

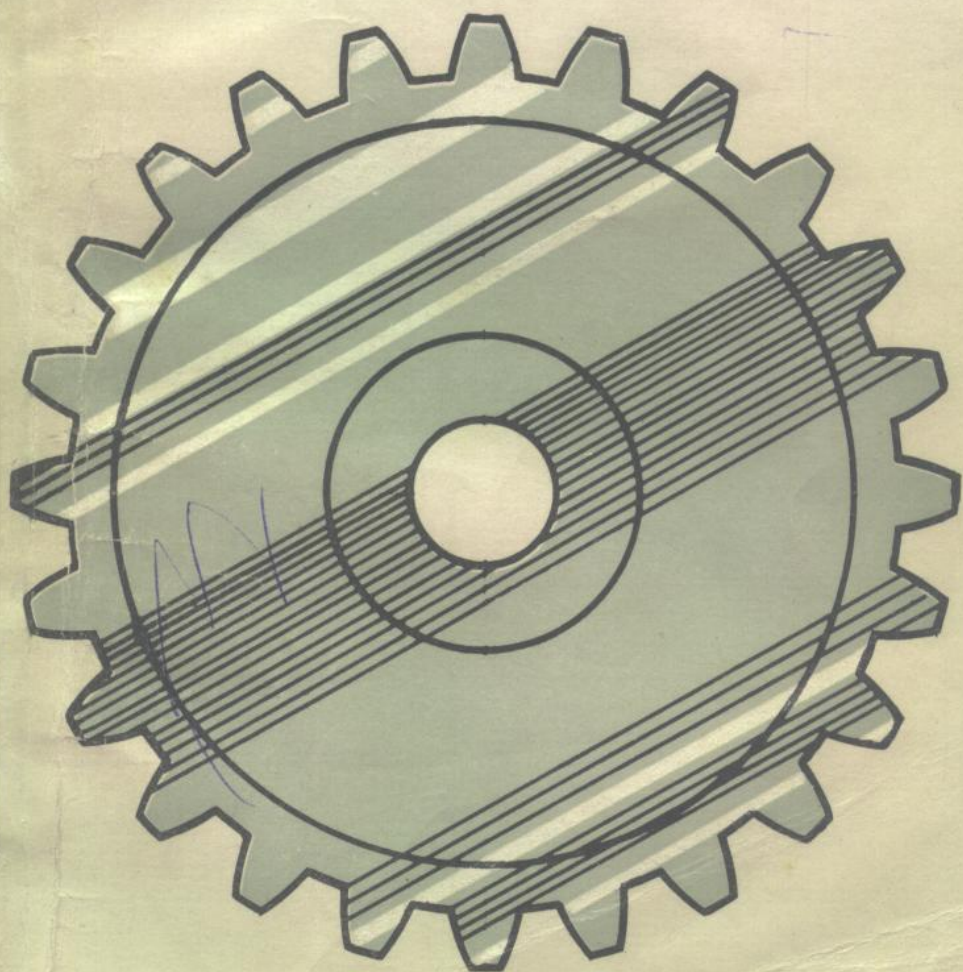
大学专业英语基础教材

English for Science and Technology

工程学

ENGINEERING

[英] T. 达德利—伊文斯等 著



科学普及出版社

大学专业英语基础教材

工 程 学

〔英〕T. 达德利~伊文斯 等著

李鹏飞 桂济世 编译

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内 容 提 要

本书是《大学专业英语基础教材》的一个分册。

这套教材是根据英国朗曼图书公司最新出版的《核心 (Nucleus) 科技英语》编译的。全套教材共十册,有:通俗科学、生物学、地质学、物理学、化学、数学、工程学、农学、医学和护理学。原书每册均配有教师手册和英制录音带。为我国读者使用方便起见,分别将各科读本与教师手册合编为一本,并增加了参考译文和必要的注释。每册附有复制的录音带一盒。这套教材内容新颖,材料丰富,语言规范,切合专业实际,并照顾到听、说和阅读等多方面能力的提高,实为非英语国家高等院校专业学科学习英语的范本。凡具有初、中级英语水平科技工作者、研究生和待出国进修的人员,均可用作教材或自学之用。通过学习,可以独立阅读专业英语书籍和接受本科英语直接教学打下有力基础。

本书为《工程学》分册。

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ENGINEERING

Tony Dudley~Evans

Tim Smart

John Wall

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工 程 学

[英] T. 达德利~伊文斯 等著

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第十一单元	292
第十二单元	300

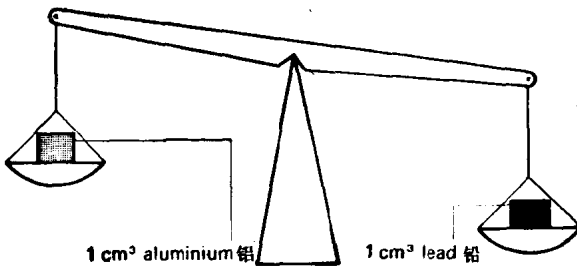
课 文

Unit 1 Properties

Section 1 Presentation

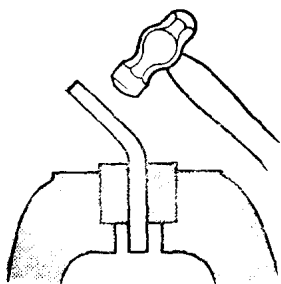
1. Look and read:

Here are some properties of materials which are important in engineering:

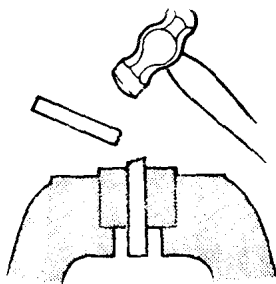


a *light* material 轻材料
(it has low mass)
(其质量小)

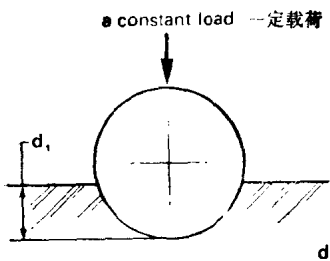
a *heavy* material 重材料
(it has high mass)
(其质量大)



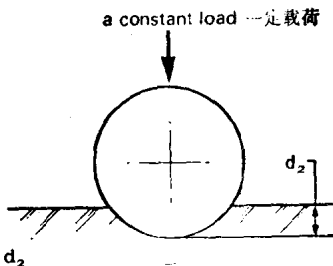
a *tough* material 韧性材料
(it does not break easily)
(不易断裂)



a *brittle* material 脆性材料
(it breaks easily) (容易断裂)



a *soft* material 软材料
(it can be dented or scratched
easily) (易被压凹或划伤)



$d_1 > d_2$

a *hard* material 硬材料
(it cannot be dented or scratch-
ed easily) (不易被压凹或划伤)



spring 弹簧

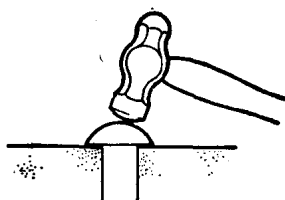
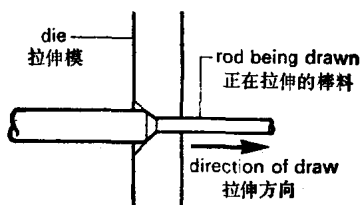
an *elastic* material 弹性材料
(it returns to its original shape
when the deforming force is
removed) (去掉变形力(作用力)
时恢复原状)



coin 硬币

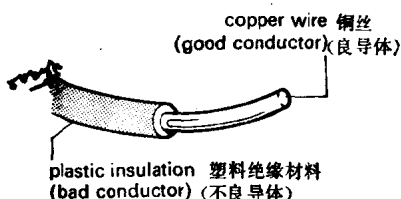
a *plastic* material 塑性材料
(it does not return to its original
shape when the deforming force
is removed) (去掉变形力(作用力)
时不恢复原状)

Plastic materials can be divided into two different groups, malleable and ductile materials.



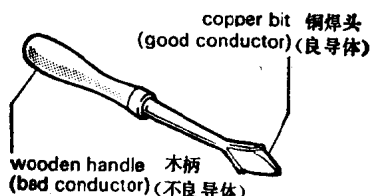
a ductile material 延性材料
(it can be stretched) (可以拉长)

a malleable material 展性材料
(it can be hammered into shape)
(可以锤打成形)



a good conductor of electricity
良导电体

a bad conductor of electricity
不良导电体



a good conductor of heat 良传热体
a bad conductor of heat 不良传热体



corrosion resistant 抗腐蚀
not corrosion resistant 不抗腐蚀

Look at this table and the example:

In this table properties of materials are graded on a scale from A (maximum) to E (minimum): e. g. the property of heaviness is graded from very heavy (A) to very light (E).

Example: Copper is very heavy.

Nylon and rubber are very light.

Cast iron is heavy, but lighter than copper.

Glass is lighter than copper and cast iron, but heavier than aluminium.

Aluminium is light, but it is heavier than nylon and rubber.

	Copper	Aluminium	Cast iron	Glass	Nylon	Rubber
Heavy(A)— light(E)	A	D	B	C	E	E
Tough(A)— brittle(E)			D			
Hard(A)— soft(E)						E
A good conductor of electricity(A)— a bad conductor of electricity(E)		B				
A good conductor of heat(A)— a bad conductor of heat(E)						

Now complete the table with information from these sentences:

Copper is the toughest of the materials.

Aluminium, nylon and rubber are tough, but less tough than copper.

Cast iron is much more brittle than these materials but less brittle than glass.

Rubber is a very soft material.

Glass is a very hard material.

Cast iron is a hard material but it is not as hard as glass.

Nylon is harder than rubber.

Copper and aluminium are softer than cast iron and glass but harder than nylon and rubber.

Glass, nylon and rubber are very poor conductors of electricity and heat.

Copper, aluminium and cast iron are good conductors of electricity and heat, but copper is a better conductor than aluminium, and aluminium is a better conductor than cast iron.

2. Look at this sentence:

Glass is light compared with copper but heavy compared with nylon.

Now make similar true sentences from this table:

Copper	is	light	compared with	copper
Aluminium		heavy		aluminium
Cast iron		brittle		cast iron
Glass		tough		glass
Nylon		soft		nylon
Rubber		hard		rubber
		a good conductor of electricity		
		a bad conductor of electricity		
		a good conductor of heat		
		a bad conductor of heat		

but	heavy	compared with	copper.
	light		aluminium.
	tough		cast iron.
	brittle		glass.
	hard		nylon.
	soft		rubber.
	a bad conductor of electricity		
	a good conductor of electricity		
	a bad conductor of heat		
	a good conductor of heat		

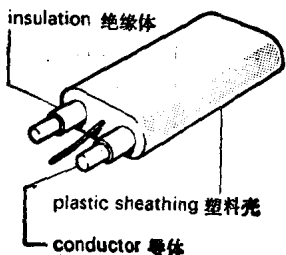
3. Look at this table:

	Copper	Aluminium	Cast iron	Glass	Nylon	Rubber
Elastic(A)—— plastic(E)	D	D	D	B	C	A
Ductile(A)——not ductile(E)	A	B	E	E	E	E
Malleable(A)—— not malleable(E)	A	A	D	E	E	E

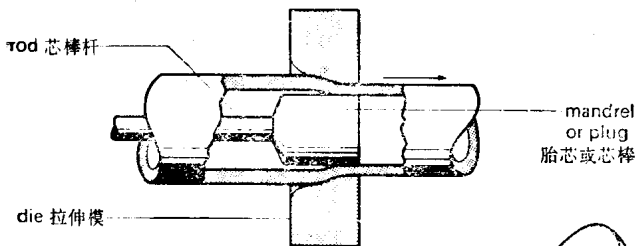
Now say whether the following statements are true or false. Correct the false statements. Some statements refer to the table on page 7.

- Rubber is more elastic than nylon.
- Glass is not a malleable material.
- Copper is not very ductile.
- Aluminium is a ductile material but it is less ductile than copper.
- Copper is a very elastic material.
- Cast iron is very malleable.
- Nylon is more malleable than cast iron.
- Cast iron is heavier than copper.
- Nylon is harder than rubber.
- Cast iron is a better conductor of electricity and heat than aluminium.

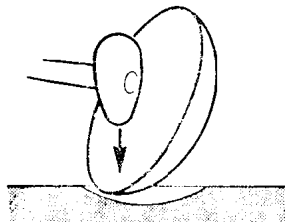
4. Answer the following questions:



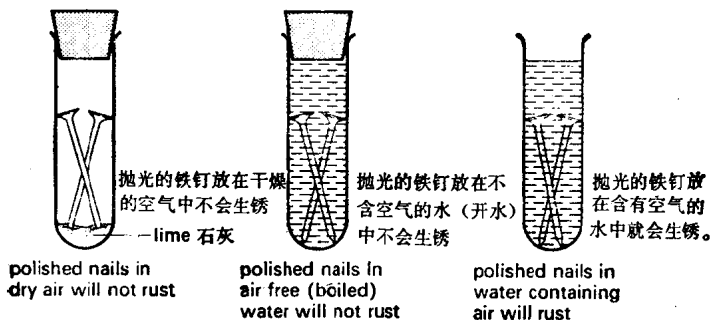
- Why is copper used for electrical wire?
- Why is plastic used to insulate electrical wire?
- Why can mild steel be stretched into a tube?



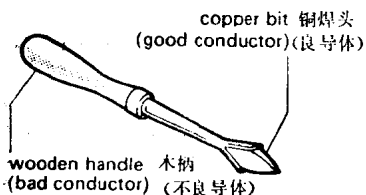
d) Why can silver (Ag) be hammered into shape?



e) Why does steel need to be protected from moist air?

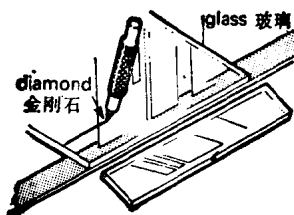
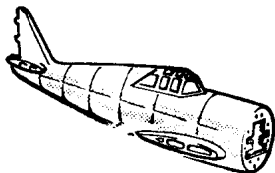
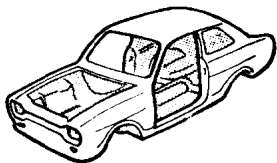


f) Why does a car spring keep its shape?



g) Why does this soldering iron have a wooden handle and a copper bit?





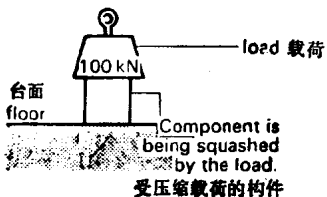
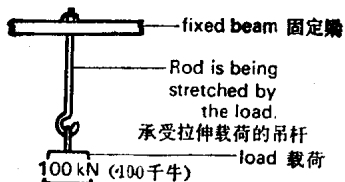
h) Why are car bodies made of steel sheets and not glass sheets?

i) Why are aluminium alloys used in aircraft bodies, but not copper alloys?

j) Why are diamonds used to cut glass?

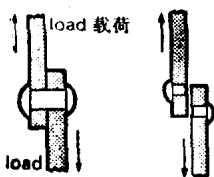
Section 2 Development

5. Look and read:

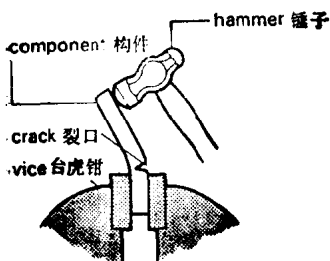


Tensile strength is the ability of a material to withstand a stretching load without breaking.

Compressive strength is the ability of a material to withstand a compressive load without breaking.



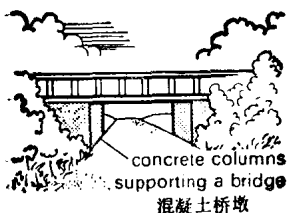
Rivet supporting a shearing load. 承受剪切载荷的铆钉



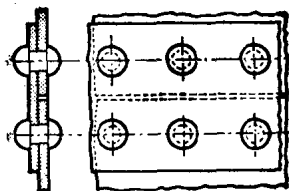
Shear strength is the ability of a material to withstand a shearing load.

Impact strength (toughness) is the ability of a material to withstand an impact load.

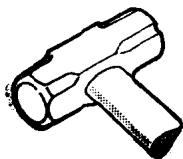
Now complete these using the terms introduced above:



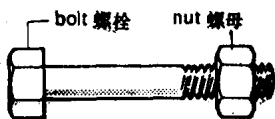
a) Concrete is used for columns which support heavy loads because it has high compressive strength.



b) Rivets are made of metal which has high shear strength.



c) The head of a hammer is made of a metal which has high impact strength.



d) Nuts and bolts are made of metal which has high _____.

6. Read the following definition:

A material which changes shape under load and returns to its original

elastic
 shape $\left\{ \begin{array}{l} \text{possesses} \\ \text{has} \\ \text{exhibits} \end{array} \right\}$ the property of *elasticity*.

Now make sentences from this table:

A material	which changes shape	under a compressive load	possesses has exhibits	the property of	<i>malleability.</i> <i>plasticity.</i> <i>ductility.</i>
		under a tensile load			
	which exhibits plasticity	under load and keeps its new shape			

Now answer these questions:

- What property does rubber possess?
- When a metal bar is drawn into a rod, what property does it exhibit?
- When the head of a rivet is hammered into shape, what property does it exhibit?
- When gold (Au) is hammered, does it exhibit elasticity or plasticity?

7. Read these definitions:

Hardness is the ability to withstand scratching or indentation.

Corrosion resistance is the ability to resist chemical or

ductility

electrochemical attack.

A material which allows electricity to pass **possesses electrical conductivity.**

A material which melts easily has **high fusibility.**

A material which melts at a very high temperature has **low fusibility.**

A light material has **low density.** A heavy material has **high density.**

Now say whether the following statements are true or false. Correct the false statements.

- a) A compression spring possesses ductility.
- b) Aluminium has low resistance to corrosion by moist air.
- c) Metals with a low shear strength may be cut easily.
- d) Coins are not made with materials which possess elasticity.
- e) Solder has low fusibility.
- f) Plastics are used to insulate electrical wire because it has high thermal conductivity.
- g) Metals which are used in air frame parts have a low density.

8. What is the most important property needed by each of the following?

- | | |
|-------------------|--------------------------------------|
| a) a table leg | e) a railway line |
| b) a car radiator | f) a chisel |
| c) a fire brick | g) a battery terminal |
| d) a rivet | h) the cables on a suspension bridge |

def
not for

Section 3 Reading

8. Read this passage:

Ferrous metals

Ferrous metals contain iron (Fe). One kind of ferrous metal is cast iron. It has high compressive strength, and is easy to cast, because it has high fluidity and relatively high fusibility. However, it has low malleability and a relatively low tensile strength.

Wrought iron has greater toughness than cast iron. It is very malleable and ductile. It has relatively high corrosion resistance. It is often used for the chains of anchors and cranes.

Mild steel is more often used in industry because it has a lower cost and a slightly higher strength than wrought iron. It has high malleability and ductility. It can be easily worked when it is cold and when it is hot. It has many uses, including the production of car bodies, rods and bars, nuts and bolts etc.

Now answer these questions:

- a) Which is the most important element which is common to all ferrous metals?
- b) Why are motor cycle cylinders made of cast iron?
- c) Why are chains not made of cast iron?
- d) Why are anchor chains made of wrought iron?
- e) Why is mild steel commonly used in industry?
- f) Why can mild steel be used for car bodies?
- g) Why is mild steel used for rods and bars?