

Scientific and Technical English

中级科技英语文选

冯其成 路文君 编

Intermediate Practice Readings

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本书共编入 20 课,在选材上注意到科学性、知识性和趣味性。文章的题材较广泛,篇幅有短有长,内容有易有难,由浅入深。每篇文章之后的练习题,以理解题为主,辅以结构题。注释翔实。书末附有参考译文及练习答案。

通过本书的学习,读者可以巩固已有基础,还可掌握一部分科技词汇,从而有利于向阅读专业英语书刊过渡。

本书供学完基础英语的理工科大学学生、研究生、科技人员及英语自学者使用。也可供大、中学英语教师参考。

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序 言

本书属中级科技读物，供理工科大学生、研究生、科技人员及自学者使用。也可供大、中学英语教师参考。通过本书的学习，读者可加深加广基础英语知识，积累部分科技词汇，提高阅读理解的能力和速度，从而较快地过渡到专业阅读。

本书共编入 20 课。在选材上注意到科学性、知识性和趣味性。文章的题材较广泛。篇幅有短有长，内容有易有难，由浅入深。课文的注释力求翔实，除直接释义外，还适当引伸，以便读者透彻理解，能举一反三。练习多为理解题，辅以少数结构题。书末附有参考译文和习题答案。

本书中的大多数文章曾在北京钢铁学院几期学生班及专业教师英语阅读班中使用，其中融合了我们数年的教学经验。在编写过程中曾得到我院外藉英语教师的帮助。由于我们水平有限，缺点错误在所难免，敬请批评指正。

编 者

1986 年 7 月

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1. Metalworking

A. Casting

Casting is one of the oldest metalworking techniques known to man. Our country made metal castings as early as 2,000 B.C.⁽¹⁾, and the process used then is not much different in principle from the one used today. *mold*

Foundry processes consist of making molds, preparing and melting the metal, pouring the metal into the molds, and cleaning the castings. The product of the foundry is a casting, which may vary from a fraction of a kilogram to several hundred tons. It may also vary in composition as practically all metals and alloys can be cast. *principle*

The metals most frequently cast are iron, steel, aluminum and so on. Of these, iron, because of its low melting point, low price and ease of control, is outstanding for its suitability for casting and is used far more than all the others. *molten*

Casting is a widely used method⁽²⁾ of producing metal products, particularly those which are intricate. Since molten materials will readily take the shape of the container into which they are poured, it is nearly as easy to cast fairly complex shapes as to produce simple forms.

Casting has some outstanding advantages as compared

with other metal working. High rates of production, small dimensional tolerances, and improved properties of materials have enabled both large and small intricate parts to be cast from all types of metals.

B. Heat Treatment

Heat treatment is a method by which the heat treater can change the physical properties of metal. There are three main operations in the heat treatment of steel: hardening, tempering and annealing.

Hardening means making harder^③. Steel which contains more than 0.75% carbon becomes very hard and very brittle when hardened^④. High carbon steel is hardened by carrying out the following operations. The steel is first slowly heated to just above its critical temperature. Having reached this temperature^⑤, it is then rapidly cooled in oil, water, or some other liquid. The process of cooling is called quenching, thus the hardening operation consists of heating and quenching. Alloying steels are usually hardened by special ways. The hardness produced by heat treatment depends upon: 1) the amount of carbon in steel; 2) the temperature of heated steel; 3) the speed of cooling.

Tempering implies reheating of hardened steel to a temperature below the critical range, retaining the temperature for some time, and then cooling in air; the object of this operation is to take some of the hardness and brittleness out of hardened steel so that it may get the required hardness.

toughness and brittleness. Having been tempered, the steel becomes stronger because its grain gets finer; as we already know⁶, steel with a coarse grain is weaker than steel with a fine grain. Hardened steel is too hard and too brittle for many tools. A hardened cutting tool will break easily while cutting; it is therefore better to make a cutting tool tough but not too hard⁷. Tempering brings about this condition.

Annealing means making hardened steel softer and removing brittleness. It is the opposite of hardening because in hardening the metal is cooled as rapidly as possible, while in annealing it is cooled as slowly as possible. The slower the cooling is, the softer it is when cold. Hardened steel is difficult to machine, but having been annealed, it can be easily machined.

New Words

foundry	['faundri]	n.	铸造
pour	[pɔ:]	vt.	倒, 浇铸
fraction	['frækʃən]	n.	几分之一
practically	['præktikəli]	ad.	实际上, 差不多
ease	[i:z]	n.	容易
outstanding	[aʊt'stændɪŋ]	a.	杰出的, 显著的
suitability	[sju:tə'biliti]	n.	适合
intricate	['intrikit]	a.	复杂的
rate	[reit]	n.	比率
tolerance	['tɒlərəns]	n.	公差
dimensional tolerance			尺寸公差

property	['prɒpəti] n.	性能
fairly	['fæli] ad.	相当, 十分
treatment	['tri:tment] n.	处理
harden	['hɑ:dn] vt.	淬火
temper	['tempə] vt.	回火
anneal	[əni:l] vt.	退火
brittle	['britl] a.	脆(性)的
critical	['kritikəl] a.	临界的
quench	[kwentʃ] vt.	淬硬, 急冷
retain	[ri'tein] vt.	保留
toughness	['tʌfnis] n.	韧性
grain	[grein] n.	晶粒
coarse	[kɔ:s] a.	粗糙的
opposite	['ɒpəzit] a.	相反的

Notes

① as early as 2,000 B.C. 早在公元前 2,000 年。其结构为 as ... as + 数量。如: The energy released amounted to as much as 25 calories per gram. 所释放的能量多达每克 25 卡。Its occurrence was as high as 37 percent. 其发生率高达 37%。本文中 as 的其它用法: a) 第二段 ... as practically all metals and alloys can be cast as 为主从连词, 引导原因状语从句, 译成“... 因为几乎所有的金属和合金都能铸造。b) 第五段 as compared with, 译成“与... 相比”, 其结构为“as + p.p. 短语”。

② a widely used method 一种广泛应用的方法。widely used 为过去分词短语, 作定语。分词短语作定语通常后

置, 如本文第一段中出现的 known to man, used then, used today. 此处 widely used 则前置。其结构为“副词(通常表示方式)+分词”。如: finely powdered iron 细铁粉, naturally occurring elements 自然存在的元素。

③ making harder 是动名词 making 加形容词构成的短语, 作宾语。译成: 变得更硬。

④ when hardened 分词作状语时, 其前可加连词 when, while, if, unless, therefore, thus 等, 相当于有关状语从句。译成: 淬火时。

⑤ Having reached this temperature 是现在分词(完成式的)短语, 作时间状语, 表示在谓语动作之前完成的行为, 其逻辑主语为句中主语 it = steel。译成: 钢达到这一温度后。

⑥ as we already know 为定语从句, 关系代词 as 代表后面主句 steel with a coarse grain is weaker than steel with a fine grain 的内容, as 在从句中作宾语, 通常译作“正如”较为通顺。故此从句译成: 正如我们已经知道的。

⑦ it is therefore better to make a cutting tool tough but not too hard. it 为形式主语, to make 引导的不定式短语为实际主语。动词 make 后接复合宾语(名词+形容词)时, 意为: 使...变得...。此句译成: 因此, 刀具宜有韧性而不过硬。

Exercises

1. True-False:

(1) Foundry is one of the metalworking techniques people have known since old times.

(2) Castings can vary both in weight and in composition.

(3) Iron is used in industry much more than all the other metals because of its low melting point, low price and ease of control.

(4) It is not much more difficult to cast intricate parts than simple ones because metals in liquid state will take the shape of the container which they are in.

(5) The casting process has certain great advantages over other metal-working technics.

2. Analyse grammatically the verbals in the first and last paragraphs of Passage A.

3. Multiple choice:

(1) Heat treatment is a process of changing the properties of metals by

- a. heating.
- b. cooling.
- c. heating followed by cooling.

(2) Hardening is an operation , by means of which a metal becomes

- a. very hard.
- b. very hard and very brittle.
- c. harder.

(3) When hardened, the steel must reach

- a. to just below its critical temperature.
- b. a little higher than its critical temperature.
- c. certain temperature.

- (4) The hardness of a hardened metal varies with
- a. the carbon content, temperature and amount of cooling.
 - b. three factors.
 - c. alloy steels.

- (5) Tempering means
- a. making softer and tougher.
 - b. causing to become harder and brittler.
 - c. having greater hardness, toughness and brittleness.

(6) The strength of the steel increases after tempering because

- a. its grain becomes less coarse.
 - b. the crops get finer.
 - c. its tiny hard bits become better.
- (7) Tempering can help make a tool
- a. not only tough but properly hard.
 - b. tough but not hard.
 - c. have a coarse grain.

- (8) Annealing suggests making
- a. softer steel harder.
 - b. steel softer and taking the brittleness out completely.
 - c. hardened steel softer.

- (9) Hardening is
- a. the antonym of annealing.
 - b. tempering plus annealing.
 - c. the opposite of annealing.
- analogy*

(10) Hardened steel is

- a. easy for a machine to work with.
- b. hard to assemble with a machine.
- c. difficult to work by machine.

2. The World of Robots

There are robots all around us. Some do very complicated jobs^① like flying airplanes and driving subway trains^②. And some do one simple job.

When an automatic washing machine is switched on, water pours in. The machine waits until the water is hot before washing the clothes. It does this by "feedback". Information about what is happening is "fed back" into the robot to tell it what to do next.

Our eyes, ears and other senses are our feedback. They tell us what is going on around us. So robots are like people in two ways. They work and they have feedback.

But very few robots look like people. Many are hidden away. Robots control the temperature of our houses, our cookers, our hot water systems. We can set the controls to the temperature we want. The robot does the rest. Its feedback usually comes from a thermostat.

One kind of thermostat is a strip of metal which bends when it gets hot. At the right temperature, it bends just enough to work a switch. This turns off the heat. As the air around it cools, the metal straightens, and this turns the heat on again.

There are robots all around, making our lives easier^③.

Some of them, like the pocket calculator, can work much more quickly than human beings can. And they rarely make mistakes.

In some ways robots are better than people. They work quickly, but do not make mistakes. They do not get bored doing the same job over and over again¹. And they never get tired.

So robots are very useful in factories. They can be taught to do many different jobs. First their electronic brains must be shown how the job is done. A person moves the robot's "arms" and "hand" through each part of the job². The robot's brain remembers each move. When the robot is put to work on its own, its brain controls the rods, wheels and motors which move its arm.

When the robot is needed for a new job, its electronic memory is "wiped clean". Then it is taught how to do its new task.

If the robot's hand stops working, or if something gets in the way, it cannot do the next part of the job. So it stops and signals for help. Then a human engineer attends to the fault.

Robots are also used for doing jobs which are dangerous. They can move objects which are too hot or too heavy for people to handle. They can work in places which are too hot or too cold for people. And they are not affected by poisonous fumes or gases.

The most "intelligent" robots can move and see. Their

eyes are cameras. Their metal fingers can feel shapes and even find out how hot and cold objects are. These robots have computer brains, linked to their eyes and fingers, which control their actions.

The expensive robots are used in scientific research. They do such jobs as handling radioactive materials.

New Words

subway [ˈsʌbweɪ] n. (= underground)	[美]地下铁道
washing [ˈwɒʃɪŋ] n.	洗
washing machine	洗衣机
feedback [ˈfiːdbæk] n.	反馈
feed back	把...送回, 反馈
hide [haɪd] (hid, hidden) v.	隐藏
cooker [ˈkʊkə] n.	炊事用具
strip [striːp] n.	带, 细长片
straighten [ˈstreɪtn] vt.	使挺直
calculator [ˈkælkjuleɪtə] n.	计算器
rarely [ˈræəli] ad.	很少, 难得
bore [bɔː] vt.	使厌烦
rod [rɒd] n.	连杆
signal [ˈsɪgnəl] v.	发信号
fault [fɔːlt] n.	错误, 故障
handle [ˈhændl] v.	处理
poisonous [ˈpɔɪznəs] a.	有毒的

*feedback
T2 29
JL 29
10/15*

fume [fju:m] n.

(有害的、难闻而强烈的)烟(雾)、气(体)

Notes

① do... jobs 干...工作。第六段 make mistakes 犯错误。不说 make... jobs, 也不说 do mistakes。do 与 make 的基本含义是“做”, 其后分别接宾语, 成一固定搭配关系, 不能换用, 又无一定规则。但常有下列情况: make 后接 something, 这种事物是过去在那里并不存在的, 如: make a cake 做糕点, make a noise 吵闹, make a fire 生火。而 do 后接 action (活动), 如 do exercises 做练习, do the work 干工作。又如: What are you making? A shirt. 你在做什么? 做衬衫。What are you doing? Playing football. 你在干什么? 踢足球。

make, do 构成的其他常见的固定搭配还有: make trouble 带来麻烦, do a favour 做好事, make progress 取得进步, do the shopping 买东西, make a speech 发表演说, do business 办事情, make a difference 产生差别, do one's best 竭尽全力, make money 挣钱, do homework 做作业, make a promise 作出允诺, do task 完成任务。

② like flying airplanes and driving subway trains, like 为一介词, 作“象”讲, like 短语作后置定语, 修饰 jobs。译作: “象驾驶飞机及地铁列车”。类似的用法, 见第四段 like people, 第六段 like the pocket calculator。

③ There are robots all around, making our lives easier. making 作“使”讲, 后接宾语和宾语补足语, 构成现