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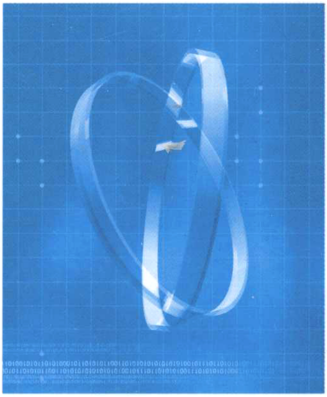

新编建筑工程专业英语

主　编　佟　芳　米胜国

New English in Architectural Engineering

哈爾濱工業大學出版社

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内 容 提 要

本书以培养学生的专业英语阅读能力为主要目标，由十三个单元组成，每个单元由两篇专业阅读和会话组成，内容涉及工程造价管理、建筑材料、建筑施工与组织、建筑工程招投标、建筑学、高层建筑、钢筋混凝土结构、预应力混凝土结构、钢结构等。

本书可作为高等学校工程造价管理和建筑工程专业的专业英语教材使用，也可供土建类专业技术人员学习、参考之用。

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前　言

国家教育部颁布的《大学英语教学大纲》把专业英语列为必修课纳入英语教学计划，目的是通过专业英语课程的学习，培养学生阅读和翻译英文专业文献的能力，为日后学习工作中获取专业信息、掌握学科发展动态、参加国际工程技术合作奠定良好的基础。编者结合本人多年的建筑工程专业英语教学实践中的经验和体会，融汇建筑行业的发展状况，专门为建筑工程专业学生编写本书。本书亦可供广大从事建筑工程专业、工程造价管理专业的工程技术人员及自学者学习使用。

本书内容选材针对性较强，涉及面广泛，难度适中，包含工程造价管理、建筑材料、建筑施工与组织管理、建筑工程招投标、建筑学、高层建筑、钢筋混凝土结构、预应力混凝土结构、钢结构等与建筑专业密切相关的内容。为了给读者进一步学习提供方便，本书附录中汇编了建筑工程常用英语词汇表，使学习者能准确掌握专业词汇的标准英文表达。

本书由天津工程职业技术学院佟芳、米胜国主编，王春旺、王淑严、于志培、李向秋、崔涛参编。具体编写分工为：王春旺编写第1~3单元；米胜国编写第4~6，10单元；佟芳编写第7，11单元及附录；王淑严编写第8，9单元；于志培编写第12，13单元；李向秋、崔涛负责本书的资料收集与整理工作。全书由佟芳统稿，由国家注册造价工程师崔玉梅初审，国家注册造价工程师张国强主审。

本书得以成稿并正式出版，要感谢哈尔滨工业大学孙爱荣老师的大力支持；还要感谢为我们仔细审稿的崔玉梅、张国强老师和其他有关同志的热情支持。本书在编写过程中参考了大量文献资料，在此一并表示感谢。由于编者水平有限，书中不足之处，恳请广大读者批评指正。

编　者

2012 年 5 月

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1

Unit 1

Passage A Properties of Concrete

Concrete is produced by mixing together cement, water, and mineral aggregates. This mixture is placed into a suitable mould, compacted, and allowed to harden. It is somewhat similar to building stone but has the advantage of being easily moulded into any suitable shape, and also of being conveniently reinforced with steel rods to improve its structural properties.

A concrete mix may be regarded as being made up of two parts, the aggregates (sand and stones) and the cement paste (that is, water and cement). The cement paste covers the surface of the stones and sand particles, building them together when it hardens. The aggregate is not altered in any way but is merely embedded firmly in a rock-like, hardened cement paste. This cementing material is formed by combining water and cement together chemically by a process called "hydration".

The chemical reaction takes place quite slowly and continues for many years. The hardened cement paste becomes harder as the hydration continues; consequently, concrete becomes harder and stronger as it grows older, provided that the temperature and moisture conditions are suitable. If, however, the concrete is allowed to dry out completely, its strength will increase no further. The longer it remains in a wet condition, the stronger it will become. Since it is also liable to attack by the weather or by chemicals, it is necessary to ensure that it becomes strong enough to withstand such attacks.

When concrete is properly made and has been allowed to harden for a sufficient length of time (usually a few days), it can resist compression forces very well and withstand quite severe weather conditions. It can resist abrasion, although not absolutely waterproof, and can offer a relatively high resistance to moisture penetration.

One of its advantages is its adaptability for a wide range of uses. It is possible to make concrete of any required strength within reasonable limits, but the stronger is made, the more is likely to cast. It would be uneconomic to use concrete of a higher strength than necessary for a particular job, but at the same time it must be strong enough to its job properly. The concrete designer is thus able to use the type of concrete which will do its job efficiently for the lowest cost.

If we are to understand how to use concrete properly, it is important that we realize what its limitations are. From the structural designer's point of view, one of the main disadvantages of concrete is its low tensile strength. That is to say, it is not able to resist forces tending to pull it apart. This may be overcome by reinforcing with steel bars at the part of a concrete structure where, tensile stresses are likely to occur.

Concrete shrinks when it dries out and will expand and contract every time it is wetted and dried. This may set up tensile forces (or stresses) in the concrete and shrinkage cracking may occur. The designer can help to avoid this by specifying contraction joints in suitable place. The supervisor on the site can also help to reduce the effect of shrinkage if he ensures that the concrete is kept wet as long as possible.

Another property of concrete which may be responsible for cracking is its expansion and contraction due to heating and cooling. The designer can overcome this by including expansion and contraction joints in suitable place to allow the concrete to move freely when the temperature changes. Steel also expands when it is heated and it is very fortunate that it expands the same amount as concrete does for a given temperature rise. For this reason steel embedded in concrete will move with the concrete without setting up any tensile stress.

The efficient use of steel bars in concrete depends on the ability of concrete to grip the steel tightly enough to prevent it from pulling out. This interaction between steel and concrete is called "bond", and the designer must check his calculations to ensure that the bond strength is sufficient. Bond may be reduced if the steel bars have loose scale, loose rust, or oil on the surface when they are embedded in the concrete. The supervisor should therefore check the steel to make sure that a good bond strength can develop.

It has already been mentioned that concrete is not entirely waterproof, but good concrete is waterproof enough for most practical purposes. It is, however, necessary to take most particular care with construction joints where there is a danger that such joints will allow water to pass through them.

Good-quality and proof-quality concrete might appear very similar by visual inspection. In order to assess the quality of the concrete properly it is necessary to use a more reliable method of inspection in the form of a suitable test. Experiments have shown that the test which generally gives the most reliable measurement of concrete quality is the crushing (or compressive) strength test. If a concrete has a high crushing strength it will usually have good durability (that is, resistance to weather, chemical attack, and abrasion), as well as being strong enough to carry heavy structural loads. This test, which is convenient to carry out, is usually made on a cube which is crushed in a mechanical testing machine.

Words and Expressions

concrete ['kɔnkri:t] *n.* 混凝土
cement [si'ment] *n.* 水泥
aggregate ['ægrigit] *n.* 骨料
embed [im'bed] *v.* 埋置
hydration [hai'dreiʃən] *n.* 水化作用
moisture ['mɔistʃə] *n.* 湿气
severe [si'viə] *a.* 不利的
abrasion [ə'breiʒən] *n.* 磨损
penetration [ˌpeni'treiʃən] *n.* 穿透
adaptability [ədæptə'biliti] *n.* 适用性
tensile strength 抗拉强度
reinforce [ˌri:in'fɔ:s] *v.* 配筋
shrink [ʃriŋk] *v.* 收缩
contraction joint 伸缩缝
site [sait] *n.* 工地现场
grip [grip] *v.* 抓住
bond [bɔnd] *n.* 粘结
scale [skeil] *n.* 鳞状物
durability [ˌdjuərə'biləti] *n.* 耐久性

Passage B Construction Cost Control

Few businesses can survive without knowledge of costs and without an intelligent control of costs. Certainly this is true in the construction industry. A contractor may be an excellent builder, but unless he knows his construction costs, he will never survive the vigorous competition in the industry. If a manufacturer finds that he has lost money on certain items, he may be able to raise the prices enough to assure a profit. However, a contractor who discovers after a project is finished that he has lost money may not have an opportunity to raise the price on the next project, especially if his losses were so great that he cannot finance another project. He may lose money because of one or more reasons, such as

1. Low bid
2. Insufficient knowledge of job conditions
3. Increase in the costs of materials and labor
4. Adverse weather conditions
5. Improper selection of construction equipment
6. Inefficient management and supervision

While it may not be possible to correct the first tour difficulties after the project is started, there may be some opportunity to improve item 5, and certainly an alert businessman should correct item 6, or better still he should not let it occur. Cost engineering or cost control will assist in correcting losses resulting from inefficient management and supervision. Cost control is more than mere bookkeeping. Bookkeeping will enable a contractor to determine whether he made a profit after a project is finished. Cost control during the period of construction will enable a contractor to analyze intelligently the performance of labor and equipment. It will show costs and production for labor and equipment. If the costs are higher than were estimated, either the estimate was too low or the costs are too high. If the latter condition is found to exist, it may be corrected while the project is still in operation, thereby providing a profit instead of a loss.

The owner of equipment should use an equipment ledger to provide information concerning each type of major equipment, showing an assigned number, with a description giving the size or capacity and any auxiliary equipment, dare of purchase, name of seller, original total cost, estimated total life, and a depreciation schedule. He should use an equipment-operating ledger to keep a complete record of the cost of each type of equipment.

Prior to starting construction on a project a contractor should set up a classification of construction accounts in which specific item numbers are assigned to each construction operation. The item numbers that were used in estimating the cost of the project should be used in preparing the classification of construction accounts. This procedure will facilitate the comparison of casts with the original estimates. In setting up the items for which costs are to be estimated and reported during construction, it is well to consider the desirability of dividing an operation into subitems. For example, the costs of concrete in a structure might be subdivided into the costs of producing aggregate, hauling aggregate, mixing and placing concrete, and finishing and curing concrete. If a concrete structure includes various sizes and shapes whose costs vary considerably, it may be desirable to divide the project into subitems for cost purposes.

Cost accounts should provide for the showing of the costs of materials, labor, and equipment separately for each operation if they are to serve the purpose for which they are used. Some contractors follow the practice of grouping the cost of all equipment into one item. This practice is not good, as it does not permit a determination of the true complete cost of a given operation on which the equipment is used. This is especially true of engineering construction for which the cost of equipment may represent a major portion of the total cost. If the cost of equipment. includes rental or depreciation, maintenance and repairs, fuel, supplies, etc., a record of the time that the equipment is used on each operation will permit the total cost to be prorated correctly between the several operations. It is not correct to charge to an operation the cost of major repairs because the equipment was assigned to that operation when the repairs were made.

Cost accounting methods should be realistic, simple, and understandable. They are not an end product, but a means of managing a project. If the men who are supposed to use the information understand it, they will use it. If the information is too complicated, it will be disregarded or used incorrectly.

Words and Expression

bid [bid] *n.* 出价,投标
supervision [ˌsjuːpəˈviʒən] *n.* 监督,管理
subitem [sʌbaitəm] *n.* 分项

Dialogue

A: Let's see the Organization Chart first.

B: Total round 200. The top management has three people only. They are Project Manager, Deputy Project Manager and Chief Engineer. Under project management there are five departments Works, Technical, Procurement, Administration and Quality Departments.

A: What about the functions of each department?

B: The Works Department is the largest one and responsible for all construction sections and teams. The Deputy Project Manager is also the Manager of Works Department. The Technical Department is in charge of all matters about drawings and designing of temporary facilities.

A: Which department deals with the subcontract matters?

B: It also belongs to the responsibility of the Technical Department.

The Procurement Department is in charge of material and construction equipment supply and warehouse. The Administration Department is in charge of all maters related to finance and public relationship. The Quality Department is a special agency for it is controlled by not only Project Management but also the Headquarter of the company.

Words and Expressions

Organization Chart 组织机构表
Project Manager 项目经理
Deputy Project Manager 项目副经理
Chief Engineer 总工程师

2

Unit 2

Passage A   Reinforced Concrete

Mild steel has a high tensile strength, this being about 200 times that of concrete. It can be embedded in concrete to carry any tensile stress which may occur, such as in beams and slabs which are subjected to bending. Let us consider a plain concrete beam, that is, one having no steel embedded in it. If this beam is supported at its ends and loaded along its lengths, it may break, as shown in Fig. 2. 1. Such a failure would occur suddenly and the beam would collapse completely.

You will notice in Fig. 2. 1(a) that the underside of this beam is being pulled by tension stresses while the top side is being pushed by compressive stresses. The concrete is strong enough to carry the compression at top, but is not strong enough to carry the tension at the bottom.

If a number of steel rods were embedded in the concrete near the bottom of the beam, the beam would be able to carry a much greater load before breaking, as the steel rods would have to be broken before the beam could collapse. The steel rods would not prevent the

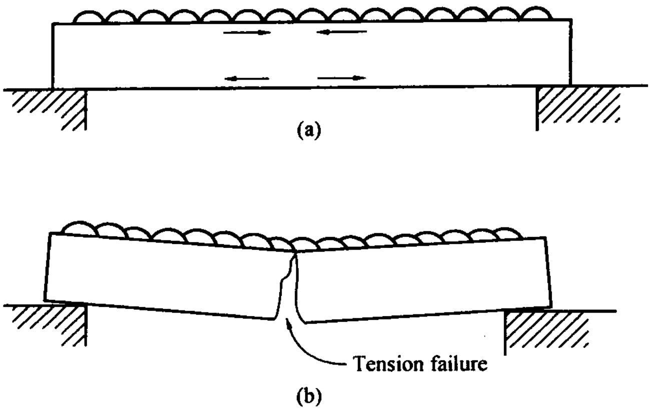

Fig. 2.1 Failure of a concrete beam with no reinforcement

concrete from cracking, and, in fact, most reinforced concrete beam are cracked when they are carrying the load for which they were designed. This is illustrated in Fig. 2.2.

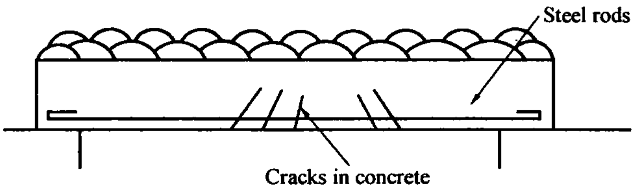

Fig. 2.2 Concrete beam reinforced with steel rods

The cracks so formed need not worry us since the steel rods would be quite capable of holding the two halves together safely.

There may, however, be a danger that moisture would enter the cracks and cause the steel to rust. The designer of the beam must ensure that the width of any crack formed is not large enough to allow corrosion of the steel to occur in this way.

In some beams diagonal cracking may occur due to a tendency of the middle part of the beam to drop out, as shown in Fig. 2.3. Such cracks are some times called shear cracks, and to avoid this, the