

21世纪 高职高专教育统编教材

# 土木工程专业英语

王爱琴 主编

 黄河水利出版社

21世纪 中国高等职业教育精品教材

# 土木工程专业英语

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21 世纪高职高专教育统编教材

# 土木工程专业英语

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黄河水利出版社

## 内 容 提 要

本书是根据《高职高专教育英语课程教学基本要求》的精神,遵循“实用为主,够用为度”的原则编写的。以培养学生阅读和翻译土木工程专业英语资料的能力为宗旨,达到以英语为工作语言进行国际间信息技术交流的目的。所选资料内容涉及建筑材料,土木工程施工、设计与管理,工程合同,招标投标,水文与水资源,农田灌溉等。多数选自原版英文文献,既有丰富的专业语言知识和词汇,又有一定的趣味性、可读性。可供高职高专院校水利水电工程、土木工程、道路与桥梁工程及相关专业的学生作教材使用,同时也可作为土木工程技术人员自学教材。

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# 前 言

伴随着中国对外开放步伐的加快,我国对外承包工程与国际经济技术合作事业蓬勃发展,需要大量外向型、复合型、开拓型的专业技术人才。其中专业英语的掌握运用起到重要的桥梁作用。

根据高教司【2000】57号文件《高职高专教育英语课程教学基本要求》(以下简称《基本要求》)的精神,基础英语教学任务完成后,应结合专业学习,开设专业英语课程,这既可保证学生在校期间英语学习的连续性,又可使他们所学的英语得到实际的应用。本教材就是依据《基本要求》,遵循“实用为主,够用为度”的原则编写的,其宗旨是培养学生阅读和翻译土木工程专业英语资料的能力,达到以英语为工作语言进行国际间信息技术交流的目的。

本书素材经过了长期的积累、增减和订正。2000年,由王爱琴和杨道富编写的《水利水电工程英语》作为黄河水利职业技术学院本部教材试用了3年。2003年4月经不断修订后编写了《土木工程英语》,由河南大学出版社出版,在部分高职高专院校使用。

2006年3月由王爱琴主持的河南省高教教改研究项目《高职高专ESP教学改革与教材建设的研究与实践》立项,进一步对土木工程专业人才培养和需求方向进行了研究,对该专业技术人才的英语能力结构进行调查和分析,确定了本书的主题内容和编写思想,之后进行了资料的筛选、修改,编成此书。

全书共有二十个单元,每个单元内容包括阅读理解、翻译技巧与阅读翻译三个部分。所选材料内容涉及建筑材料,土木工程施工、设计与管理,工程合同,招标投标,水文与水资源,农田灌溉等。题材选自原版英语书刊,既有丰富的专业语言知识和词汇,又有一定的趣味性、可读性。翻译技巧中的例句选自本教材及同类书刊,与所学专业知

识紧密结合,语言规范,详细易懂。每单元后附有生词、语言难点注释和练习题。全书由王爱琴统稿,参编人员及具体分工是:王爱琴编写第一单元~第七单元,郑谨编写第八单元~第十单元,孙淑慧编写第十一单元~第十五单元,王玉洁编写第十六单元~第十八单元,王敏编写第十九单元,卢聚伦编写第二十单元。

本书由河南省学术技术带头人杨道富教授主审。杨道富教授参加世界银行国际工程项目5年多,有丰富的国际工程施工经验,在本书编写过程中提供了部分资料。杨邦柱教授也对本书的编写提出许多宝贵建议。

在本书的编写过程中,我们还参考了大量土木工程英语文献、专业英语工具书,以及已建国际工程实际资料。在此我们一并表示诚挚的谢意。

书中若有差错和不妥之处,敬请同行和读者提出宝贵的批评意见,以利修改。

编 者

2007年6月

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# Unit One

## ※ Reading and Comprehension

### Cement

#### Introduction

Cement, any material that hardens and becomes strongly adhesive after application in plastic form. The term cement is often used interchangeably with glue and adhesive; in engineering and building construction the term usually refers to a finely powdered, manufactured substance consisting of gypsum plaster or portland cement that hardens and adheres after being mixed with water.

Cements are used for various purposes, such as binding sand and gravel together with portland cement to form concrete, for uniting the surfaces of various materials, or for coating surfaces to protect them from chemical attack. Cements are made in a wide variety of compositions for a wide variety of uses. They may be named for the principal constituents, such as calcareous cement, which contains silica, and epoxy cement, which contains epoxy resins; for the materials they join, such as glass or vinyl cement; for the object to which they are applied, such as boiler cement, or for their characteristic property, such as hydraulic cement, which hardens underwater, or acid-resisting cement, or quick-setting cement. Cements used in construction are sometimes named for their commonly reported place of origin, like Roman cement, or for their resemblance to other materials, such as Portland cement, which produces a concrete resembling the Portland stone used for building in England. Cements that resist high temperatures are called refractory cements.

Cements set, or harden, by the evaporation of the plasticizing liquid such as water, alcohol, or oil, by internal chemical change, by hydration, or by the growth of interlacing sets of crystals. Other cements harden as they react with the oxygen or carbon dioxide in the atmosphere.

#### Portland Cement

Typical Portland cements are mixtures of tricalcium silicate, tricalcium aluminate, and dicalcium silicate, in varying proportions, together with small amounts of magnesium and iron compounds. Gypsum is often added to slow the hardening process.

Portland cement is manufactured from lime-bearing materials, usually limestone, together with clays, shales, or blast-furnace slag containing alumina and silica, in the

approximate proportions of 60 percent lime, 19 percent silica, and 8 percent alumina, 5 percent iron, 5 percent magnesia, and 3 percent sulfur trioxide. Some rocks, called cement rocks, are naturally composed of these elements in approximately suitable proportions and can be made into cement without the use of large quantities of other raw materials. In general, however, cement plants rely on mixed materials. In the manufacture of cement the raw materials are ground together, the mixture is heated until it fuses into a clinker, and the clinker is ground into a fine powder.

A number of tests are used to check the quality of the cement. A common one is to use a mortar specimen of one part of cement and three parts of sand and measure its tensile strength after a week in air and underwater. A good cement will show a tensile strength of 19.4 kg per sq cm (2751 b per sq in) under these conditions.

### Special Cements

By varying the percentage of its normal components or adding others, portland cement can be given various desirable characteristics, such as rapid hardening, low heat during hydration, and resistance to alkalis. Rapid-hardening cements, sometimes called high-early-strength cements, are made by increasing the proportion of tricalcium silicate or by finer grinding, so that up to 99.5 percent will pass through a screen with 16,370 openings per sq cm (105,625 per sq in). Some of these cements will harden as much in a day as ordinary cement does in a month. They produce much heat during hydration, however, which makes them unsuitable for large structures where such heat may cause cracks. Special low-heat cements, which usually have a large proportion of dicalcium silicate, are generally used for massive pourings. Where concrete work must be exposed to alkaline conditions, which attack concretes made with ordinary portland cement, resistant cements with a low aluminum content are generally employed. Cements for use under salt water may contain as much as 5 percent iron oxide, and those with as much as 40 percent aluminum oxide are used to resist the action of sulfate-bearing waters.

## New Words

cement [sɪ'ment] *n.* 水泥

interchangeably [ɪntə'tʃeɪndʒəb(ə)li] *ad.* 可替换地, 可互换地

adhesive [əd'hi:sɪv] *a.* 黏着的, 附着的 *n.* 黏合剂, 黏着剂

gypsum ['dʒɪpsəm] *n.* 石膏, 灰泥板

plaster ['plɑ:stə] *n.* 灰泥, 灰粉

powdered ['paʊəd] *a.* 成粉末状的

portland ['pɔ:tlənd] *n.* 波特兰

adhere [əd'hɪə] *v.* 粘着, 附着

concrete ['kɒkri:t] *n.* 混凝土

coat [kəʊt] *v.* 在...涂, 用...覆盖

calcareous [kæl'keəriəs] *a.* 石灰质的, 钙质的  
 silica ['silikə] *n.* 硅石, 二氧化硅  
 epoxy [e'pɒksɪ] *a.* 环氧的, 环氧化物的 *n.* 环氧树脂  
 resin ['rezɪn] *n.* 树脂, 松脂  
 vinyl ['vaɪnɪl, 'vɪnɪl] *n.* 乙烯基  
 hydraulic [haɪ'drɔ:lɪk] *a.* 水力的  
 refractory [rɪ'fræktəri] *a.* 耐火的, 难溶的 *n.* 耐火材料  
 evaporation [ɪ,væpə'reɪʃən] *n.* 蒸发  
 plasticizing *n.* 塑化, 增塑  
 hydration [haɪ'dreɪʃən] *n.* 水化作用  
 interlace [ɪ,ɪntə(:)'leɪs] *v.* 使交织, 使交错  
 crystal ['krɪstl] *n.* 水晶  
 oxygen ['ɒksɪdʒən] *n.* 氧  
 carbon ['kɑ:bən] *n.* 碳  
 dioxide [daɪ'ɒksaɪd] *n.* 氧化物  
 tricalcium [traɪ'kælsɪəm] *n.* 三钙  
 silicate ['sɪlɪkɪt] *n.* 硅酸盐  
 dicalcium [daɪ'kælsɪəm] *n.* 二钙  
 magnesium [mæg'ni:ʒəm] *n.* 镁  
 compound ['kɒmpaʊnd] *n.* 化合物, 复合物  
 limestone ['laɪmstəʊn] *n.* 石灰石  
 lime [laɪm] *n.* 石灰  
 blast-furnace *n.* 鼓风炉  
 slag [slæg] *n.* 熔渣, 矿渣  
 alumina *n.* 泡沫砖  
 magnesia [mæg'ni:ʃə] *n.* 氧化镁  
 sulfur ['sʌlfə] *n.* 硫磺  
 trioxide [traɪ'ɒksaɪd] *n.* 三氧化物  
 grind (*pt, pp* ground) [graɪnd] *v.* 磨碎  
 fuse [fju:z] *v.* 使溶化  
 clinker ['klɪŋkə] *n.* 熔渣  
 mortar ['mɔ:tə] *n.* 灰浆, 砂浆  
 specimen ['spesɪmɪn] *n.* 样品, 标本  
 tensile ['tensəl] *a.* 张拉的, 拉力的  
 opening ['əʊpənɪŋ] *n.* 空口, 缺口  
 screen [skri:n] *n.* 筛, 滤网  
 aluminum [æljʊ'mɪnɪəm, ælə'mɪnɪəm] *n.* 铝  
 oxide ['ɒksaɪd] *n.* 氧化物

sulfate [ 'sʌlfet ] *n.* 硫酸盐  
pouring [ 'pɔ:riŋ ] *n.* 浇注, 浇铸  
alkaline [ 'ælkəlaɪn ] *a.* 碱的, 含碱的  
alkali [ 'ælkəlaɪ ] *n.* 碱(金属)  
aluminate [ 'əljʊ:mɪneɪt ] *n.* 铝酸盐

## Proper Names

gypsum plaster 石膏灰泥  
Portland cement 波特兰水泥  
epoxy resins 环氧树脂  
calcareous cement 含钙水泥; 水硬石灰  
hydraulic cement 水硬性水泥  
acid-resisting cement 耐酸水泥  
quick-setting cement 快(早)凝水泥  
refractory cement 耐火水泥  
rapid-hardening cement 快凝水泥  
high-early-strength cement 高早强水泥  
carbon dioxide 二氧化碳  
tricalcium silicate 硅酸三钙  
tricalcium aluminate 铝酸三钙  
dicalcium silicate 硅酸二钙  
sulfur trioxide 三氧化硫  
iron oxide 氧化铁  
aluminum oxide 氧化铝

## Exercises

### I. Answer the following questions according to the text.

1. What does the term "cement" refer to in engineering and building construction?
2. Cements are used for various purposes, list some of them.
3. Why do cements get a wide variety of names? Give some examples.
4. Why a kind of cement is named as Portland cement?
5. What is the material making up the largest proportion in manufacturing Portland cement?

### II. Choose the best answer for each of the following.

1. Cements that resist high temperatures are called \_\_\_\_\_.
  - a. refractory cement
  - b. calcareous cement
  - c. epoxy cement
  - d. vinyl cement
2. Roman cement is named for \_\_\_\_\_.

- a. its place of origin
  - b. its resemblance to other material
  - c. the principal constituents
  - d. the object to which it is applied
3. Cements set, or harden, \_\_\_\_\_.
- a. by the evaporation of the plasticizing liquid, or by internal chemical change, or by hydration
  - b. by the growth of interlacing sets of crystals
  - c. as they react with the oxygen or carbon dioxide in the atmosphere
  - d. a, b and c
4. A common test to check the quality of the cement is to use a mortar specimen of \_\_\_\_\_ and measure its tensile strength.
- a. two parts cement and three parts of sand
  - b. one part of cement and three parts of sand
  - c. two parts of cement and two parts of sand
  - d. three parts of cement and one part of sand
5. A good cement will show a tensile strength of \_\_\_\_\_ kg per sq cm under these conditions.
- a. 23.5
  - b. 19.4
  - c. 21.3
  - d. 20.6

■. Translate the following phrases.

- 1. internal chemical change
- 2. tensile strength
- 3. special low-heat cement
- 4. be exposed to
- 5. react with oxygen
- 6. 特种水泥
- 7. 快凝水泥
- 8. 耐酸水泥
- 9. 耐火水泥
- 10. 高炉矿渣

IV. Word Building

1. The prefix "inter-" means "mutual", or "placed between". Give the Chinese meaning of the following words:

interchangeably (                    )	intercrop (                    )
interaction (                    )	interaction (                    )
interflow (                    )	interrelation (                    )
interplanting (                    )	interlayer (                    )

2. The suffix "-ance" means "the act of", "the state of" or "the quality of". Give the

Chinese meaning of the following words:

appearance ( )

variance ( )

resistance ( )

clearance ( )

reliance ( )

disturbance ( )

endurance ( )

allowance ( )

## ※ Translation Strategy

### 科技英语的特征

科技英语(English for Science and Technology, 简称 EST)是随着科学技术的发展而形成的一种独立的文体形式。有关自然科学和社会科学的学术著作、论文、研究报告、专利产品的说明等均属于此类。作为独立的文体形式,科技文章有着其自身的特点。了解科技文体的特点将有助于翻译的实践。总的说来,科技文体有以下一般特征:

- (1) 无人称 (Impersonal)
- (2) 语气正式 (Formal in mode of speech)
- (3) 陈述客观、准确 (Objective and accurate in statement)
- (4) 语言规范 (Standard in language)
- (5) 文体质朴 (Undornated in stylistics)
- (6) 逻辑性强 (Strict in logic)
- (7) 专业术语性强(Concentrated in technical terms)

#### 一、无人称 (Impersonal)

绝大多数科技文章很少使用有人称的句子。这主要是由于科技文章所讨论的是科学发现或科技事实。尽管科技活动系人类所为,但由于科技文章所报告的主要是这种科技的结果或自然规律,而不是报告这些结果或自然规律是谁发现或完成的,因此科技文章往往没有人称。

#### 二、语气正式 (Formal in mode of speech)

由于科技活动本身是一种十分严肃的事情,来不得半点马虎,因此用于描述科技活动的科技文章在语气上也比较正式。

#### 三、陈述客观、准确 (Objective and accurate in statement)

科技文章是反映客观事物的,文章中不能掺杂作者个人的主观意志,对客观事物的陈述必须客观、准确。这既是科技文章的特征,也是对科技文章的基本要求。

#### 四、语言规范 (Standard in language)

科技文章的语言一般比较规范,主要表现为语法的规范性。这与文学作品有很大不同。科技文章的语法之所以规范,是由其描述客观事物必须准确无误这一要求所决定的。

#### 五、文体质朴 (Undornated in stylistics)

在修辞手段上,科技文章则以交际修辞(communicative rhetoric)为主,文风质朴,描

述准确, 不像文学文体那样赋予美学修辞(aesthetic rhetoric)手段和艺术色彩, 主要表现在语言的统一性和连贯性强, 语句平衡, 简洁而不单调, 语句长而不累赘、迂回。

#### 六、逻辑性强 (Strict in logic)

逻辑性强是科技文章的又一个突出的特征。科技文章的逻辑性强主要表现在概念明确, 判断合理、恰当, 推理严密等。

#### 七、专业术语性强(Concentrated in technical terms)

众所周知, 科技文章均有一个专业范围。一般说来, 其读者都是本专业的科技人员, 至少说文章是为本专业的读者而写的。因此, 科技文章还有一个特征, 就是高度的专业术语性。专业术语是构成科技理论的语言基础, 其语义具有严谨性和单一性。采用术语写作能使文章更加准确而简洁。

综上所述, 科技英语的特征表现在用词、句型、语法结构和修辞等方面。因此, 我们从事科技英语翻译时必须了解科技英语的特点, 以便于我们有意识地选择恰当的翻译方法与技巧来处理科技英语文章。

## ※ Reading and Translation

**Exercise A: Read the following passage and translate the underlined parts into Chinese.**

### Aggregates

(1)Aggregate is inert material (chemically inactive) such as sand, slag, pebbles, gravel, broken stone, broken bricks, industrial by products etc., which is mixed with cement and water and concrete or mortar is prepared. The aggregate is added to cement paste to increase the bulk Seventy to seventy-five percent of the volume of the hardened mass of concrete consists of aggregates. The remaining thirty to twenty five percent consists of hardened cement paste, uncombined water (i.e., water not involved in the hydration of the cement) and air voids. (2)Aggregate must be clean, dense, hard, durable, structurally sound, capable of developing good bond with cement, weather resistant and unaffected by water. Sand, gravel and broken stone are natural available materials most commonly used as aggregates. Blast furnace slag (air-cooled and crushed) and broken bricks are the artificial and processed aggregates used in concrete. Natural aggregates are generally classified as coarse and fine aggregates. Natural materials having uniform shear strength in all directions are ideal for use as aggregates. Other natural materials having pronounced planes of weakness or cleavage (e.g., slate, shale,

aggregate 骨料,集料  
inert 惰性的

mortar 灰浆, 砂浆  
bulk 体积

hydration 水化作用

shear 剪切力

pronounced 显著的

and micaceous materials) are usually undesirable. The aggregates used for concrete should conform to IS:383-1970 (specifications for coarse and fine aggregate from natural sources for concrete).

### Coarse aggregate

Broken stones, pebbles and gravel retained on IS:4.75 mm sieve is called as coarse aggregate. Coarse aggregate is prepared by crushing igneous stone (e.g., granite, gneiss), sedimentary stone (e.g., sand stones), and metamorphic stone (e.g., crystalline lime).

(3) Coarse aggregates prepared from very fine grained granite stone is used for high strength concrete. Coarse aggregates obtained from crushing of hard sand stone are also suitable for use in concrete.

Coarse aggregates made from the soft sand stone cracks when there is high degree of shrinkage in concrete, and it should be used with care.

Coarse aggregates (if prepared from close grained crystalline lime stone) is also suitable for use in plain cement concrete. Coarse aggregate made from broken bricks is also used for plain cement concrete only. It makes the concrete weak in strength. In structural concrete, the reinforcement is likely to be rusted when the broken brick aggregates are used. Coarse aggregates are separated in two or three size groups for use in concrete for large and important constructions. Each size group of aggregate is separately weighed according to grade charts and then combined to result in densely packed concrete. For construction of less importance, aggregates brought from the pits or river beds (called as all in aggregate) are directly used.

### Fine aggregate

Sand and any other aggregates which pass through IS: 4.75 mm sieve is called fine aggregate. Sand is brought from lakes, pits, rivers and sea-shores. (4) Sand is thoroughly washed so that there remain no clay films over the surface of the aggregate. It prevents adhesion of cement to the aggregate. Clay and silt are fine materials which pass through 75 micron IS: sieve. Clay and silt materials (if present) will increase water content. Dust is also detrimental material to concrete. As such the fine aggregates should be free from dust, organic impurities and silts. Chlorides (present in seashore sand) cause efflorescence and rusting and corrosion of reinforcement in structural concrete.

In order to prepare strong concrete, angular grained sand

cleavage 劈理, 解理  
micaceous 含云母的

igneous 火成的  
metamorphic 片麻岩  
crystalline 水晶的

reinforcement 钢筋

grade 级配

detrimental 有害的

chlorides 氯化物  
efflorescence 风化



(having good interlocking property) is used. Round grained particles of sand lack in interlocking property.

interlocking 连锁

In order to prepare the concrete to have good strength, weather resistance and durability, the aggregates are closely packed. For this reason, the gradation of particle sizes of the aggregates is of considerable importance.

#### Grading of aggregates

(5) Gradation of particle sizes of the aggregate vary with the nature and course of material and the requirements in this respect depend upon the type of structure. The particle sizes of fine and coarse aggregates are properly graded. Use of well graded aggregates reduces the air voids. The cement fills up the air voids of fine aggregates. The cement and sand both together fill up the air voids of the coarse aggregate. The finishing, workability and uniformity of concrete are considerably affected by the grading of fine aggregates.

gradation 分类

workability 和易性

#### Exercise B: Translate the following sentences into English.

1. 沙、沙砾和碎石都是最常用的天然骨料。
2. 天然骨料可分为粗骨料和细骨料，四面剪切应力均匀的材料都可作为理想的骨料。
3. 粗骨料可由碾碎的火成岩、沉积岩和变质岩石配制而成。
4. 小于筛径 IS: 4.75 mm 的沙子和其他骨料称为细骨料。细骨料应该没有尘土、有机杂质和泥沙。
5. 细骨料的配级在相当大的程度上影响着混凝土的表面平整性、和易性和均匀性。