高等学校土木建筑专业
|应用型本科系列规划教材|

土木工程专业英语

董 祥 ◎ 主编

TUMUGONGCHENG
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高等学校土木建筑专业应用型本科系列规划教材

土木工程专业英语

Special English for Civil Engineering

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内 容 提 要

本书是为土木工程专业的学生学习专业英语而编写的，包括三部分。第一部分“专业英语学习篇”涵盖土木工程及其下各专业方向的基本内容，主要包括建筑工程、桥梁工程、道路工程、土木工程管理等。第二部分“专业英语实践篇”介绍用英语进行专业交流、翻译和写作时应掌握的技巧，以及目前在专业英语学习和实践中常用的辅助工具。第三部分“专业英语词汇表”列出了常用的土木工程英文专业词汇和短语。

本书可作为土木工程专业本科生学习专业英语的教材，也可供土木工程及相关专业的研究生、专科生学习参考，亦可供土木工程专业技术人员了解专业知识、查用专业词汇、提高英语水平时使用。

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总前言

国家颁布的《国家中长期教育改革和发展规划纲要(2010—2020年)》指出，要“适应国家和区域经济社会发展需要，不断优化高等教育结构，重点扩大应用型、复合型、技能型人才培养规模”；“学生适应社会和就业创业能力不强，创新型、实用型、复合型人才紧缺”。为了更好地适应我国高等教育的改革和发展，满足高等学校对应用型人才的培养模式、培养目标、教学内容和课程体系等的要求，东南大学出版社携手国内部分高等院校组建土木建筑专业应用型本科系列规划教材编审委员会。大家认为，目前适用于应用型人才培养的优秀教材还较少，大部分国家级教材对于培养应用型人才的院校来说起点偏高，难度偏大，内容偏多，且结合工程实践的内容往往偏少。因此，组织一批学术水平较高、实践能力较强、培养应用型人才的教学经验丰富的教师，编写出一套适用于应用型人才培养的教材是十分必要的，这将有力地促进应用型本科教学质量的提高。

经编审委员会商讨，对教材的编写达成如下共识：

一、体例要新颖活泼。学习和借鉴优秀教材特别是国外精品教材的写作思路、写作方法以及章节安排。摒弃传统工科教材知识点设置按部就班、理论讲解枯燥无味的弊端，以清新活泼的风格抓住学生的兴趣点，让教材为学生所用，使学生对教材不会产生畏难情绪。

二、人文知识与科技知识渗透。在教材编写中参考一些人文历史和科技知识，进行一些浅显易懂的类比，使教材更具可读性，改变工科教材艰深古板的面貌。

三、以学生为本。在教材编写过程中，“注重学思结合，注重知行统一，注重因材施教”，充分考虑大学生人才就业市场的发展变化，努力站在学生的角度思考问题，考虑学生对教材的感受，考虑学生的学习动力，力求做到教材贴合学生实际，受教师和学生欢迎。同时，考虑到学生考取相关资格证书的需要，教材中

还结合各类职业资格考试编写了相关习题。

四、理论讲解要简明扼要，文例突出应用。在编写过程中，紧扣“应用”两字创特色，紧紧围绕着应用型人才培养的主题，避免一些高深的理论及公式的推导，大力提倡白话文教材，文字表述清晰明了、一目了然，便于学生理解、接受，能激起学生的学习兴趣，提高学习效率。

五、突出先进性、现实性、实用性、操作性。对于知识更新较快的学科，力求将最新最前沿的知识写进教材，并且对未来发展趋势用阅读材料的方式介绍给学生。同时，努力将教学改革最新成果体现在教材中，以学生就业所需的专业知识和操作技能为着眼点，在适度的基础知识与理论体系覆盖下，着重讲解应用型人才培养所需的知识点和关键点，突出实用性和可操作性。

六、强化案例式教学。在编写过程中，有机融入最新的实例资料以及操作性较强的案例素材，并对这些素材资料进行有效的案例分析，提高教材的可读性和实用性，为教师案例教学提供便利。

七、重视实践环节。编写中力求优化知识结构，丰富社会实践，强化能力培养，着力提高学生的学习能力、实践能力、创新能力，注重实践操作的训练，通过实际训练加深对理论知识的理解。在实用性和技巧性强的章节中，设计相关的实践操作案例和练习题。

在教材编写过程中，由于编写者的水平和知识局限，难免存在缺陷与不足，恳请各位读者给予批评斧正，以便教材编审委员会重新审定，再版时进一步提升教材的质量。本套教材以“应用型”定位为出发点，适用于高等院校土木建筑、工程管理等相关专业，高校独立学院、民办院校以及成人教育和网络教育均可使用，也可作为相关专业人士的参考资料。

高等学校土木建筑专业应用型
本科系列规划教材编审委员会
2010 年 8 月

前　言

《土木工程专业英语》是土木工程专业本科生的专业基础课程之一。最初开设此课程的目的，是使学生在完成大学基础英语学习后，通过对专业英语的后续学习，掌握一定量的专业词汇，培养能够顺利阅读并正确理解英文专业文献的能力；近年来，随着我国土木工程行业对外交流的增多，对本科毕业生专业英语的实际要求已不再停留在阅读层面，而是提高到了掌握听、说、读、写、译等综合技能上。然而，当前我国许多高校该课程的教学效果却并不十分理想，表现在不少具有较好基础英语功底的本科生，学习了专业英语之后，在毕业设计时仍无法顺利完成英文文献翻译和论文英文摘要撰写等基本环节。这表明，《土木工程专业英语》课程在教学思想和教学方法上亟待改进。

基于以上实际背景和教学现状，我们编写了此本《土木工程专业英语》本科教材。全书分为三部分：第一部分“专业英语学习篇”以土木工程为主线，系统介绍了土木工程及其下各专业方向的基本内容，包括土木工程、建筑工程、桥梁工程、隧道工程、道路工程、机场工程、轨道交通工程、岩土与地下工程、土木工程材料、土木工程设备、土木工程施工、土木工程管理、土木工程美学与环境工程等；该篇继承了传统教材的优点，强化学生专业词汇的积累、专业英语阅读能力的培养，体现了宽口径的“大土木”培养思想；并在每章之后设有“技能训练”环节，引导学生变接受性被动学习为探索性主动学习。第二部分“专业英语实践篇”着眼于对学生听、说、读、写、译等专业英语综合技能的培养，系统介绍了用英语进行土木工程专业交流、翻译和写作时应掌握的技巧，并辅以实例介绍了英语词典、电子词典、网络搜索引擎、计算机英语词典软件、在线词典、在线翻译、语料库等现代化工具在专业英语学习与实践中的应用。第三部分“专业英语词汇表”相当于简明专业英语词典的作用，该部分亦可供土木工程专业技术人员遇到相关问题时查用。

本书第一部分由哈尔滨工业大学、东南大学、河南大学、南通大学、南京工程学院、河南城建学院、三江学院等七所高校的专业教师共同编写，具体分工如

下：第 1 章由袁玉卿编写，第 2 章、第 4 章、第 7 章～第 9 章由董祥编写，第 3 章、第 5 章由沈正和倪红梅共同编写，第 6 章由倪红梅编写，第 10 章、第 18 章由葛文璇编写，第 11 章由王继果编写，第 12 章～第 14 章由盛怡编写，第 15 章～第 17 章由台双良编写；第二部分包括第 19 章～第 22 章，由土木工程专业教师董祥和英语专业教师蒋琍共同编写；第三部分由张树娟编写。

全书由董祥担任主编并统稿，蒋琍、倪红梅和台双良担任副主编；承蒙南京林业大学国际教育学院副院长、土木工程学院博士生导师黄新教授在百忙之中为本书提供了许多有益的建议，东南大学硕士研究生段影娜和于华洋为本书的资料整理做了大量工作，在此向他们表示衷心的感谢。在本书的编写过程中，参考了大量的英文专业书籍、论文和研究报告，特向这些资料的原作者们表示感谢。

编　者

2010 年 8 月

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第一部分　专业英语学习篇

Part Ⅰ Special English Learning

1 Civil Engineering

1.1 Text

1.1.1 Passage

Introduction to Civil Engineering

Civil engineering is a professional engineering discipline that deals with the design, construction and maintenance of the physical and naturally built environment, including works such as bridges, roads, canals, dams and buildings. Civil engineering is the oldest engineering discipline after military engineering, and it is defined to distinguish non-military engineering from military engineering. It is traditionally broken into several sub-disciplines including environmental engineering, geotechnical engineering, structural engineering, transportation engineering, municipal or urban engineering, water resources engineering, materials engineering, coastal engineering, surveying and construction engineering. Civil engineering takes place at all levels: in the public sector from municipal to federal levels, and in the private sector from individual homeowners to international companies.

Engineering has been one part of life since the existence of human beings. The earliest practices of civil engineering may appear between 4000 BC and 2000 BC in Ancient Egypt and Mesopotamia when human beings started to abandon a nomadic existence, thus causing a need for the construction of shelter. During that time, transportation became increasingly important and it led to the development of the wheel and sailing. The construction of Pyramids in Egypt (2700-2500 BC) might be considered as the first example of large-scale constructions. Other ancient historic civil engineering constructions include the Parthenon by Iktinos in Ancient Greece (447-438 BC), the Appian Way by Roman engineers (312 BC), the Great Wall of China by General Meng Tian under orders from Emperor Qin (220 BC), the stupas constructed in ancient Sri Lanka like the Jetavana Ramaya, and the extensive irrigation works in Anuradhapura. The Romans developed civil structures throughout their empire, especially including aqueducts, insulae, harbors, bridges, dams and roads.

Until modern times there was no clear distinction between civil engineering and architecture, and the term engineer and architect were mainly geographical variations referring to the same person, often used interchangeably. In the 18th century, the term

civil engineering began to be used to distinguish it from military engineering.

The first self-proclaimed civil engineer was John Smeaton who constructed the Eddystone Lighthouse. In 1771, Smeaton and some of his colleagues formed the Smeatonian Society of Civil Engineers, a group of leaders of the profession who met informally over dinner.

In 1818 the Institution of Civil Engineers was founded in London, and in 1820 the eminent engineer Thomas Telford became its first president. The institution received a Royal Charter in 1828, formally recognizing civil engineering as a profession. Its charter defined civil engineering as the art of directing the great sources of power in nature for the use and convenience of man, as the means of production and of traffic in states, both for external and internal trade, as applied in the construction of roads, bridges, aqueducts, canals, river navigation and docks for internal intercourse and exchange, and in the construction of ports, harbors, moles, breakwaters and lighthouses, and in the art of navigation by artificial power for the purposes of commerce, and in the construction and application of machinery, and in the drainage of cities and towns.

In the mid-17th century, civil engineering was very original in this period, construction materials mainly used stones, grass reinforcement, adobe and other natural materials. Construction tools are primitive axes, hammers, knives, shovels and other hand tools, construction of facilities.

The history of modern civil engineering is generally believed from the mid-17th century to post-second world war, a total of more than 300 years. During that period, civil engineering was becoming an independent discipline. In 1683, Italian scholar Galileo published *Dialogues Concerning Two New Sciences*, first expressing the formula of the design of beam theory. In 1687, Newton summed up the three laws of mechanics. Mechanics of the Civil Engineering laid the basis of the analysis. Then in material mechanics, theory of elasticity and strength of materials based on the Navier in France in 1825 established a civil engineering structural design of the allowable stress method. Since then, civil engineering has become more systematic and theoretical guidance.

For materials, the invention of Portland cement in 1824 and reinforced concrete in 1867 became historic events in civil engineering. As the mass production of concrete and steel can be achieved, civil engineers can make use of these materials, the construction of large and complex engineering facilities.

After World War Ⅱ, the rapid development of science and technology made civil engineering rely on modern science and technology to achieve further development. Steel and concrete, which are the most important building materials, had further development. Their strength improved several times, and reliability, durability and other properties were much better.

Civil engineering is the application of physical and scientific principles, and its history is intricately linked to advances in understanding of physics and mathematics

throughout history. Because civil engineering is a wide ranging profession, including several separate specialized sub-disciplines, its history is linked to knowledge of structures, materials science, geography, geology, soils, hydrology, environment, mechanics and other fields.

Throughout ancient and medieval history, most architectural design and construction were carried out by artisans, such as stone masons and carpenters, who then became the role of master builder. Knowledge was retained in guilds and seldom supplanted by advances. Structures, roads and infrastructure that existed were repetitive, and increases in scale were incremental.

One of the earliest examples of a scientific approach to physical and mathematical problems applicable to civil engineering is the work of Archimedes in the 3rd century BC, including Archimedes Principle, which underpins our understanding of buoyancy, and practical solutions such as Archimedes' screw. Brahmagupta, an Indian mathematician, used arithmetic in the 7th century AD, based on Hindu-Arabic numerals, for excavation (volume) computations.

Numerical analysis of the computer, which was difficult to compute a rough calculation in the past, can be simplified into a more precise calculation now. For example, by means of finite element analysis software, people can easily solve the problems to complete the complex human statically indeterminate structure calculation of internal forces and displacements. Finite element theory and the structural dynamics of the continuous development of the people can make a convenient and precise structure of the force and deformation calculation, making the design work greatly simplified. With the help of the computer-aided design (CAD application), the designers are free from manual graphics. More construction machineries allow a substantial increase of construction, increase of the degree of automation. With the use of more construction machineries, degree of automation makes the construction of a substantial increase.

Usually the construction of a project facilities has to go through investigation, design and construction of three stages, requiring the use of engineering geological investigation, hydro geological investigation, engineering survey, soil mechanics, engineering mechanics, engineering design, building materials, construction equipment, construction machinery, building the economy other disciplines and construction technology, construction organizations in the field of knowledge, and computer and mechanical testing techniques. Thus the scope of civil engineering is a broad comprehensive discipline. With the advance of science and technology development and engineering practice, the civil engineering disciplines have become broad categories, which are complex integrated systems.

Civil engineering is accompanied by the development of human society. It reflects the construction of engineering facilities in various historical periods of society, economy, culture, science, and technology development prospects. Therefore, civil

society has become one of the witnesses of the historical developments.

In the ancient times, people began to build rudimentary houses, roads, bridges and communication channels to meet the simple life and production.

Many well-known engineering facilities showed human creativity in this historical period. For example, China's Great Wall, Dujiangyan, the Grand Canal, Zhaozhou Bridge, Ying Xian Tower, the Pyramids, the Greek Parthenon, the Roman water supply, colosseum amphitheater (Roman Jungle field), and many other famous churches and palaces.

After the Industrial Revolution, especially in the 20th century, civil society put forward new demands and the social progress in all areas of civil engineering created good conditions. Thus civil engineering in this period got rapid development. In the worldwide, modern large-scale industrial plants, skyscrapers, nuclear power plants, highways and railways, bridge, long tunnel of large diameter pipelines, the Grand Canal, large dams, large airports, major seaports and marine engineering appeared. Modern civil society continued to create new human physical environment, as human society was an important part of modern civilization.

Civil engineering is a highly practical subject. In the early times, civil engineering practice was through summing up successful experiences, especially learning from failure. From the 17th century, Galileo and Newton, who were the guiders of modern civil engineering, practice with the combined mechanical, gradually mechanics, structural mechanics, fluid mechanics, rock mechanics, and the theory as the basis for civil engineering disciplines. Civil engineering gradually developed into a science relying on experience.

In the development of civil engineering, engineering practice often precedes theory; engineering accidents often show new unforeseen factors and trigger new theoretical research and development. Till now, a number of works dealing with the problem still rely on practical experience.

Why do the development of civil engineering technology rely on engineering practice and are not by virtue of scientific experiments and theoretical studies? There are two reasons. First, some of the objective situations are too complicated and difficult to faithfully carry out laboratory or field tests and theoretical analysis. Second, a new engineering practice can reveal new problems. For example, the construction of tall buildings, tall towers and long span bridges, masts, wind and seismic engineering issues highlightedly in order to develop this new theory and technology.

Features of modern civil engineering, with the rapid development of various construction requirements, are that people need to build large-scale, long span, tall, light, and sophisticated buildings with modern equipment. This raises new issues to the civil engineering and promotes the civil engineering discipline forward.

1.1.2 New Words and Expressions

construction [kən'strʌkʃən] *n.* 建造,建设;建筑物
canal [kə'næl] *n.* 运河、管道
structural engineering 结构工程
construction engineering 建筑工程
geotechnical engineering 岩土工程
stupas ['stu:pəs] *n.* 舍利塔
breakwater ['breɪk wɔ:tə] *n.* 防波堤
durability ['djʊərə'bɪlətɪ] *n.* 耐久性
mason ['meɪsən] *n.* 石匠,砖瓦匠
carpenter ['kɑ:pɪntə] *n.* 木匠,工匠
infrastructure ['ɪnfrəˌstrʌktʃə] *n.* 基础设施,公共建设
synthetic materials 合成材料
finite element analysis 有限元分析
statically indeterminate structure 超静定结构
structural dynamics 结构动力学
span [spæn] *n.* 跨度,跨径,(桥或拱的)墩距
paleolithic ['peɪəulɪθɪk] *a.* 旧石器时代的
adobe [ə'dəʊbɪ] *n.* (制风干砖用的)灰质黏土
beam [bi:m] *n.* 梁,横梁
mechanics [mɪ'kænɪks] *n.* 力学,机械学
Portland cement 波特兰水泥,普通水泥,硅酸盐水泥
reinforced concrete 钢筋混凝土
deformation [ˌdi:fɔ:'meɪʃən] *n.* 损形,变形
geological [dʒɪə'lɒdʒɪkəl] *a.* 地质(学)的
skyscraper ['skaɪ'skreɪpə] *n.* 摩天大楼
tunnel ['tʌnəl] *n.* 隧道;坑道;洞穴通道
the Grand Canal 大运河
seismic ['saɪzmɪk] *a.* 地震的,由地震引起的;震撼世界的

1.1.3 Exercises

Translate the following paragraphs into Chinese

(1) Until modern times there was no clear distinction between civil engineering and architecture, and the term engineer and architect were mainly geographical variations referring to the same person, often used interchangeably. In the 18th century, the term civil engineering began to be used to distinguish it from military engineering.

(2) Civil engineering is the application of physical and scientific principles, and its history is intricately linked to advances in understanding of physics and mathematics throughout history. Because civil engineering is a wide ranging profession, including several separate specialized sub-disciplines, its history is linked to knowledge of structures, materials science, geography, geology, soils, hydrology, environment, mechanics and other fields.

(3) Civil engineering is a highly practical subject. In the early times, civil engineering practice was through summing up successful experiences, especially learning from failure. From the 17th century, Galileo and Newton, who were the guiders of modern civil engineering, practice with the combined mechanical, gradually mechanics,