



全国高等职业教育规划教材

模具专业英语

主编 杨 勇



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全国高等职业教育规划教材

模具专业英语

Professional English for Mold Design and Manufacturing

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前 言

现代模具设计与制造是技术、资金、人才密集型的产业。目前,我国约有模具生产厂 2 万余家,从业人员有 50 余万人。据国际技术协会统计,产品零件粗加工的 75%、精加工的 50%都是由模具加工完成的。近年来,模具向大型、精密、复杂、长寿命模具和模具标准化的方向发展,我国正成为世界模具大国。随着全球经济一体化,我国与国外模具同行之间的业务交往和技术合作也随之增多,模具专业英语的应用越来越广泛。对于模具设计与制造专业的大中专学生和从事相关工程技术人员来讲,熟练掌握模具专业英语技能是非常必要的。

模具专业的科技英语词汇和语句等虽常见于各专业文献中,但比较分散,难以全面、系统地反映模具材料、设备和工艺以及模具对外贸易等的内在关联。为了满足模具设计与制造专业英语教与学的需求,我们编写了本书。

模具设计与制造内涵丰富,涉及面很广,包括高分子材料、模具金属材料与热处理、模具结构、成型加工设备、模具制造工艺、先进制造方法等内容。本书编者在编写过程中,注重将模具设计与制造工程实际紧密结合,力求所选教材内容紧扣专业基本知识点,体现基本内容、基本要求、基本能力。同时,本书注意知识的衔接性、系统性和拓展性,其先修课要求完成机械专业基础课程(机械制图、力学、材料等)和机械制造技术基础、数控加工技术等。根据模具专业知识的教学针对性特点,在教材内容深度和广度方面进行合理搭配,以实用性和可运用性为目的,拥有广度,照顾深度。课文简单易读,适合不同层次的读者阅读。

本书从国内外最新出版的教科书、专著、外文期刊中进行选材,尽管所选内容篇幅有限,但比较精练,基本涵盖了模具设计与制造学科领域的专业知识。全书主要包括:冲压成形、弯曲成形、拉伸成形、挤压成形、注塑成型、模具加工与制造、模具制造设备与系统、模具的报价与合同等。

本书内容丰富,取材新颖,重点突出,图文并茂,与专业课程紧密结合,实用性强。为方便阅读理解,全书由课文、单词与词组、注释、练习等部分组成,在编排上各单元相对独立,每节后附有重点句解析和专业词汇,同时在书后附有模具专业词汇总表。每章后面附有科技英语翻译方法与技巧、练习题,在附录中附有练习参考答案。

本书由杨勇任主编,杨南粤、周敏、文珊任副主编,李助军、诸进才参加编写。全书共有 9 个单元其中杨南粤、李助军负责第 2、4、7 单元的编写;周敏、诸进才负责第 3、6、8 单元的编写;文珊负责第 1、5、9 单元的编写以及全书的英文校对等,全书由杨勇统稿审定,感谢广东技术师范学院的支持。

由于编者的水平和经验有限,书中不足之处在所难免,恳请广大读者批评指正。

编 者

目 录

前言

Unit 1 Fundamentals of Die and Mold Materials, and Heat Treatment

1.1 Introduction to Die and Mold Materials	1
1.2 Introduction to Heat Treatment	4
1.3 Further Readings	7

Unit 2 Stamping

2.1 Introduction to Stamping	13
2.2 Stamping Process	15
2.3 Stamping Methods	18
2.4 Further Readings	20

Unit 3 Bending

3.1 Introduction to Bending	27
3.2 Bending Process	29
3.3 Quality Analysis of Bending Workpieces	30
3.4 Bending Methods	32
3.5 Further Readings	35

Unit 4 Drawing

4.1 Introduction to Drawing	41
4.2 Drawing Process	44
4.3 Definition and Analysis of Drawing Coefficient	46
4.4 Drawing Methods	48
4.5 Further Readings	50

Unit 5 Extrusion

5.1 Introduction to Extrusion	60
5.2 Extrusion Process	62
5.3 Design for Extrusion Dies	64
5.4 Extruding Methods	70
5.5 Further Readings	74

Unit 6 Plastic Forming

6.1 Introduction to Plastic Materials	79
6.2 Plastic Forming Process	82
6.3 Plastic Forming Methods	84
6.4 Further Readings	90

Unit 7 Mold Manufacturing and Processing

7.1 Introduction to Mold Manufacturing	99
7.2 Common Methods of Mold Manufacturing and Processing	102
7.3 Special Methods of Mold Manufacturing	104
7.4 Assembly Process of Molds	107
7.5 Further Readings	110

Unit 8 Mold Manufacturing Equipment and Systems

8.1 CNC Machining and Equipment	117
8.2 Press Machines	121
8.3 Injection Molding Machines	127
8.4 Electric Discharge Machines	131
8.5 Further Readings	135

Unit 9 Quotation and Contract for Mold and Die

9.1 Introduction to Quotation for Mold and Die	143
9.2 Quotation Strategies and Terms of Payment	148
9.3 Further Readings	152

Appendixes

Appendix A 练习参考答案	167
Appendix B 词汇表	170
参考文献	184

Unit 1 Fundamentals of Die and Mold Materials, and Heat Treatment

1.1 Introduction to Die and Mold Materials

1.1.1 Carbon Steels

Carbon steels are used extensively in tool construction. Carbon steels are those steels which contain iron and carbon, and small amounts of other alloy elements. Carbon steels are the most common and least expensive type of steels used for tools.^① The three principal types of carbon steels used for tooling are low carbon, medium carbon, and high carbon steels. Low carbon steels contain between 0.3% and 0.7% carbon. As the carbon content is increased in carbon steels, the strength, toughness, and hardness also increase when the metal is heat-treated.

Low carbon steels are soft, tough steels that are easily machined and welded. Due to their low carbon content, these steels cannot be hardened except by case hardening. Low carbon steels are well suited for the following applications: tool bodies, handles, die shoes, and similar situations where strength and wear resistance are not required.^②

Medium carbon steels are used where greater strength and toughness are required. Since medium carbon steels have a higher carbon content they can be heat-treated to make parts such as studs, pins, axles, and nuts. Steels in this group are more expensive as well as more difficult to machine and weld than low carbon steels.

High carbon steels are the most hardenable type of carbon steel and are used frequently for parts where wear resistance is an important factor.^③ Other applications where high carbon steels are well suited include drill bushings, locators, and wear pads. Since the carbon content of these steels is so high, parts made from high carbon steel are normally difficult to machine and weld.

1.1.2 Alloy Steels

Alloy steels are basically carbon steels with additional elements added to alter the characteristics and bring about a predictable change in the mechanical properties of the alloyed metal. Alloy steels are not normally used for most tools due to their increased cost, but some have found favor for special applications. The alloy elements used most often in steels are manganese, nickel molybdenum, and chromium. They can have the general name of manganese steel, nickel steel, molybdenum steel and chromium steel according to their specific content of the alloy elements in alloy steels.

Another type of alloy steel frequently used for tooling applications is stainless steel. Stainless steel is a term used to describe high chromium and nickel-chromium steels. These steels are used for

tools which must resist high temperatures and corrosive atmospheres. Some high chromium steels can be hardened by heat treatment and are used where resistance to wear, abrasion, and corrosion are required.^④ Typical applications where a hardenable stainless steel is sometimes preferred are plastic injection molds. Here, the high chromium content allows the steel to be highly polished and prevents deterioration of the cavity from heat and corrosion.^⑤

1.1.3 Basic Properties of Die and Mold Steels

The specific material selected for a particular die or mold is normally determined by the mechanical properties necessary for the proper operation of the dies and molds. These materials should be selected only after a careful study and evaluation of the function and requirements of the proposed tool. In most applications, more than one type of materials will be satisfactory, and a final choice will normally be governed by requirements from customers for dies and molds, such as performance and economic considerations for dies and molds.

The principal materials used for dies and molds can be divided into two major categories : cold work tool (die) steel and hot work tool (mold) steel, such as carbide steel, alloy tool steel, carbon tool steel, high-speed steel, high alloy steel, high carbon steel, low carbon steel, carbon tool steel and so on. To properly select a die or mold material, there are several physical and mechanical properties you should understand to determine how the materials you select will affect the function and performance of the die or mold.

Physical and mechanical properties are those characteristics of a material which control how the material will react under certain conditions. Physical properties are those properties which are natural in the material and cannot be permanently altered without changing the material itself.

These properties include weight, thermal and electrical conductivity, rate of thermal expansion, and melting point. The mechanical properties of a material are those properties which can be permanently altered by thermal or mechanical treatment. These properties include strength, hardness, wear resistance, toughness, brittleness, plasticity, ductility, malleability, and modulus of elasticity.

From a practical standpoint, die and mold steels are utilized in working and shaping basic materials such as metals and plastics into desired forms. From a usefulness standpoint, die steels are of the performances which are capable of being hardened and tempered and wear resistance, high hardness, sufficient anti-impact strength. Mold steels are of the performances which are capable of being hardened and tempered and heat resistance, corrosion resistance and wear resistance.

Die and mold steels are relatively special steel products, they have a very important application in production of the die and mold products, such as deep-drawing dies, stamping dies, extrusion dies, piercing dies, bending dies, pressure die-casting dies, forming dies, blanking dies and thermoplastic and thermosetting molds. They are playing a more and more important role in die and mold industry.

New Words and Expressions

Element ['elimənt] n. 要素, 元素, 成分, 元件

Principal ['prinsəpəl] adj. 主要的, 首要的

heat treatment 热处理
 machine [mə'ʃi:n] n. 机器, 机械 vt. 机器制造, 用车床加工
 weld [weld] vt. 焊接 n. 焊接, 焊缝
 handle ['hændl] n. 柄, 把手, 把柄 vt. 触摸; 运用; 买卖; 处理; 操作
 die shoe 模脚
 stud [stʌd] n. 柱头螺栓
 pin [pin] n. 钉, 销, 栓
 axle ['æksl] n. 轴, 车轴, 轮轴
 nut [nʌt] n. 螺母
 hardenable ['hɑ:dnəbl] adj. 可硬化的
 frequently ['fri:kwəntli] adv. 常常, 频繁地, 经常地
 wear resistance 耐磨性
 drill bushing 钻套
 locator [ləu'keɪtə] n. 定位器 (表示位置之物); 土地
 wear pad 耐磨垫板
 alter ['ɔ:lteɪ] v. 改变
 predictable [pri'diktəbl] adj. 可预言的
 manganese [mæŋɡə'ni:z] n. [化]锰 (元素符号为 Mn)
 nicke ['nikl] n. [化]镍
 molybdenum [mə'libdinəm] n. [化]钼
 chromium ['krəumiəm] n. [化]铬
 resist [ri'zɪst] vt. 抵抗, 反抗, 抗; 忍得住
 corrosive [kə'rəusɪv] adj. 腐蚀的, 蚀坏的, 腐蚀性的; n. 腐蚀物, 腐蚀剂
 abrasion [ə'breɪʒən] n. 磨损
 preferred [pri'fəd] adj. 首选的
 polish ['pɒlɪʃ] n. 磨光; 光泽 vt. 擦亮, 发亮, 磨光
 deterioration [di,tɪəriə'reɪʃən] n. 变坏, 退化; 堕落

Notes

① Carbon steels are those steels which contain iron and carbon, and small amounts of other alloying elements. Carbon steels are the most common and least expensive type of steels used for tools.

译文: 碳钢是指那些仅仅由铁和碳以及少量的其他合金元素构成的钢。碳钢是一种最常见、最廉价的工具钢。

解析: 此句中的 which 是关系代词, 引导定语从句, 修饰前面的名词 steels, 并充当定语从句中的主语。used for tools 是过去分词短语作后置定语, 修饰中心词 steels, 其也可以等同于一个定语从句 which/that are used for tools.

② Low carbon steels are well suited for the following applications: tool bodies, handles, die shoes, and similar situations where strength and wear resistance are not required.

译文：低碳钢很适用于以下用途：刀具本体，把柄，模脚以及一些对强度和耐磨性不作要求的场合。

解析：be suited for 适用于。

③ High carbon steels are the most hardenable type of carbon steels and are used frequently for parts where wear resistance is an important factor.

译文：高碳钢是一种可硬化性能最好的碳钢，并常用于对耐磨性要求非常高的部件。

解析：此句 where 中是关系副词，引导定语从句。

④ Some high chromium steels can be hardened by heat treatment and are used where resistance to wear, abrasion, and corrosion are required.

译文：一些高铬钢能够通过热处理硬化，并被用于要求耐磨损，耐大气腐蚀的场合。

解析：resistance to 对……的抵抗，耐……。

⑤ Typical applications where a hardenable stainless steel is sometimes preferred are plastic injection molds. Here, the high chromium content allows the steel to be highly polished and prevents deterioration of the cavity from heat and corrosion.

译文：优先选用可硬化不锈钢的典型应用是塑料注射模具。因为高的含铬量使得钢材具有很好的抛光性，而且能够防止型腔由于受热和腐蚀而产生性能的退化。

解析：此句中 prevent...from 译为“阻止，妨碍”。

1.2 Introduction to Heat Treatment

1.2.1 Basic Concept of Heat Treatment

Heat treatment is a method used to alter the physical, and sometimes chemical properties of a material.^① The most common application is metallurgical. Heat treatments are also used in the manufacture of many other materials, such as die and mould, glass, etc.

Heat treatment involves the use of heating or chilling, normally to extreme temperatures, to achieve a desired result such as hardening or softening of a material. Heat treatment techniques mainly include annealing, normalizing, hardening, and tempering. It is noteworthy that while the term heat treatment applies only to processes where the heating and cooling are done for the specific purpose of altering properties intentionally, heating and cooling often occur incidentally during other manufacturing processes such as hot forming or welding. The temperature of the heat treatment and the length of time at this temperature, or “soaking period”, depend upon the composition of the material.^②

1.2.2 Conventional Methods of Heat Treatment

Annealing is a technique used to recover cold work and relax stresses within a metal. Annealing typically results in a soft, ductile metal. When an annealed part is allowed to cool in the furnace, it is called a full anneal heat treatment. When an annealed part is removed from the furnace

and allowed to cool in air, it is called a normalizing heat treatment. A stress relief annealing is when only the first stage of annealing is performed. The second stage of annealing is recrystallization, where new stress-free grains grow. The third stage is grain growth, which causes the existing grains to grow.

Normalizing is a process to heat iron-base alloys to temperatures approximately 50°C above the critical temperature range followed by cooling in air to below the range. The purpose is to put the metal structure in a normal condition by removing all internal strains and stresses given to the metal during some processing operations. ^③

Hardening is done to increase the strength and wear properties of steels. For instance, case hardening is a hardening process in which an alloy element, most commonly carbon or nitrogen, diffuses into the surface of a monolithic metal. The resulting interstitial solid solution is harder than the base material, which improves wear resistance without sacrificing toughness. Case hardening is specified by hardness and case depth. The case depth can be specified in two ways: total case depth or effective case depth. The total case depth is the true depth of the case. The effective case depth is the depth of the case that has a hardness equivalent of HRC50. This value can be roughly approximated as 65% of the total case depth; however, the chemical composition and hardenability can affect this approximation. If neither type of case depth is specified the total case depth is assumed. The hardened material is then often tempered to reduce the brittleness that may increase from the quench hardening process. ^④

Tempering is a process done subsequently to quench hardening. Quench-hardened parts are often too brittle. This brittleness is caused by a predominance of martensite. This brittleness is removed by tempering. Tempering results in a desired combination of hardness, ductility, toughness, strength, and structural stability. Tempering is not to be confused with tempers on rolled stock. These tempers are the indication of the degree of cold work performed.

The mechanism of tempering depends on the steel and the tempering temperature. The prevalent martensite is a somewhat unstable structure. When heated, the carbon atoms diffuse from martensite to form a carbide precipitate and the concurrent formation of ferrite and cementite, which is the stable form (Fig.1-1).

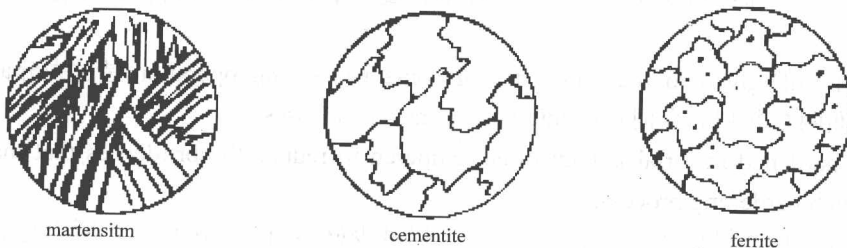


Fig.1-1 Typical microscopic structures of steel

New Words and Expressions

- annealing [æ'ni:liŋ] v. 退火
normalizing ['nɔ: məlaiziŋ] v. 正火
hardening ['ha: dəniŋ] v. 淬火
tempering ['tempəriŋ] v. 回火
martensite ['ma: tənzaɪt] n. 马氏体
ferrite ['ferait] n. 铁素体
cementite [si'mentaɪt] n. 渗碳体
strains [streɪns] n. 应变
stresses [stresɪz] n. 应力
brittleness ['brɪtlɪnis] n. 脆性
diffuse from 扩散
monolithic [ˌmɒnə'liθɪk] adj. 独块巨石的; 整体的; 庞大的; 单片的; 整体式的; 巨大的
interstitial [ˌɪntə'stiʃəl] n. 填隙原子; 节间 adj. 间质的; 空隙的; 填隙的; 间隙的
precipitate [pri'sɪpaɪt] vt. 使突然发生; 加速; 促使; 猛抛下; 猛然摔下; 使沉淀; 使沉降 vi. 【化】沉淀; 【气】(水汽)凝结成雨(或雪等)[(+as)]

Notes

① Heat treatment is a method used to alter the physical, and sometimes chemical properties of a material.

译文: 热处理是一种用来改变材料物理, 有时甚至是化学性能的方法。

解析: used to alter the physical, and sometimes chemical properties of a material 是修饰 method 的后置定语。

② The temperature of the heat treatment and the length of time at this temperature, or “soaking period”, depend upon the composition of the material.

译文: 热处理的温度和在这温度下的时间长短, 即“保温期”, 取决于材料的组成成分。

解析: 本句有两个并列主语, 其分别为 temperature 和 length of time, “soaking period” 为主语的同位解释短语。

③ The purpose is to put the metal structure in a normal condition by removing all internal strains and stresses given to the metal during some processing operation.

译文: 目的是通过消除在某些加工过程中金属产生的内应变和应力, 使金属结构处于正常状态。

解析: 本句的 given to the metal during some processing operation 是过去分词做后置定语, 修饰前面两个并列的介词宾语 internal strains 和 stresses。

④ The hardened material is then often tempered to reduce the brittleness that may increase from the quench hardening process.

译文: 淬火后的材料往往还要进行回火, 以减少材料由淬火硬化工艺所引起的脆性。

解析: 本句的 hardened 是过去分词作定语, 修饰主语 material, 译为淬火后的材料。that may increase from the quench hardening process 是定语从句, 修饰名词 brittleness。

1.3 Further Readings

Reading A Selection of Mold and Die

At present, the plastic products are widely used in the daily life of the growing, accounting for about one injection molding technology to 80%. Injection molding with a shape, size precision can be embedded with pieces of high productivity and easy to realize modernization and post-processing features such as less widely used in automotive, construction, household appliances, food, medicine and many other fields. To receive a good cost-effective production, the selection of plastic molds for the plastics industry is crucial. Therefore, it is very necessary for mold designers to understand the basic requirements for mold materials and the selection of appropriate material.

Mold and die working conditions vary. But in addition to a certain pressure, mold and die also should bear the influence of temperature. Plastic mold is used in accordance with the conditions of the different processing methods to mold the basic performance requirements of steel roughly summarized as follows.

The hardness of plastic is usually of about 50-60HRC, after heat treatment the mold surface should have sufficient hardness to ensure that there is sufficient stiffness mold. Due to plastic flow of the filling and greater pressure to bear stress and friction, die at work should maintain the mold dimensional accuracy and stability to ensure adequate service life of molds. The wear resistance of die depends on the chemical composition of steel and heat treatment, hardness. Thereby, increasing the hardness of tool will help improve its wear resistance.

Reading B Definition of Heat Treatment

By definition, heat treatment is the controlled heating and cooling of metals for the purpose of altering their properties. Because both physical and mechanical properties can be altered by heat treatment, it is one of the most important and widely used manufacturing processes. However, if the heat treatment is performed improperly, more harm than good can result.

Although the term heat treatment is often associated only with those thermal processes designed to increase strength, the definition permits inclusion of a set of processes called heat treatments. These are performed with the major goal of preparing the material for fabrication. Specific objectives may be the improvement of machining characteristics, the reduction of forming force, or the restoration of ductility to enable further processing. Thus, heat treatment becomes even more attractive. The same metal can now be softened for ease of fabrication and then, by another heat treatment, can be given a totally different set of properties for actual service.

Most processing heat treatments involve rather slow cooling or extended times at elevated temperatures, thus tending to approximate equilibrium conditions. The resulting structures, therefore, can be reasonably predicted by the use of equilibrium phase diagrams. The diagram indicates the temperatures that must be attained to achieve a desired structure and the change that will occur on subsequent cooling. It should be remembered, however, that the diagram is for true equilibrium conditions, and the departures from equilibrium may lead to substantially different results.

New Words and Expressions

cost-effective	性价比
injection molding	注射成型模具
in accordance with	按照或依据某事物
forming force	成型力
ductility [dʌk'tɪləti]	n. 延展性
equilibrium phase diagrams	平衡相图

Translation Methods and Skills of EST (English of Science and Technology) 科技英语翻译方法与技巧——省略法

为了更好地表达原意，翻译时往往可以省略原文中某些词语，以便使译文更加严谨、精练、明确。所省略的词语，在英语中是必不可少的，但译成汉语则显多余。

(一) 冠词的省略

一般说来，英语定冠词 the 和不定冠词 a 及 an 在句中用作泛指，常省略不译。另外，定冠词 the 用作特指，根据汉语表达习惯有时也可省略不译。

(1) Because the body's defense system is damaged, the patient has little ability to fight off many other diseases. 由于人体的免疫系统遭到破坏，病人几乎没有什么能力来抵抗许许多多其他疾病的侵袭。

(2) Any substance is made up of atoms whether it is a solid, a liquid, or a gas. 任何物质，无论它是固体、液体或气体，都是由原子构成的。

(3) The atom is the smallest particle of an element. 原子是元素的最小粒子。

(4) Human beings and the great apes had a common ancestor about 5 million years ago. 大约 500 万年以前，人类和类人猿拥有共同的祖先。

(5) Other scientists, however, are afraid that the world may become too hot for human life. 而有些科学家则担心地球会升温，使人类无法生存。

(6) With the development of electrical engineering, power can be transmitted over long distance. 随着电气工程学的发展，电力能被输送到非常遥远的地方去。

(7) The PC has given the average American—the kind of computing power that 10 years ago was found only in large corporations. 个人计算机使普通美国人具有了在 10 年前只有一些大公司才能具有的计算能力。

(8) While the Chinese are eager to import modern medical technology from the West, increasing members of Westerners are equally interested in adopting the traditional medical remedies of China. 现在中国人热衷于从西方国家进口现代化医疗技术，而越来越多的西方人则热衷于接受中医疗法。

(9) Although the world is large, man is able to live in only a small part of it. 尽管地球很大，可人类只能在其中很小的一部分地方生活。

(10) The total land area that contributes surface run off to a river or lake is called a watershed, river basin, or catchment area. 为某一江河或湖泊提供地表径流的整个陆地面积

称作流域、河流盆地或汇水面积。

(二) 代词的省略

英语中表示泛指的人称代词、用作定语的物主代词、反身代词以及用于比较句中的指示代词汉译时, 根据汉语的表达习惯常可省略。另外, 有些代词可承前省略。

(1) If you know the frequency, you can find the wave length. 如果知道频率, 就能求出波长。

(2) Different metals differ in their conductivity. 不同的金属具有不同的导电性能。

(3) A gas distributed itself uniformly through a container. 气体均匀地分布在整个容器中。

(4) The desert animals can hide themselves from the heat during the daytime. 沙漠中的动物能躲避白天的炎热天气。

(5) The volume of the sun is about 1,300,000 times that of the earth. 太阳的体积约为地球的130万倍。

(6) Liquids are like solids in that they have definite volume. 液体像固体一样, 都有一定的体积。

(7) When the signal we pick up has increased by 10 times as the gain may have been reduced by 8 times. 信号增大到10倍, 增益降低到1/8。

(8) If we use electronic computers in hospitals, diagnosis will become quicker and more accurate. 如果医院里使用计算机, 就会使诊断更加快速, 更加准确。

(9) Newton wasted much time on the theological studies toward the end of his life. 牛顿晚年在神学研究上浪费了很多时间。

(三) 连词的省略

英语中连词使用频率较高, 而汉语则不然。因此, 翻译时常可省略不译。

(1) This system is totally enclosed and prevents air pollution from dust particles or gases. 此系统为全封闭式, 能防止尘粒或烟气污染大气。

(2) When the temperature is maintained constant, the volume of a given sample of gas varies inversely with the pressure. 在温度保持不变的情况下, 一定气体的体积与压力成反比。

(3) Like charges repel each other while opposite charges attract. 同性电荷相斥, 异性电荷相吸。

(4) If water is cold enough, it changes to ice. 水冷却到一定程度便成冰。

(5) There are some metals which are lighter than water. 有些金属比水轻。

(6) Acupuncture and Chinese herbal remedies date back at least 2,200 years, although the earliest known written record of Chinese medicine is the *Huangdi Nei Jing* from the 3rd century BC. That opus provided the theoretical concepts for the traditional Chinese medicine that remain the basis of its practice today. 针灸和中草药的历史至少可追溯到2200年以前。《黄帝内经》撰写于公元前3世纪, 是目前已知的最早中医书面记录, 这部著作中所记载的一些中医理论概念至今仍是中医医疗的基础。

(7) Men have known that smallpox is caused by a virus. 人们知道天花是由病毒引起的。

(8) As has been found there are more than a hundred elements. 已经发现, 元素有一百多种。

(9) The patient has a supracondylar fracture, so he was admitted to the hospital this

morning. 病人患髌上骨折, 今天上午获准入院。

(10) The salts of carbonic acid, or the carbonates, can be prepared by adding alkali to such aqueous solutions. 碳酸盐能通过往这种水溶液(碳酸溶液)中添加强碱而制得。

(四) 动词的省略

英语谓语必须用动词, 汉语不仅可以用动词作谓语, 还可以直接用名词、形容词、主谓词组等作谓语。因此, 汉译时往往可以省略原文的谓语动词, 使译文通顺、简练。

(1) Friction always opposes to the motion whatever its direction may be. 不管运动方向怎样, 摩擦总是同运动趋势方向相反。

(2) The wire gets hot, for the current becomes too great. 电线发热, 因为电流太大。

(3) A square has four equal sides. 正方形四边相等。

(4) Steels possess good hardness and high strength. 钢的硬度大, 强度高。

(5) The nuclear reactions give the sun its constant supply. 太阳中核反应不断向太阳提供能量。

(6) Aluminum alloy has low specific electrical resistance and high thermal conductivity. 铝合金的电阻很低, 而导热性很强。

(7) Then came the development of the microcomputer. 后来, 微型计算机发展起来了。

(8) In the case of a possible accident, the machine comes to a halt immediately upon the operator's direction. 一旦发生事故, 只要操作人员一发指令, 机器就立刻停下来。

(9) The Pacific alone covers an area larger than that of all the continents put together. 仅仅太平洋的面积就比所有大陆面积的总和还要大。

(10) Evidently semiconductors have a lesser conducting capacity than metals. 显然, 半导体的导电能力比金属差。

(五) 介词的省略

英语中介词使用频率较高, 句中词与词之间的关系多用介词来表示, 而汉语则不然, 主要是通过语序与逻辑关系来表示。因此, 翻译时常可省略不译。

(1) In the transmission of electric power a high voltage is necessary. 远距离输电必须用高压。

(2) Most substances expand on heating and contract on cooling. 大多数物体热胀冷缩。

(3) We consider isotopes of great use for our research work. 我们认为同位素对研究工作很有用。

(4) A body in motion remains in motion unless acted on by an external force. 如果没有外力的作用, 运动的物体仍然保持运动状态。

(5) It is necessary to develop our computer science at high speed. 必须高速发展我国的计算机科学。

(6) There is no easy answer with meningitis. 脑膜炎不易治疗。

(7) Acupuncture appears most promising for treating chronic musculoskeletal pain. 针灸最适合用于治疗慢性肌与骨骼疼痛。

(8) The instrument has worked well for six hours. 这台仪器已经正常工作了 6 小时。

(9) The density of air varies directly as pressure, with temperature being constant. 温度不变, 空气的密度和压力成正比。

(10) The temperature of the liquid is raised by the application of heat. 加热可以提高液体温度。

(六) 引导词的省略

英语中的两个引导词 “it” 和 “there”，翻译时一般省略不译。

(1) It takes a year for the earth to go around the sun. 地球绕太阳一周需用一年的时间。

(2) It is the gravitation which makes the satellites move round the earth. 地球引力使卫星绕地球运行。

(3) It is demonstrated that it takes a year for the earth to go around the sun. 已经证实，地球绕太阳转一周需要一年的时间。

(4) Perhaps it was the isolation of the remote field of animal husbandry that fostered his originality. 也许是因为他远离尘嚣从事饲养业使他具有独创能力。

(5) Heat from the sun makes it possible for plants to grow. 来自太阳的热使植物生长成为可能。

(6) There are many kinds of atoms, differing in both mass and properties. 原子种类很多，质量与性质都不相同。

(7) There is a rapidly increasing range of uses for electronic computers. 电子计算机的应用范围正在迅速扩大。

(8) There are serious philosophical problems created by the Big Bang, which can not be explained. “创世大爆炸”引起一些严肃的哲学问题。我们对这些问题很难做出解释。

(9) There are some chemical fuels that are clean and smokeless. 有些化学燃料洁净无烟。

(七) 同义词或近义词的省略

英语中有些同义词或近义词往往可以连用，或者表示强调，使意思更加明确；或者表示一个名称的不同说法。在英译汉时，往往省略其中一个词语。

(1) The mechanical energy can be changed back into electrical energy by means of a generator or dynamo. 利用发电机可以把机械能转变成电能。

(2) Insulators in reality conduct electricity but, nevertheless, their resistance is very high. 绝缘体实际上也导电，但其电阻很高。

(3) Explosive technological development after 1940 gave the medical profession enormous power to fight disease and sickness. 1940 年以来，随着技术的迅速发展，医学界大大提高了战胜疾病的能力。

(4) Most electricity still comes from fossil fuels, and so generates the greenhouse gas, carbon dioxide. 大部分电力仍来自于化石燃料，从而产生了温室气体二氧化碳。

(5) Technology is the application of scientific method and knowledge to industry to satisfy our material needs and wants. 技术就是在工业上应用科学方法和科学知识以满足我们物质上的需求。

Exercises

I. Choose appropriate words to complete the following sentences and change the form if necessary.

(1) corrosion / corrosive / corrodible / corrode