学习，这样才能真正提高专业英语水平。

二、专业英语的语法结构语法特点

由于科学技术关心的不是个人的心理情绪，而是客观的普遍规律和对过程、概念的描述，因此专业英语应具有的客观性及无人称性（Objectivity and Impersonality）要反映到语法结构上来。

专业英语的语法特点可以归纳为客观（Objectivity）、准确（Accuracy）和精炼（Conciseness）。

（一）客观

专业英语的客观性指它所讨论的内容是客观的。为求客观，常用被动语态和一般现在时，据统计，专业英语中被动语态的句子要占 1/3 ~ 1/2。即使用了主动语态，主语也常常是无生命体（Inanimate Subject）。

就时态而言，因为专业资料所涉及的内容（如科学定义、定理、方程式或公式、图像等）一般并没有特定的时间关系，所以在专业英语中大部分都使用一般现在时，而过去将来时、完成进行时等，在专业英语中则很少出现。

（二）准确

专业英语的准确性指意思表达要求准确，这是专业英语最基本的要求。准确性主要表现在用词上。例如，为了准确、精细地描述事物过程，所以句子都较长，有时甚至一段就是一个句子。长句可以反映客观事物中复杂的关系。

【例 1】

A very brief conceptual introduction to time-sharing is not an easy task because the term has already become so generalized that it has a great variety of meanings to scores of interesting groups and wide ranges of intelligence levels in such groups. It might best be developed by listing its logical components: simultaneity—a variable number of people can use the computer at essentially the same time; independence—the programs being handled by the system are operated independently of one another without risk of being intermixed or having security breached; immediacy—all requests for computer response receive that response within second (or less) of the completion of the required computation and most often before "action deadlines" occurs; spatial unlimited ability—missiles millions of miles away have operated in real-time; and earth-bound time-sharing users can communicate with the computer by means of teletype, visual displays (cathode-ray tubes) and scores of other input/output devices which are

not generally in close proximity to the central computer, and can be continent away, time-sharing is really the utilization of time.

New Words and Phrases

simultaneity [ˌsaiməltəˈniəti] *n.* 同时性
breach [briːtʃ] *n.* 违反，破坏
immediacy [iˈmiːdiəsi] *n.* 即时性
deadline [ˈdedlain] *n.* 最后期限
spatial [ˈspeiʃəl] *a.* 空间的
earth-bound [ˈəːθbaund] *a.* 只在地球上的
teletype [ˈtelitaip] *n.* 电传打字机
proximity [prɔkˈsimiti] *n.* 接近，近似

【例 2】

The first generation of computers, which used vacuum tubes, came out in the late 1940s. Univac I is an example of these computers which could perform thousands of calculations per second. In 1960, the second generation of computers was developed and these could perform work ten times faster than their predecessors. The reason for this extra speed was the use of transistor instead of vacuum tabes. The second-generation computers were smaller, faster and more dependable than first-generation computers. The third-generation computers appeared on the market in 1965. These computers could do a million calculations a second, which is 1,000 times as many as first-generation computers. Unlike second-generation computers, these are controlled by tiny integrated circuits and are consequently smaller and more dependable. Fourth-generation computers have now arrived, and the integrated circuits that are being developed have been greatly reduced in size. This is due to microminiaturization, which means that the circuits are much smaller than before; as many as 1,000 tiny circuits now fit onto a single chip. A chip is a square or rectangular piece of silicon, usually from 1/10 to 1/4 inch, upon which several of an integrated circuit are etched or imprinted, after which the circuit is encapsulated in plastic, ceramic or metal. Fourth-generation computers are 50 times faster than third-generation computers and can complete approximately 1,000,000 instructions per second.

New Words and Expressions

first-generation computer 第一代计算机
vacuum tube 真空管，电子管
transistor [trænˈzistə] *n.* 晶体管

integrated circuits（IC） 集成电路

microminiaturization [ˈmaikrəuˌminiətʃəraiˈzeiʃən] *n.* 超小型化

chip [tʃip] *n.* 芯片

etch [etʃ] *v.* 蚀刻

imprint [ˈimprintˌimˈprint] *vt.* 铭刻，留下烙印

encapsulate [inˈkæpsjuˌleit] *vt.* 包裹起来

plastic [ˈplæstik] *n.* 塑料

ceramic [siˈræmik] *n.* 陶器

metal [ˈmetl] *n.* 金属

approximately [əˈprɔksimitli] *ad.* 近似地，大约地

（三）精炼

精炼指专业英语在表达形式上要求简洁、精炼，希望用尽可能少的单词来清晰地表达原意，因而导致了非限定动词、名词化单词、词组及其简化形式的广泛使用。

1．动名词的运用

动名词短语可用于取代时间从句或简化实践陈述句。

通常的表达形式为：

1）Before it is executed, the program should be loaded into main memory.

2）When we turn on the computer, the computer will boot from either a floppy diskette or from the hard disk.

3）When you use the mouse to button, you can select an option a list.

相应的精炼表达形式为：

1）Before being executed, the program should be loaded into memory.

2）On turning on the computer, the computer will boot from either a floppy diskette or from the harddisk.

3）By using the mouse to click a button, you can select an option from a list.

2．分词的运用

使用过去分词可以取代被动语态的关系从句，使用现在分词可以取代主动语态的关系从句。例如：

1）Your new computer is a powerful tool which is designed to handle all your business and personal needs.

2）When（While/Once/If/Unless/Though）it is（was/has been）inverted . . .

3）As was mentioned . . .

4）The plane which is flying at . . .

可用如下精炼形式表示为：

1）Your new computer is a powerful tool designed to handle all your business and personal needs.

2）When（While/Once/If/Unless/Though）inverted . . .

3) As mentioned above . . .

4) The plane flying at . . .

3. 不定式的运用

不定式短语可用以替换表示目的、功能的状语从句。例如：

1) We keep micrometers in boxes. Our object in doing this is to protect from rust and dust.

2) What does a fuse do? It protects a circuit.

可精炼地表达为：

1) We keep micrometers in boxes to protect them from rust and dust.

2) The function of a fuse is to protect a circuit.

4. 其他简化形式

1) It is necessary to examine whether the New design efficient.

2) It is doubtful how accurate the results are.

3) If it is possible . . .

4) As mentioned before . . .

相应的精炼形式为：

1) It is necessary to examine the efficiency of the new design.

2) The accuracy of these results doubtful.

3) If possible . . .

4) As before . . .

5. 被动语态的运用

被动语态在科技文章中用得十分频繁，这主要有两个原因：一是科技文章重在描写行为或状态本身，注重客观的事实或道理，所以由谁或由什么行为或状态作为主体就显得不那么重要了。表现在句中常可以省出行为或状态的主体以简化语句。例如：

1) All the insulating substances were damaged by sea water.

2) The raw materials with which engineers work are seldom found in useful forms.

被动语态使用频繁的另外一个原因是它便于向后扩展句子，构成更长的句子，便于对问题作更精确的描述，但又不至于把句子弄得头重脚轻。例如：

In the digital computer the numbers to be manipulated are represented by sequences of digits, which are first recorded in suitable code, then converted into positive and negative electrical impulses, and stored in electrical or magnetic registers.

前述为求准确而常用长句的方式与这里精炼的要求并不矛盾。因为长句的句子虽长，但其结构及用词仍是精炼的，只是长句包含的信息量更大，准确性更高。

Reading Material 

What is Multimedia?

The concept of multimedia has been around for years。 If we break the word multimedia into its component parts, we will get multi—meaning more than one, and media—meaning form of communication. So what is multimedia? The answer is neither simple nor easy. Multimedia is a kind of computer technology that combines text, audio. static graphics image, animations, and full-motion video. In fact, multimedia is just two media: sound and pictures. It is made from a mix of hardware and software, or machine and ideas. It presents information, shares ideas and educes emotions. It enables you to see, hear, and understand the thoughts of others. In other words, it is a form of communication. You can control multimedia and interact with it. You can make it do what you want it to do. That's the strength of multimedia.

Audio

Audio is referring to sound or to things which can be heard. Usually, the human ear can hear a range of frequencies between around 20 Hz ~ 20 kHz. But some animals can hear higher frequencies. Computers in software can easily process digitized sound. Virtually all professional sound recording and editing are digital nowadays.

JPEG

JPEG image-compression standard and file format define a set of compression methods for high-quality images such as photographs, single video frames or scanned pictures. JPEG does not work very well when compressing text, line art or vector graphics.

MPEG

MPEG standards are the main algorithms used to compress video and have been international standards since 1993. Because movies contain both images and sound, MPEG can compress both video and audio. The goal of MPEG-1 was to produce video recorder-quality output using a bit rat of 1. 2 Mbit/s. A major goal of the MPEG-2video standard is to define the format of the video data which is to be transmitted. This data format is the result of a compression and encoding process. If the compression techniques are in MPEG-2, then they are to a large extent based on the some knowledge. The knowledge is that we have about how the human eye and the visual centers in the brain recognize images.

Digital Video

So far, the capabilities of human eye to recognize images have been described, too. But how are the images described in digital equipment? Video applications deal with so called color spaces in order to define images. There are two major color spaces types used in digital vid-

eo: RGB and YUV. RGB is commonly used in computer environments, while YUV is related more to the television world.

The simplest representation of digital video is a sequence of frames, each consisting of a rectangular grid of picture elements or pixels. Each pixel can be a single bit, to represent either black or white. To use 8 bits per pixel to represent 256 gray levels. This schedule gives high-quality black-and-white video. For color video, good systems use 8 bits for each of the RGB colors. While using 24 bits per pixel limits the number of colors to about 16 million, the human eye cannot even distinguish so many colors.

New Words and Phrases

audio [ˈɔːdiəu] *n.* 音频
animation [ˌæniˈmeiʃən] *n.* 动画
video [ˈvidiəu] *n.* 视频
compression [kəmˈpreʃən] *n.* 压缩
frame [freim] *n.* 帧
algorithm [ˈælgəˌriðəm] *n.* 算法
rectangular [rekˈtæŋgjulə] *n.* 矩形
grid [grid] *n.* 网格
pixel [ˈpiksəl] *n.* 像素
JPEG (Joint Photographic Experts Group) 联合图像专家组
MPGE (Motion Picture Experts Group) 运动图像专家组