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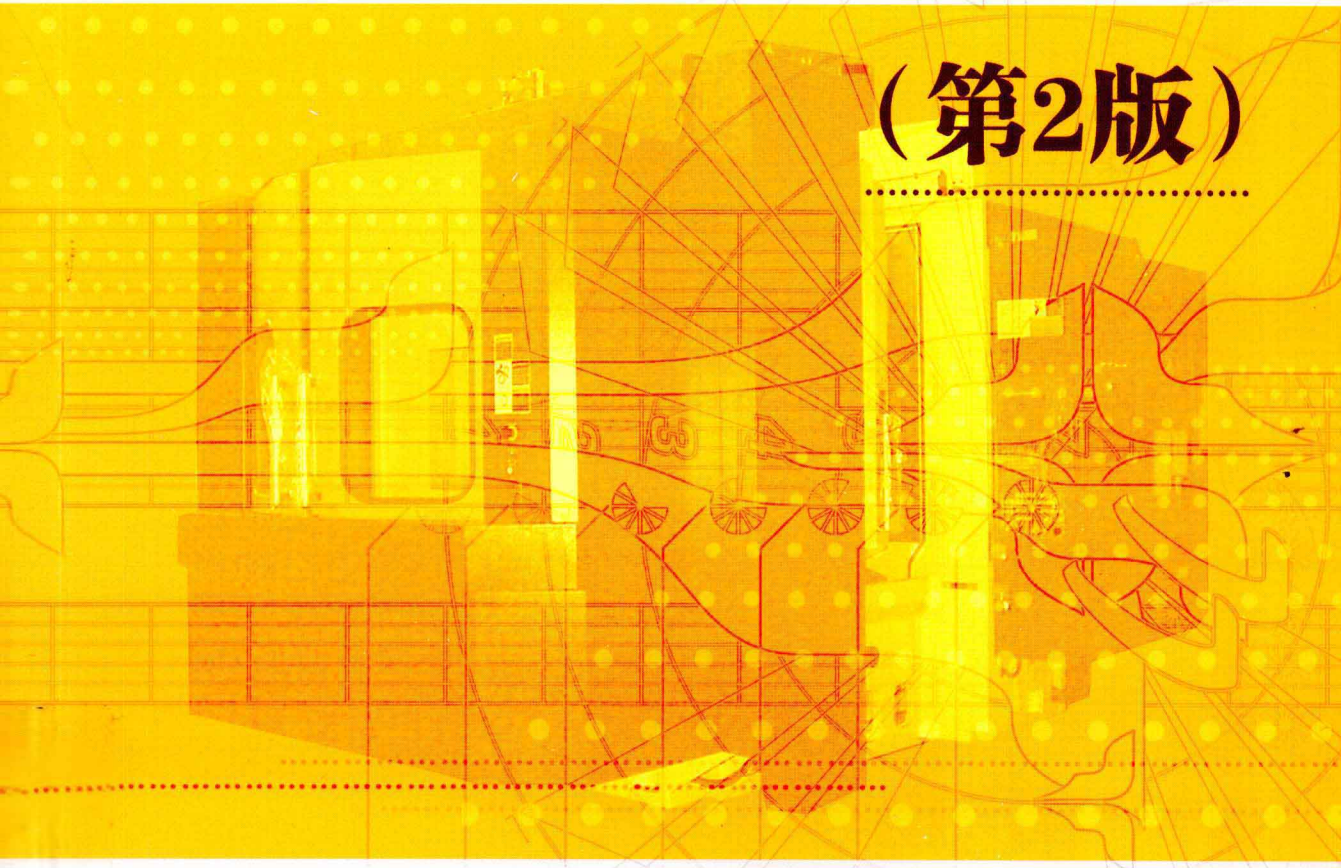
机电类

机电一体化及数控专业英语

JIDIANYITIHUA JI SHUKONG ZHUANYE YINGYU

（第2版）



杨　宏 / 主编

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内 容 提 要

本书是针对高职院校机电一体化和数控专业而编写的专业英语教材，内容包括基础模块、机电一体化模块、数控技术模块及应用写作模块。书中的每个教学单元分为课文和阅读材料两个部分，其中，课文部分中的 Text 1 侧重于基础知识，Text 2 侧重于实践与实验知识，Text 3、Text 4 侧重于教学知识的拓展。每个教学单元都配有针对性的练习，书末附有参考译文及参考答案。本书在材料选取上十分注重体现教材内容的广泛性、灵活性和实用性，且在编写上把易于教学、讲究实效放在首位。

本书适合于高等职业院校机械设计与制造、机电一体化、数控技术与模具技术等专业作为教材使用，同时也适合成人高校学生以及相关专业人员自学使用。

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前　言

当前职业院校专业英语教学所面临的最大问题之一，就是所用的教材不太符合教学实际的需要。考虑到目前高职高专学生英语的实际水平和现代社会对机电一体化与数控技术专业英语的实际要求，以及机电一体化技术与数控技术两个专业的内在联系，我们“合二为一”地编写了这本《机电一体化及数控专业英语（第2版）》教材。本书每个教学单元分为课文和阅读材料两个部分，其中课文部分采用了灵活的版面设计，并对内容加以旁注，以便于理解。本书内容取材面广，11个教学单元共计88篇文章，每篇文章短小精悍，实用性强。本书在编写风格上具有强烈时代性。每个教学单元都配有针对性的练习，书末配有练习答案与教学单元课文的参考译文。另外，还可提供与本书配套的电子课件及本书全部阅读材料的参考译文，需要者可在出版社网站下载。

本书按模块式结构的方式进行篇章的组织，总体分为基础模块、机电一体化模块、数控技术模块及应用写作模块。这些模块既彼此独立又相互联系，相辅相成。本教材在内容的安排上充分体现了现代社会对专业英语教材广泛性、灵活性与实用性的客观要求。这种灵活而实用的编写方式使本教材适合机电工程类多个方向专业英语的教学需要。本书特别适合于高等职业院校机械设计与制造、机电一体化、数控技术与模具技术等专业使用，同时也适合成人高校学生以及相关专业人员自学使用。

本书由杨宏（武汉铁路职业技术学院）担任主编，其他参编和提供资料的人员有：铁路职业技术学院的郭艳艳、罗亚、曾照平、黄秀川、黄超、乔建生、颜昌标、罗东山、倪静、龚武能、郑凯，以及武汉市一轻工业学校的尹静。本书在编选的时候参阅了部分报刊和著作，由于联系上的困难，部分参阅文章的作者或译者未能及时取得联系，在此深表歉意。敬请原作者或译者见到本书后，及时与我们联系，以便我们按照国家有关规定支付稿酬及赠送样书。另外，一些厂家和相关人员也为本书的编写提供了部分资料。本书在编写过程中还得到了杨承毅老师的大力支持与帮助。在此一并表示感谢！

由于编者水平有限，书中难免有不妥之处，恳请读者批评指正。

编　者

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Unit 1 Basic Knowledge (I)

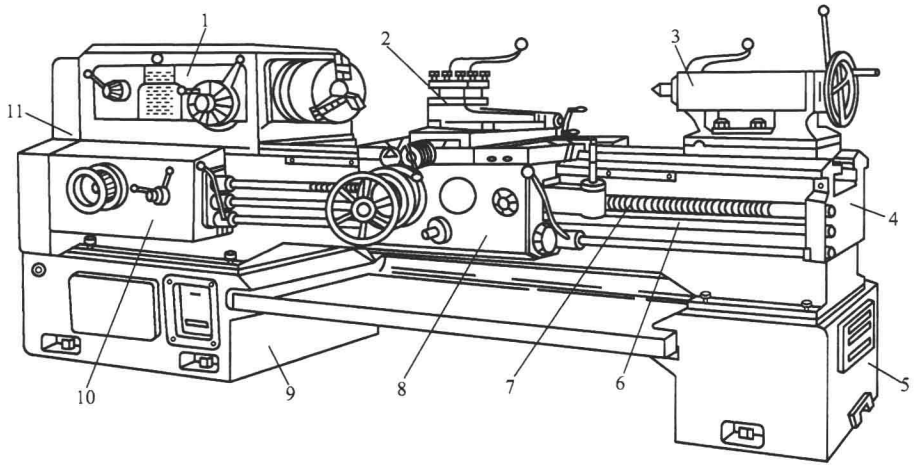
Text 1 Lathe and Turning

In general(1), lathes can be classified as(2) parallel lathes and vertical lathes. The general purpose parallel lathe is a versatile machine in the workshop, and is capable of carrying out(3) a wide variety of machining operations.

The main components of the general purpose parallel lathe (as shown in Fig.1.T1.1) are the headstock, the tool-rest, the tailstock, the bed, the lead screw, the feed rod, the apron, etc. The headstock and tailstock are at(4) opposite ends of a bed, and a tool-rest is between them which holds the cutting tool.[1]

Turning means that the part is rotating while it is being machined. The starting material is usually a workpiece that has been made by other processes, such as casting, forging, extrusion, or drawing. Turning operations can be classified as rough turning or finish turning operations. The objective of the rough turning operation is to remove the bulk of(5) the excess metal as rapidly and efficiently as possible. Enough metal

(1) in general
一般[大体]说来
(2) be classified as …
被分为……
(3) carry out …
实现，执行
(4) be at …
在，位于，处于
(5) the bulk of sth.
大部分，主要部分
(6) so (that) …
为了，以便 [表示目的]



1—Headstock; 2—Tool post; 3—Tailstock; 4—Bed; 5— Tailstock pedestal; 6—Feed rod;
7—Lead screw; 8—Apron; 9— Headstock pedestal; 10—Feeding box; 11—Change gear box

Fig.1.T1.1 A Parallel Lathe

must be left on the workpiece so[6] a finish turning operation can be performed. The objective of the finish turning operation is to attain the required dimensional tolerances and the required surface finish on all surfaces of the workpiece. Parts are sometimes semi-finish turned in a lathe, and the final dimensions and surface turning are obtained on a grinding machine.[2]

New Words

lathe [leið]	n. 车床，机床，镟床
turning ['tə:niŋ]	n. 车削，车工工作
parallel ['pærəlel]	adj. 平行的，卧式的
vertical ['və:tikəl]	adj. 垂直的，立式的，直立的；头顶的
versatile ['və:sətail]	adj. 多种用途的，通用的，万能的；多面手的
workshop ['wə:kʃɔp]	n. 车间，工厂，工场；讲习班；研讨会
headstock ['hedstɔk]	n. 床头箱，主轴箱，头架
tool-rest	n. 刀架
tailstock ['teilstɔk]	n. 尾座，尾架，顶尖座
bed [bed]	n. 车床床身
pedestal ['pedistəl]	n.（支承）腿，柱脚；台座，基架，基座
apron ['eiprən]	n. 溜板箱，围裙；停机坪；舞台口
workpiece ['wə:kpi:s]	n. 工件，轧件，工件壁厚
process ['prəuses, 'prɔ-]	n. 过程，加工，工艺
casting ['kʌ:stiŋ]	n. 铸件（法），铸造
forging ['fɔ:dʒiŋ]	n. 锻件，模锻，锻造；伪造
extrusion [eks'tru:ʒən]	n. 挤压件，挤压
drawing ['drɔ:iŋ]	n. 拉延[削、制、深、丝]；拉制件
objective [əb'dʒektiv, ɔb-]	n. 目标，目的；[光学]物镜；[语法学]宾格
rough [rʌf]	adj. 粗加工的，未经加工的；粗糙的；粗野的
bulk [bʌlk]	n. 大部分，主要部分，大多数，大块；体积
excess [ik'ses]	n. 过量，过度，余量，超过，超额；无节制
metal ['metəl]	n. 金属；合金；金属材料；金属制品
dimensional [di'menʃənəl; dai-]	adj. 尺寸的；空间的
tolerance ['tɔlərəns]	n. 公差；容忍，宽容

Technical Phrases

parallel lathe	卧式车床
vertical lathe	立式车床
general purpose parallel lathe	普通卧式车床
versatile machine	万能机器
lead screw	丝杠
feed rod	光杠
cutting tool	切削刀具

finish turning operation	精车加工
grinding machine	磨床，砂轮机，研磨机
feeding box	进给箱
change gear box	交换齿轮箱

Notes

1. The headstock and tailstock are at opposite ends of a bed, and a tool-rest is between them which holds the cutting tool.

主轴箱和尾座位于床身两头，刀架位于它们之间，用来夹持刀具。

句中 them 指 headstock 和 tailstock。

定语从句 which holds the cutting tool 修饰先行词 a tool-rest。

2. Parts are sometimes semi-finish turned in a lathe, and the final dimensions and surface turning are obtained on a grinding machine.

在车床上有时零件进行的是半精车，而所需的最终的尺寸和精整的表面是在磨床上获得的。

Text 2 Vitrified Bond & Vitrified Grinding Wheel

Vitrified Bonded Grinding Wheel(as shown in Fig.1.T2.1) is the most popular abrasive tool used in metal condition area.[1]

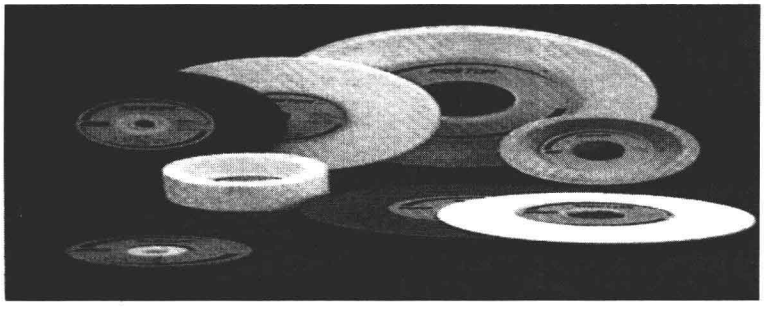


Fig.1.T2.1 Vitrified Grinding Wheels

Bond is a very important composition of a grinding wheel. Its function is to hold abrasive grains together to form a wheel to accomplish the grinding task. Vitrified bond normally is a blend of minerals in vitreous state. The selection of bond is based on(1) the requirements of wheel speed, grinding application and surface finish required.

To achieve the best result, grinding wheels should be chosen carefully and correctly.[2] Compared with(2) other bonded grinding wheels, vitrified bonded grinding wheel has following characters,

(1) based on
以……为基础，根据
(2) compared with
和……相比
(3) such as
例如……，像这种的
(4) fit for
适于

such as[3] rigid, friable, durable, high sintering temperature, high temperature resistance, stable physical and chemical properties, which make vitrified bonded grinding wheel fit for[4] various cooling systems and low operating speed. So it is the best choice for precision grinding application, requiring high accuracy and tight tolerance, such as surface grinding, cylindrical grinding, gear grinding, thread grinding, internal grinding, centerless grinding, etc.

New Words

vitrify ['vitrifai]	v. 使……成玻璃，使……玻璃化；玻璃化，使成玻璃状
bond [bɔnd]	n. 结合剂，粘合剂；结合；约定；债券
blend [blend]	n. 混合物，混合品；掺合物；混合
mineral ['minərəl]	n. 无机材料；矿物；[化]无机物
vitreous ['vitriəs]	adj. 呈玻璃态的
rigid ['ridʒid]	adj. 坚硬的；严格的；僵硬的，精确的
friable ['fraiəbl]	adj. 脆性的，脆弱的，易碎的
durable ['djuərəbl]	adj. 耐用的，持久的
sintering ['sintəriŋ]	adj. 抗（高温）的
stable ['steibl]	adj. 稳定的，坚定的，牢固的

Technical Phrases

vitrified bond	陶瓷结合剂
Vitrified Bonded Grinding Wheel	陶瓷结合剂砂轮
abrasive tool	磨具
tight tolerance	高的尺寸公差精度
surface grinding	平面磨
cylindrical grinding	外圆磨
gear grinding	齿条修磨
thread grinding	螺纹磨
internal grinding	内圆磨
centerless grinding	无芯磨

Notes

1. Vitrified Bonded Grinding Wheel is the most popular abrasive tool used in metal condition area.

陶瓷结合剂砂轮是金属加工领域最常见的一种磨具。

句中 used in metal condition area 为过去分词短语作后置定语，且表被动。

2. To achieve the best result, grinding wheels should be chosen carefully and correctly.

为了达到最佳的磨削效果，必须仔细地、合理地选择砂轮。

句中 To achieve the best result 为不定式短语作状语，表示目的。

Text 3 Integrated Circuit

An integrated circuit(also called a chip)is a piece of[1] silicon on which multiple gates have been embedded. These silicon pieces are mounted on a plastic or ceramic package with pins along the edges that can be soldered onto circuit boards or inserted into[2] appropriate sockets.[1] Each pin connects to the input or output of a gate, or to power or ground.

Integrated Circuits(IC)[3]are classified by a number of gates contained in them. These classifications also reflect the historical development of IC technology (see Table 1.T3.1).

An SSI chip has a few independent gates, such as the one shown in Fig.1.T3.1.This chip has 14 pins: eight for input to gates, four for output of the gates, one for ground, and one for power. Similar chips can be made with different gates.

(1) a piece of 一块
(2) inserted into
插入，加进
(3) Integrated Circuits(IC)
集成电路
(4) more than 大于
(5) small-scale
小规模的
(6) only a few
仅仅少数，一点点

Table 1.T3.1 The Classification of IC

Abbreviation	Name	Number of Gates
SSI	Small-Scale Integration	1 to 10
MSI	Medium-Scale Integration	10 to 100
LSI	Large-Scale Integration	100 to 100, 000
VLSI	Very-Large-Scale Integration	more than 100, 000

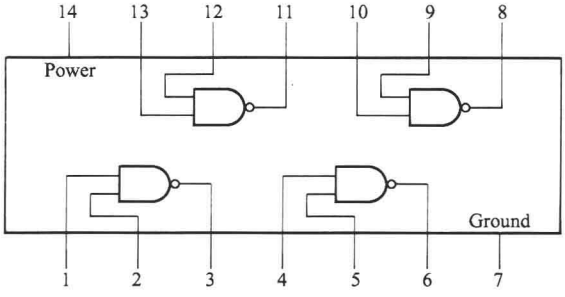


Fig.1.T3.1 An SSI Chip Containing Independent NAND Gates

How can a chip have more than[4] 100,000 gates on it? That would imply the need for 300, 000 pins! The key is that the gates on a VLSI chip are not independent as they are in small-scale[5] integration. VLSI chips embed circuits with a high gate-to-pin ratio. That is, many gates are combined to create complex circuits that require only a few[6] input and output values. Multiplexers are an example of this type of circuit.

New Words

integrated ['intigreitid] adj. 集成的，综合的；完整的；互相协调的

silicon ['silikən; -kɔn]	n. 硅片；硅，硅元素
multiple ['mʌltipl]	adj. 多重的，许多的，反（重）复的
gate [geit]	n. 门；大门，出入口；门道
power [pauə]	n. 电源；能力；力量；功率
ground [graund]	n. 接地；地面,土地
embed [im'bed]	v. 封装，放入，包埋；使嵌入，使插入
mount [maunt]	v. 安装
plastic ['plæstik;'plʌːs-]	adj. 塑料的；可塑的
ceramic [si'ræmik]	adj. 陶瓷（材料）的，陶器（土，质）的
solder ['sɔldə]	v. （低温）焊（接，固）
socket ['sɔkit]	n. 插座（槽），孔，穴；窝，牙糟
pin [pin]	n. 针，引脚
combine [kəm'bain]	v. 使结合，使联合，使化合；结合，联合，化合
multiplexer ['mʌltipleksə]	n. 多路器；多工器；多路转接器

Technical Phrases

Integrated Circuits(IC)	集成电路（又称芯片），缩写为 IC
Small-Scale Integration	小规模集成，缩写为 SSI
Medium-Scale Integration	中规模集成，缩写为 MSI
Large-Scale Integration	大规模集成，缩写为 LSI
Very-Large-Scale Integration	超大规模集成，缩写为 VLSI

Notes

1．These silicon pieces are mounted on a plastic or ceramic package with pins along the edges that can be soldered onto circuit boards or inserted into appropriate sockets.

这些硅片被封装在塑料或陶瓷中，可以通过边缘的引脚焊接在电路板上或插入适合的插座中。

句中 that can be soldered onto circuit boards or inserted into appropriate sockets 为定语从句，先行词为 the edges。

Text 4　Heat Treatment of Steel

Fig.1.T.4.1 shows steel's microstructure. The various microstructures described thus far[(1)] can be modified by heat-treatment techniques—that is[(2)], by controlled heating and cooling of steel at various rates . These treatments induce phase transformations that greatly influence such mechanical properties as[(3)] the strength，hardness，ductility, toughness，and wear resistance of the steel. The effects of thermal treatment

（1）thus far
迄今，到此为止
（2）that is
即，也就是
（3）such...as
……的那些，……的那种

depend on the particular steel, its composition and microstructure, the degree of prior cold work, and the rates of heating and cooling during heat treatment.

Fig.1.T4.2 shows surface hardening treatment for spur gear. The object of heat treating metals is to impart certain desired physical properties to the metal or to eliminate undesirable structural conditions which may occur in the processing or fabrication of the material.[1] There are three main operations in the heat treatment of steel: hardening, tempering and annealing.

Hardening is the process of heating to a temperature above the critical range and cooling rapidly enough through the critical range to appreciably harden the steel. The rapid temperature drop fixes the structural change in the steel which occurred at the critical temperature, and makes it very hard.[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. The quenching media used may depend upon the composition, hardness desired, and the complexity of the design.

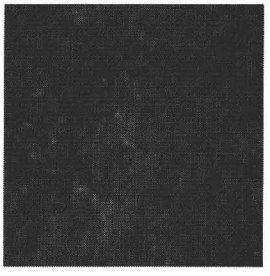


Fig.1.T4.1 Steel's Microstructure

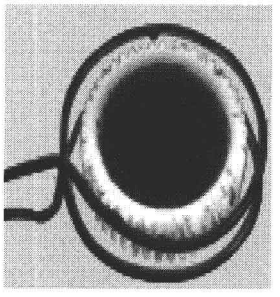


Fig.1.T4.2 Surface hardening treatment for spur gear

Tempering is the reheating after hardening of the steel to some temperature below the critical temperature range, followed by any desired rate of cooling. The purpose of tempering is the removal of strains, and the reduction of hardness and brittleness.

Annealing is a comprehensive term applied to heat treatments which may be used to remove stresses; induce softness; alter ductility, toughness, electrical, magnetic, or other physical properties; refine the crystalline structure; remove gases; or produce a microstructure. The temperature of the treatment and the rate of cooling depend upon the object of the treatment and the composition of the material being heat treated.

Gas, oil, and electric furnaces are the commonly used for heat treatment of steel. An electric furnace is shown in Fig.1.T4.3.

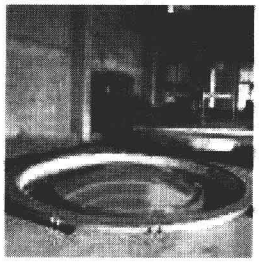


Fig.1.T4.3 An electric furnace

New Words

treatment ['tri:tmənt]	n. 处理；对待；治疗，疗
microstructure ['maikrəu,strʌktʃə]	n. [冶金学]微观结构，显微结构
describe[di'skraib]	v. 描述，形容；描绘
modify['mɔdifai]	v. 修改，修饰；更改
technique [tek'ni:k]	n. 技巧，技术；手法
rate [reit]	n. 比率，率；速度；等级；价格
induce [in'dju:s, in'du:s]	v. 引起，引诱，诱导
phase [feiz]	n. 相，[冶金学]金相组织
transformation['trænsfə'meiʃən]	n. 转化；转换；变形；改革
influence ['influəns]	v. 影响；改变 n. 影响；势力；感化；有影响的人或事
particular [pə'tikjulə]	adj. 特定的，特别的，独有的，详细的 n. 个别项目；详细说明
strength [streŋθ, streŋkθ]	n. 强度；力量；力气
hardness ['hɑ:dnis]	n. 硬度；坚硬；困难；冷酷
ductility [dʌk'tiləti]	n. 延展性；柔软性；顺从
toughness	n. 韧性；强健；有黏性

Technical Phrases

heat treatment	热处理
phase transformations	金相组织的改变
mechanical properties	机械性能
wear resistance	耐磨性
Very-Large-Scale Integration	超大规模集成，缩写为 VLSI

Notes

1. The object of heat treating metals is to impart certain desired physical properties to the metal or to eliminate undesirable structural conditions which may occur in the processing or fabrication of the material.

热处理的目的是使金属获得某种需要的物理性能或消除在加工制造过程中出现的不合要求的组织状态。

本句中有两个并列的不定式（“to impart ...”和“to eliminate ...”）作“is”的表语。不定式短语“impart M to N”意为“把 M 给予 N”，在具体的翻译时可译为“使 N 获得 M”。structure 指材料的组织结构。

2. The rapid temperature drop fixes the structural change in the steel which occurred at the critical temperature, and makes it very hard.

温度的急促下降会使在临界温度时钢的组织转变固定下来，结果使钢变得很硬。

本句的前后两个分句用“and”连接起来，名词结构“The rapid temperature drop”作本

句的主语。前面的一个分句(The rapid temperature drop ... at the critical temperature)表示原因；后面的一个分句（makes it very hard）表示结果，“it”指代“the steel”。

Exercises to the text

I. Choose from Column B an appropriate object for each of the words in Column A.

A	B
（ ）1. 车床	a. headstock
（ ）2. 金属	b. lathe
（ ）3. 主轴箱	c. cutting tool
（ ）4. 处理	d. tailstock
（ ）5. 硬度	e. microstructure
（ ）6. 尾架	f. lead screw
（ ）7. 切削刀具	g. integrated
（ ）8. 丝杠	h. hardness
（ ）9. 集成的	i. treatment
（ ）10. 显微结构	j. metal

II. Translate the following sentences into Chinese.

1. The effects of thermal treatment depend on the particular steel, its composition and microstructure, the degree of prior cold work, and the rates of heating and cooling during heat treatment.

2. Tempering is the reheating after hardening of the steel to some temperature below the critical temperature range, followed by any desired rate of cooling.

3. The temperature of the treatment and the rate of cooling depend upon the object of the treatment and the composition of the material being heat treated.

Reading Material

1-1 Cutting Processes and Tools

Some of the common cutting processes are illustrated in Fig.1.R1.1. They remove material from the surface of a workpiece by producing chips.