· 普通高等教育“十三五”规划教材

（计算机专业群）

计算机专业英语

（第二版）

孙建忠　姚卫红　白凤仙　编著

中国水利水电出版社
www.waterpub.com.cn

普通高等教育“十三五”规划教材（计算机专业群）

计算机专业英语（第二版）

孙建忠　姚卫红　白凤仙　编著

中国水利水电出版社
www.waterpub.com.cn
·北京·

内 容 提 要

本书以计算机技术和网络技术为背景，精选了 14 个主题：计算机的历史与发展、微型计算机的结构、数制与布尔代数、数据结构、操作系统、软件工程、编程语言、Internet、WWW、计算机与网络安全、大数据、多媒体技术、物联网和云计算等，并力求体现计算机技术与应用的最新发展。

本书所选材料语言规范、内容新颖、完整实用。每章除包括学习指导、课文、注释、译文、阅读材料和练习之外，还精选了 14 个专业英语学习专题，介绍专业词汇及其构成规律、科技英语的阅读与翻译技巧、科技论文的写作和阅读技巧、求职英语和广告英语的要点等。

本书是计算机专业的专业英语教材，也可作为广大科技工作者使用计算机的参考书。

图书在版编目（CIP）数据

计算机专业英语 / 孙建忠，姚卫红，白凤仙编著
. -- 2版. -- 北京 : 中国水利水电出版社，2018.12
普通高等教育“十三五”规划教材. 计算机专业群
ISBN 978-7-5170-7233-1

Ⅰ. ①计… Ⅱ. ①孙… ②姚… ③白… Ⅲ. ①电子计算机－英语－高等学校－教材 Ⅳ. ①TP3

中国版本图书馆CIP数据核字(2018)第273671号

策划编辑：石永峰　责任编辑：张玉玲　加工编辑：庄　晨　封面设计：李　佳

书　名	普通高等教育“十三五”规划教材（计算机专业群） 计算机专业英语（第二版） JISUANJI ZHUANYE YINGYU
作　者	孙建忠　姚卫红　白凤仙　编著
出版发行	中国水利水电出版社 （北京市海淀区玉渊潭南路 1 号 D 座　100038） 网址：www.waterpub.com.cn E-mail：mchannel@263.net（万水） sales@waterpub.com.cn 电话：（010）68367658（营销中心）、82562819（万水）
经　售	全国各地新华书店和相关出版物销售网点
排　版	北京万水电子信息有限公司
印　刷	三河航远印刷有限公司
规　格	184mm×260mm　16 开本　17 印张　443 千字
版　次	2005 年 4 月第 1 版　2005 年 4 月第 1 次印刷 2018 年 12 月第 2 版　2018 年 12 月第 1 次印刷
印　数	0001—3000 册
定　价	42.00 元

第二版前言

随着计算机网络技术的飞速发展，人类已经进入了信息时代。世界似乎在悄悄地变小，中外经济、文化、科技交往日趋频繁，而这一切都是以语言为载体的。由于诸多原因，国际上最通用的语言还是英语，而因特网的普及更巩固了英语作为跨文化交往通用语言的地位。因此，为了掌握最新的计算机技术、了解计算机的发展动向，必须具备较高的英语水平。

本书的编写目的，首先是让学生掌握计算机专业英语的基本术语，了解一些计算机专业的基本知识；其次是让学生掌握专业英语的阅读、翻译和写作技巧，提高专业技能；此外，还介绍了计算机技术的一些最新发展。

本书以计算机与网络技术为背景，精心组织、合理选材，主要内容包括计算机的历史与发展、微型计算机的结构、数制与布尔代数、数据结构、操作系统、软件工程、编程语言、Internet、WWW、计算机与网络安全、大数据、多媒体技术、物联网和云计算等。考虑到提高学生专业技能的需要，我们还系统而扼要地介绍了计算机词汇及其构成规律、科技英语的阅读与翻译技巧、科技论文的阅读、翻译和写作技巧，以及求职英语和广告英语等专业英语的学习要点。

本书由大连理工大学的孙建忠、姚卫红、白凤仙编写，具体分工为：白凤仙编写第 1 章至第 4 章，姚卫红编写第 5、6、7、10、12 章，孙建忠编写第 8、9、11、13、14 章和专业英语专题，并负责全书统稿工作。

由于作者水平有限，书中难免出现疏漏，恳请读者批评指正。

编 者

2018 年 10 月

第一版前言

随着计算机网络技术的突飞猛进，人类已经进入了信息时代。世界似乎在悄悄地变小，中外经济、文化、科技交往日趋频繁，而这一切都是以语言为载体的。由于诸多原因，国际上最通用的语言还是英语，而因特网的普及，更巩固了英语作为跨文化交往通用语言的地位。因此，为了掌握最新的计算机技术，了解计算机的发展动向，必须具备较高的英语水平。

本书的编写目的，首先是让学生掌握计算机专业英语的基本术语，了解一些计算机专业的基本知识；其次是为了使学生掌握专业英语的阅读、翻译和写作技巧，提高专业技能；此外，还介绍了计算机技术的一些最新发展。

本书以计算机与网络技术为背景，精心组织，合理选材。主要内容包括：计算机的历史与发展、计算机的组成、数制与布尔代数、数据结构、操作系统、软件工程、程序设计语言、因特网、万维网、计算机与网络安全、数据库管理、多媒体技术、计算机图形学和虚拟现实技术等共 14 章。考虑到提高学生专业技能的需要，我们还系统而扼要地介绍了计算机词汇及其构成规律、科技英语的阅读与翻译技巧、科技论文的阅读、翻译和写作技巧，以及求职英语和广告英语等专业英语学习要点。

本书由大连理工大学孙建忠、姚卫红、白凤仙编写。具体分工为：第 1、2、3、4、5、6 章课文选材、注释、练习与答案以及译文由白凤仙编写，第 7、10、11、12、13、14 章课文选材、注释、练习与答案以及译文由姚卫红编写，第 8、9 章和每章的专业英语专题由孙建忠编写，孙建忠还负责全书统稿。大连理工大学孟贵胥、王怡月和武汉工业学院李若芬、李红、周龙、秦世宏等参与了本书大纲的制定和部分章节的编写工作。

由于作者水平有限，书中难免出现疏漏，恳请读者不吝赐教。

编 者

2005 年 4 月

目　　录

Chapter 1 The History and Future of Computers

本章学习指导

20 世纪 40 年代，世界上诞生了第一台电子计算机。此后，随着真空管、晶体管、集成电路与超大规模集成电路的发展及其在计算机中的应用，推动了计算机从第一代发展到第四代。而今天，由于科学技术日新月异的变化，计算机的发展进入了“无代”时代。通过本章学习，读者应掌握以下内容:

- 现代计算机的共同特征和各代计算机的特点;
- 计算机技术的发展趋势;
- 了解科技英语的特点，掌握科技英语翻译要点。

1.1 The Invention of the Computer

It is hard to say exactly when the modern computer was invented. Starting in the 1930s and through the 1940s, a number of machines were developed that were like computers. But most of these machines did not have all the characteristics that we associate with computers today. These characteristics are that the machine is electronic, that it has a stored program, and that it is general purpose.

One of the first computerlike devices was developed in Germany by Konrad Zuse in 1941. Called the Z3, it was general-purpose, stored-program machine with many electronic parts, but it had a mechanical memory. Another electromechanical computing machine was developed by Howard Aiken, with financial assistance from IBM, at Harvard University in 1943. It was called the Automatic Sequence Control Calculator Mark I, or simply the Harvard Mark I. Neither of these machines was a true computer, however, because they were not entirely electronic.

1.1.1 The ENIAC

Perhaps the most influential of the early computerlike devices was the Electronic Numerical Integrator and Computer, or ENIAC. It was developed by J. Presper Eckert and John Mauchly at the University of Pennsylvania. The project began in 1943 and was completed in 1946. The machine was huge; it weighed 30 tons and contained over 18,000 vacuum tubes.

The ENIAC was a major advancement for its time. It was the first general-purpose, electronic computing machine and was capable of performing thousands of operations per second. It was controlled, however, by switches and plugs that had to be manually set. Thus, although it was a general-purpose electronic device, it did not have a stored program. Therefore, it did not have all the characteristics of a computer.

While working on the ENIAC, Eckert and Mauchly were joined by a brilliant mathematician, John von Neuman. Together, they developed the idea of a stored program computer. This machine, called the Electronic Discrete Variable Automatic Computer, or EDVAC, was the first machine whose design included all the characteristics of a computer. It was not completed, however, until 1951.

Before the EDVAC was finished, several other machines were built that incorporated elements of the EDVAC design of Eckert, Mauchly, and von Neuman. One was the Electronic Delay Storage Automatic Computer, or EDSAC, which was developed in Cambridge, England. It first operated in May of 1949 and is probably the world's first electronic stored-program, general-purpose computer to become operational. The first computer to operate in the United States was the Binary Automatic Computer, or BINAC, which became operational in August of 1949.

1.1.2 The UNIVAC I

Like other computing pioneers before them, Eckert and Mauchly formed a company in 1947 to develop a commercial computer. The company was called the Eckert-Mauchly Computer Corporation. Their objective was to design and build the Universal Automatic Computer or UNIVAC. Because of difficulties of getting financial support, they had to sell the company to Remington Rand in 1950. Eckert and Mauchly continued to work on the UNIVAC at Remington Rand and completed it in 1951. Known as the UNIVAC I, this machine was the first commercially available computer.

The first UNIVAC I was delivered to the Census Bureau and used for the 1950 census. The second UNIVAC I was used to predict that Dwight Eisenhower would win the 1952 presidential election, less than an hour after the polls closed. The UNIVAC I began the modern of computer use.

New Words & Expressions

computerlike *a.* 计算机似的

vacuum tubes 真空管

thousands of 成千上万的

electromechanical *a.* 机电的，电机的

Census Bureau 人口普查局

known as 通常所说的，以……著称

Abbreviations

ENIAC (Electronic Numerical Integrator and Computer) 电子数字积分计算机，ENIAC 计算机

EDSAC (Electronic Delay Storage Automatic Computer) 延迟存储电子自动计算机

BINAC (Binary Automatic Computer) 二进制自动计算机

UNIVAC (Universal Automatic Computer) 通用自动计算机

1.2 Computer Generations

Since the UNIVAC I computers have evolved rapidly. Their evolution has been the result of changes in technology that have occurred regularly. These changes have resulted in four main generations of computers.

1.2.1 First-Generation Computers: 1951～1958

First-generation computers were characterized by the use of vacuum tubes as their principal electronic component. Vacuum tubes are bulky and produce a lot of heat, so first-generation computers were large and required extensive air conditioning to keep them cool. In addition, because vacuum tubes do not operate very fast, these computers were relatively slow.

The UNIVAC I was the first commercial computer in this generation. As noted earlier, it was used in the Census Bureau in 1951. It was also the first computer to be used in a business application. In 1954, General Electric took delivery of a UNIVAC I and used it for some of its business data processing.

The UNIVAC I was not the most popular first-generation computer, however. This honor goes to the IBM 650. It was first delivered in 1955 before Remington Rand could come out with a successor to the UNIVAC I. With the IBM 650, IBM captured the majority of the computer market, a position it still holds today.

At the same time that hardware was evolving, software was developing. The first computers were programmed in machine language, but during the first computer generation, the idea of programming language translation and high-level languages occurred. Much of the credit for these ideas goes to Grace Hopper, who, as a Navy lieutenant in 1945, learned to program the Harvard Mark I. In 1952, she developed the first programming language translator, followed by others in later years. She also developed a language called Flow-matic in 1957, which formed the basis for COBOL, the most commonly used business programming language today.

Other software developments during the first computer generation include the design of the FORTRAN programming language in 1957. This language became the first widely used high-level language. Also, the first simple operating systems became available with first-generation computers.

1.2.2 Second-Generation Computers: 1959～1963

In the second generation of computers, transistors replaced vacuum tubes. Although invented in 1948, the first all-transistor computer did not become available until 1959. Transistors are smaller and less expensive than vacuum tubes, and they operate faster and produce less heat. Hence, with second-generation computers, the size and cost of computers decreased, their speed increased, and their air-conditioning needs were reduced.

Many companies that had not previously sold computer entered the industry with the second generation. One of these companies that still makes computers is Control Data Corporation (CDC). They were noted for making high-speed computers for scientific work.

Remintong Rand, now called Sperr-Rand Corporation, made several second-generation UNIVAC computers. IBM, however, continued to dominate the industry. One of the most popular second-generation computers was the IBM 1401, which was a medium-sized computer used by many businesses.

All computers at this time were mainframe computers costing over a million dollars. The first minicomputer became available in 1960 and cost about $120,000. This was the PDP-1, manufactured by Digital Equipment Corporation (DEC).

Software also continued to develop during this time. Many new programming languages were designed, including COBOL in 1960. More and more businesses and organizations were beginning to use computers for their data processing needs.

1.2.3 Third-Generation Computers: 1964～1970

The technical development that marks the third generation of computers is the use of integrated circuits or ICs in computers. An integrated circuit is a piece of silicon (a chip) containing numerous transistors. One IC replaces many transistors in a computer; result in a continuation of the trends begun in the second generation. These trends include reduced size, reduced cost, increased speed, and reduced need for air conditioning.

Although integrated circuits were invented in 1958, the first computers to make extensive use of them were not available until 1964. In that year, IBM introduced a line of mainframe computers called the System/360. The computers in this line became the most widely used third-generation machines. There were many models in the System/360 line, ranging from small, relatively slow, and inexpensive ones, to large, very fast, and costly models. All models, however, were compatible so that programs written for one model could be used on another. This feature of compatibility across many computers in a line was adopted by other manufacturers of third-generation computers.

The third computer generation was also the time when minicomputers became widespread. The most popular model was the PDP-8, manufactured by DEC. Other companies, including Data General Corporation and Hewlett-Packard Company, introduced minicomputers during the third generation.

The principal software development during the third computer generation was the increased sophistication of operating systems. Although simple operating systems were developed for first-and second-generation computers, many of the features of modern operating systems first appeared during the third generation. These include multiprogramming, virtual memory, and time-sharing. The first operating systems were mainly batch systems, but during the third generation, interactive systems, especially on minicomputers, became common. The BASIC programming language was designed in 1964 and became popular during the third computer generation because of its interactive nature.

1.2.4 Fourth-Generation Computers: 1971～?

The fourth generation of computers is more difficult to define than the other three generations. This generation is characterized by more and more transistors being contained on a silicon chip. First there was Large Scale Integration (LSI), with hundreds and thousands of transistors per chip, then came Very Large Scale Integration (VLSI), with tens of thousands and hundreds of thousands of transistors. The trend continues today.

Although not everyone agrees that there is a fourth computer generation, those that do feel that it began in 1971, when IBM introduced its successors to the System/360 line of computers. These mainframe computers were called the System/370, and current-model IBM computers, although not called System/370s, evolved directly from these computers.

Minicomputers also proliferated during the fourth computer generation. The most popular lines were the DEC PDP-11 models and the DEC VAX, both of which are available in various models today.

Supercomputers first became prominent in the fourth generation. Although many companies, including IBM and CDC, developed high-speed computers for scientific work, it was not until Cray Research, Inc., introduced the Cray 1 in 1975 that supercomputers became significant. Today, supercomputers are an important computer classification.

Perhaps the most important trend that began in the fourth generation is the proliferation of microcomputers. As more and more transistors were put on silicon chips, it eventually became possible to put an entire computer processor, called a microprocessor, on a chip. The first computer to use microprocessors became available in the mid-1970s. The first microcomputer designed for personal use was the Altair, which was sold in 1975. The first Apple computer, marketed with the IBM PC in 1981. Today, microcomputers far outnumber all other types of computers combined.

Software development during the fourth computer generation started off with little change from the third generation. Operating systems were gradually improved, and new languages were designed. Database software became widely used during this time. The most important trend, however, resulted from the microcomputer revolution. Packaged software became widely available for microcomputers so that today most software is purchased, not developed from scratch.

1.2.5 Generationless Computers

We may have defined our last generation of computers and begun the era of generationless computers. Even though computer manufacturers talk of "fifth" and "sixth"-generation computers, this talk is more a marketing play than a reflection of reality.

Advocates of the concept of generationless computers say that even though technological innovations are coming in rapid succession, no single innovation is, or will be, significant enough to characterize another generation of computers.

New Words & Expressions

result in 导致，终于造成……结果

take delivery of 正式接过……

high-level language 高级语言

more and more 越来越多的

multiprogramming *n.* 多道程序设计

virtual memory 虚拟内存

compatible *a.* 兼容的；compatibility *n.* 兼容性

air conditioning 空气调节，空调

Navy lieutenant 海军上尉

mainframe *n.* 主机，大型机

range from ...to... 从……到……

time-share *n.* 分时，时间共享

from scratch 从头开始

outnumber *vt.* 数目超过，比……多

start off *v.* 出发，开始

proliferate *v.* 增生，扩散

Abbreviations

COBOL (Common Business-Oriented Language) 面向商业的通用语言
DEC (Digital Equipment Corporation) 美国数字设备公司
LSI (Large Scale Integrated Circuit) 大规模集成电路
VLSI (Very Large Scale Integrated Circuit) 超大规模集成电路

Notes

IBM introduced a line of mainframe computers called the System/360. IBM 公司推出了一个称为System/360 的大型计算机系列，此处 line 指系列产品。

1.3 Near–future Supercomputer Directions

Some idea of what might be happening in the near future in supercomputer design can be gleaned from a press release issued by the US Department of Energy (DoE). It came out of the SUPERCOMPUTING 2002 Conference held last November in Baltimore, MD. The press release announced that the DoE had awarded IBM a $290 (USD) million contract to build the two fastest supercomputers in the world with a combined peak speed of 460 TFlops. To get an idea of the speed computing throughput 460 teraflops represents, the press release states that, "These two systems will have more than one-and-a-half times the combined processing power of all 500 machines on the recently announced TOP 500 List of Supercomputers."

The first system, "ASCI Purple," [apparently the DoE likes colorful names] will be the world's first supercomputer capable of 100 Tflops. ASCI Purple will have a massive cluster of POWER-based IBM eServer systems and IBM storage systems. This supercomputer represents a fifth-generation system under the Advanced Simulation and Computing Initiative (ASCI) Program. It will serve as the primary supercomputer for DoE.

According to the press release, the second system will be a research machine called Blue Gene/L. It will employ advanced IBM semiconductor and system technologies based on new architectures being developed by DoE and IBM. Blue Gene/L is expected to achieve a peak performance of 360 TFlops with 130,000 processors running under the Linux operating system. It will have the capability to process data at a rate of one terabit per second, equivalent to the data transmitted by ten thousand weather satellites. Applications are expected to include the simulation of very complex physical phenomena in areas such as turbulence, biology and high explosives.

The ASCI Purple system will use IBM's next generation microprocessor, the POWER5, employing a total of 12,544 of them. These 12,544 processors will be spread among 196 individual computers. The total memory bandwidth will be 156,000 GBs, the equivalent of simultaneously playing 31,200 DVD movies. A super-fast data highway with a total interconnect bandwidth of 12,500 GB will interconnect the 196 computers. The IBM AIXL operating system will be used to run this configuration. The operating system will contain 50 terabytes of memory, an amount that is 400,000 times the capacity of the average desktop PC. There will also be two petabytes of disk storage or holding the content of approximately one billion books.

Finally, since the UNIVAC-1's introduction, raw computer speed has increased by about 11 to 12 orders of magnitude in about 50 years, or a factor of 10 every five years. This is a truly remarkable achievement. It's also interesting to contemplate that, if this growth continues over the next 50 years, then by the 100th anniversary of the UNIVAC-1, computers will be operating at speeds on the order of 1023 Flops!

New Words & Expressions

glean *vt., vi.* 搜集（情报或事实）

Tflops *abbr.* teraflops 每秒兆兆（10^{12}）次

terabit *n.* 兆兆位

bandwidth *n.* 带宽

Petabyte *n.* 千兆兆（10^{15}）字节

contemplate v. 凝视，沉思

turbulence *n.* 扰动，湍流

flops *n.* 每秒浮点运算次数（floating-point operation per second）

MD *abbr.* Maryland（马里兰）

architecture *n.* 体系机构

factor *n.* 阶乘

Terabyte *n.* 兆兆（10^{12}）字节

microprocessor *n.* [计]微处理器

order *n.* 阶，次

GB=GigaBit 千兆位；= GigaByte，吉字节

Reading Material: Classes of Computing Applications and Their Characteristics

Although a common set of hardware technologies is used in computers ranging from smart home appliances to cell phones to the largest supercomputers, these different applications have different design requirements and employ the core hardware technologies in different ways. Broadly speaking, computers are used in three different classes of applications.

Personal computers (PCs) are possibly the best known form of computing, which readers of this book have likely used extensively. Personal computers emphasize delivery of good performance to single users at low cost and usually execute third-party software. This class of computing drove the evolution of many computing technologies, which is only about 35 years old!

Servers are the modern form of what were once much larger computers, and are usually accessed only via a network. Servers are oriented to carrying large workloads, which may consist of either single complex applications—usually a scientific or engineering application—or handling many small jobs, such as would occur in building a large web server. These applications are usually based on software from another source (such as a database or simulation system), but are often modified or customized for a particular function. Servers are built from the same basic technology as desktop computers, but provide for greater computing, storage, and input/output capacity. In general, servers also place a greater emphasis on dependability, since a crash is usually more costly than it would be on a single user PC.

Servers span the widest range in cost and capability. At the low end, a server may be little more than a desktop computer without a screen or keyboard and cost a thousand dollars. These low-end servers are typically used for file storage, small business applications, or simple web serving. At the other extreme are **supercomputers**, which at the present consist of tens of thousands of processors and many **terabytes** of memory, and cost tens to hundreds of millions of dollars. Supercomputers are usually used for high-end scientific and engineering calculations, such as weather forecasting, oil exploration, protein structure determination, and other large-scale problems. Although such supercomputers represent the peak of computing capability, they represent a relatively small fraction of the servers and a relatively small fraction of the overall computer market in terms of total revenue.

Embedded computers are the largest class of computers and span the widest range of applications and performance. Embedded computers include the microprocessors found in your car, the computers in a television set, and the networks of processors that control a modern airplane or cargo ship. Embedded computing systems are designed to run one application or one set of related applications that are normally integrated with the hardware and delivered as a single system; thus, despite the large number of embedded computers, most users never really see that they are using a computer!

Embedded applications often have unique application requirements that combine a minimum performance with stringent limitations on cost or power. For example, consider a music player: the processor need only be as fast as necessary to handle its limited function, and beyond that, minimizing cost and power are the most important objectives. Despite their low cost, embedded computers often have lower tolerance for failure, since the results can vary from upsetting (when your new television crashes) to devastating (such as might occur when the computer in a plane or cargo ship crashes). In consumer-oriented embedded applications, such as a digital home appliance, dependability is achieved primarily through simplicity—the emphasis is on doing one function as perfectly as possible. In large embedded systems, techniques of redundancy from the server world are often employed. Although this book focuses on general-purpose computers, most concepts apply directly, or with slight modifications, to embedded computers.

Many embedded processors are designed using *processor cores*, a version of a processor written in a hardware description language, such as Verilog or VHDL. The core allows a designer to integrate other application-specific hardware with the processor core for fabrication on a single chip.

New Words & Expressions

saerver *n.* 服务器

workload *n.* 工作量

low-end a. 低端

stringent *adj.* 严格的

processor *n.* [计]处理器

terabytes *n.* 兆兆（10^{12}）字节

database *n.* 数据库

high-end *a.* 高端

fabrication *n.* 制造

Verilog *n.* 一种硬件描述语言

Abbreviations

VHDL (VHSic hadware description language) 超高速集成电路硬件描述语言

科技英语的特点

与非科技英语相比，科技英语有四多，即复杂长句多、被动语态多、非谓语动词多、词性转换多。

一、复杂长句多

科技文章要求叙述准确，推理谨严，因此一句话里包含三四个甚至五六个分句的，并非少见。译成汉语时，必须按照汉语习惯破成适当数目的分句，才能条理清楚，避免洋腔洋调。这种复杂长句居科技英语难点之首，读者要学会运用语法分析方法来加以解剖，以便以短代长，化难为易。例如：

Factories will not buy machines unless they believe that the machine will produce goods that they are able to sell to consumers at a price that will cover all cost.

这是由一个主句和四个从句组成的复杂长句，只有进行必要的语法分析，才能正确理解和翻译。现试译如下：

除非相信那些机器造出的产品卖给消费者的价格足够支付所有成本，否则厂家是不会买的。

也可节译如下：

要不相信那些机器造出的产品售价够本，厂家是不会买的。

后一句只用了 24 个字，比前句 40 个字节约用字 40%，而对原句的基本内容无损。可见，只要吃透原文的结构和内涵，翻译时再在汉语上反复推敲提炼，复杂的英语长句，也是容易驾驭的。又如：

There is an increasing belief in the idea that the “problem solving attitude” of the engineer must be buttressed not only by technical knowledge and “scientific analysis” but that the engineer must also be aware of economics and psychology and, perhaps even more important, that he must understand the world around him.

这个长句由一个主句带三个并列定语从句构成，试译如下：

越来越令人信服的想法是：工程师不仅必须用技术知识和科学分析来加强解决问题的意向，而且也一定要了解经济学和心理学，而可能更为重要的是必须懂得周围世界。

这两个例句初步说明了英语复杂长句的结构和译法。

二、被动语态多

英语使用被动语态大大多于汉语，如莎士比亚传世名剧《罗密欧与朱丽叶》中的一句就两次用了被动语态：

Juliet was torn between desire to keep Romeo near her and fear for his life, should his presence be detected.

朱丽叶精神上受到折磨，既渴望和罗密欧形影不离，又担心罗密欧万一让人发现，难免有性命之忧。

科技英语更是如此，有三分之一以上用被动语态。例如：

(a) No work can be done without energy.

译文：没有能量决不能做功。

(b) All business decisions must now be made in the light of the market.

译文：所有企业现在必须根据市场来作出决策。

(c) Automobiles may be manufactured with computer-driven robots or put together almost totally by hand.

译文：汽车可以由计算机操纵的机器人来制造，或者几乎全部用手工装配。

以上三例都用被动语态。但译成汉语时都没有用被动语态，以便合乎汉语传统规范。例(c)的并列后句，其谓语本应是 may be put together。put 是三种变化形式一样的不规则动词，在这里是过去分词，由于修辞学

上避免用词重复出现的要求，略去了 may be 两词，所以并非现在时，而是被动语态。

科技英语之所以多用被动语态，为的是要强调所论述的客观事物（四例中的 work, necessaries, business decisions, automobiles），因此放在句首，作为句子的主语，以突出其重要性。

三、非谓语动词多

英语每个简单句中，只能用一个谓语动词，如果读到几个动作，就必须选出主要动作当谓语，而将其余动作用非谓语动词形式，才能符合英语语法要求。

非谓语动词有三种：动名词、分词（包括现在分词和过去分词）和不定式。例如：

(a) 要成为一个名符其实的内行，需要学到老。

这句中，有“成为”“需要”和“学”三个表示动作的词，译成英语后为：

To be a true professional requires lifelong learning.

可以看出，选好“需要”（require）作为谓语，其余两个动作：“成为”用不定式形式 to be，而“学”用动名词形式 learning，这样才能符合英语语法要求。

(b) 任何具有重量并占有空间的东西都是物质。

这句包含“是”（在英语中属于存在动词）“具有”和“占有”三个动作，译成英语为：

Matter is anything having weight and occupying space.

将“是”（is）当谓语（系动词），而“具有”（having）和“占有”（occupying）处理为现在分词，连同它们的宾语 weight 和 space 分别构成现在分词短语作为修饰名词 anything 的定语。

(c) 这门学科为人所知的两大分支是无机化学和有机化学。

这句有“为人所知”和“是”两个动词，译成英语后为：

The tow great divisions of this science known are inorganic chemistry and organic chemistry.

这里将“是”（are）作为谓语系动词，而将“为人所知”（known）处理为过去分词。

上述三例分别列举了三种非谓语动词的使用情况。其必要性都是为了英语语法上这条铁定的要求：每个简单句只允许有一个谓语动词。这就是英语为什么不同于其他语言，有非谓语动词，而且用得十分频繁的原因。

四、词性转换多

英语单词有不少是多性词，即既是名词，又可用作动词、形容词、介词或副词，字形无殊，功能各异，含义也各不相同，如不仔细观察，必致谬误。例如：

(a) above

介词：above all (things) 首先，最重要的是

形容词：for the above reason 由于上述理由

副词：As (has been) indicated above 如上所指出

(b) light

名词：（启发）in (the)light of 由于，根据；（光）high light(s) 强光，精华；（灯）safety light 安全指示灯

形容词：（轻）light industry 轻工业；（明亮）light room 明亮的房间；（淡）light blue 淡蓝色；（薄）light coating 薄涂层

动词：（点燃）light up the lamp 点灯

副词：（轻快）travel light 轻装旅行　　（容易）light come, light go 来得容易去得快

诸如此类的词性转换，在德、俄等西方语言中是少有的，而科技英语中却屡见不鲜，几乎每个技术名词