



世纪高等教育土木工程系列规划教材

土木工程 专业英语

戴俊 刘存中 主编
薛建阳 主审



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本书是 21 世纪高等教育土木工程系列规划教材之一。全书由 36 个单元组成,每单元内容包括课文精讲、翻译练习、材料泛读和专业英语知识介绍。本书所选阅读材料涵盖土木工程总论、结构工程、岩土工程、道路与桥梁工程、隧道与地下工程、土木工程施工管理及计算机在土木工程中的应用等方面,阅读材料内容新颖,大都是相关领域的新知识和新成果介绍。书中介绍的内容涉及专业英语的教学、语法特点、阅读方法及翻译方法与技巧等,对学生专业英语阅读和翻译能力的提高很有帮助。

本书可作为土木工程本科生专业英语课程的教材,也可作为土木工程研究生专业英语阅读的参考用书,同时还可供土木工程及相关领域的高校教师和工程技术人员阅读参考。

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随着 21 世纪国家建设对专业人才的需求,我国工程专门人才培养模式正在向宽口径方向转变,现行的土木工程专业包括建筑工程、交通土建工程、矿井建设、城镇建设等 8 个专业的内容。经过几年的教学改革和教学实践,组织编写一套能真正体现专业大融合、大土木的教材的时机已日臻成熟。

迄今为止,我国高等教育已为经济战线培养了数百万专门人才,为经济的发展作出了巨大贡献。但据 IMD1998 年的调查,我国“人才市场上是否有充足的合格工程师”指标世界排名在第 36 位,与我国科技人员总数排名第一的现状形成了极大的反差。这说明符合企业需要的工程技术人员,特别是工程应用型技术人才供给不足。

科学在于探索客观世界中存在的客观规律，它强调分析，强调结论的惟一性。工程是人们综合应用科学理论和技术手段去改造客观世界的客观活动，所以它强调综合，强调实用性，强调方案的优选。这就要求我们对工程应用型人才和科学研究型人才的培养实施不同的方案，采用不同的教学模式，使用不同的教材。

机械工业出版社为适应高素质、强能力的工程应用型人才培养的需要而组织编写了本套系列教材，目的在于改革传统的高等工程教育教材，结合大土木的专业建设需要，富有特色、有利于应用型人才的培养。本套系列教材的编写原则是：

- 1) 加强基础, 确保后劲。在内容安排上, 保证学生有较厚实的基础, 满足本科教学的基本要求, 使学生日后发展具有较强的后劲。
- 2) 突出特色, 强化应用。本套系列教材的内容、结构遵循“知识新、结构新、重应用”的方针。教材内容的要求概括为“精”、“新”、“广”、“用”。“精”指在融会贯通“大土木”教学内容的基



础上,挑选出最基本的内容、方法及典型应用实例;“新”指在将本学科前沿的新技术、新成果、新应用、新标准、新规范纳入教学内容;“广”指在保证本学科教学基本要求前提下,引入与相邻及交叉学科的有关基础知识;“用”指注重基础理论与工程实践的融会贯通,特别是注重对工程实例的分析能力的培养。

3) 抓住重点,合理配套。以土木工程教育的专业基础课、专业课为重点,做好实践教材的同步建设,做好与之配套的电子课件的建设。

我们相信,本套系列教材的出版,对我国土木工程专业教学质量的提高和应用型人才的培养,必将产生积极作用,为我国经济建设和社会发展作出一定的贡献。

江見鯨

前 言

专业英语是大学英语教学的一个重要部分，是必修课程。根据教育部大学英语教学大纲的规定和近年来对大学生专业英语阅读的新要求，结合编者多年来的教学实践，在参考现有土木工程专业英语教材的基础上，编写了本教材。

本书以提高土木工程专业学生的专业英语阅读能力为出发点，介绍了专业英语的阅读技巧和翻译方法，通过课文材料的阅读，可扩展学生的专业知识视野。本书的特点是：

- 选材内容新颖。课文材料多来自较新的专业杂志和网络文章，较好地介绍了当今土木工程领域相关的新技术和新成果。

- 选材内容涉及面广。课文选材涉及土木工程总论，工程结构设计与施工，岩土与基础工程，道路、桥梁与隧道工程，土木工程防灾与减灾，建筑材料及计算机在土木工程中的应用等，有助于学生全面了解土木工程专业。

- 课文编排重点突出。每单元课文内容分重点讲解和一般阅读两部分，前面部分为重点讲解内容，后面部分可供有潜力的学生阅读。

- 教材适应性广。教材课文难度、深浅不等，可以适用于不同英语水平的学生，满足不同的教学目的和要求。

- 强调学生能力的培养。使用本书不仅可以获得更广泛的土木工程专业知识，而且可以了解专业英语阅读的特点、专业英语正确的阅读技巧和翻译方法，从而提高专业英语的阅读和翻译水平。

- 适应专业英语教学的新要求。近年来，各高校对学生的英语水平提出了新的要求，要求学生在完成毕业设计（论文）的同时，还必须完成一定篇幅的文章的英汉翻译，并要求写出毕业设计（论文）



的英文摘要。本书充分考虑了这一点,设计了相应的练习和知识讲解。

本书由西安科技大学戴俊教授和河南工业大学刘存中副教授主编。编写分工为:戴俊编写第1、2、8~11、14、15、36单元,刘存中编写第3~7、22、25单元,北京建工学院董军编写第12、13、29~31单元,河南理工大学梁为民、王新生编写16~19单元,河南工业大学刘起霞编写第23、24、32、33单元,河南工业大学李作正编写第20、21单元,西安科技大学熊光红编写第26~28单元,西安科技大学奚家米编写第34、35单元。每单元后面的补充知识均由戴俊编写。

西安建筑科技大学薛建阳教授对本书进行了全面审阅,就内容的取舍和编排提出了许多宝贵的意见,对有关术语进行了核对,为本书增色不少,在此深表感谢。

由于时间仓促,加之编者水平有限,书中不当、错漏之处在所难免,恳请读者批评指正。

编 者

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Unit 1

Text

Introduction of Civil Engineering

Engineers have probably contributed more to the shaping of civilization than any other professional group. In every society, the role of engineers is to develop the technological application to meet practical needs. For example, the application of an electrical system is to provide power to a city, a water wheel is to run a **mill**, an artificial heart is to prolong life, etc. The systems that supply our food, water, fuel, power, transportation network, communication, and other conveniences are the products of engineering skill. Despite the essential engineers play in the above progress and in the well being of humanity¹, their exact role is imperfectly understood.

Engineering is the art of converting knowledge into useful practical applications. An engineer is a person, who **plays** the key role in this process of conversion. Since engineering is the profession which serves people, their environment is an important **consideration**. Often, there have been difficulties in distinguishing engineers from scientists. It is difficult to determine where the work of the scientist ends and that of the engineer begins.

The basic distinction between the linked professions of science and engineering lies in their goals. Scientists aim to invent while engineers strive to use the inventions effectively to **cater** to the needs of mankind. For example, the German physicist Heinrich Hertz² discovered radio waves while Guglielmo Marconi³ developed wireless telegraphy using radio waves, a feat of engineering⁴. And after the scientific principles of nuclear fission were established, the hard work of creating atomic weapons and useful power plants was accomplished by electrical, chemical and mechanical engineers.

Civil engineering is that branch of engineering which aims to provide a comfortable

and safe living for the people. **Shelter**, one of other primary needs of mankind, is provided by civil engineers. The efficient planning of water supply and irrigation systems increases the food production in a country. Shelters, apart from just being shelters, have been constructed by civil engineers to provide a peaceful and comfortable life. The engineering marvels of the world, starting from the **pyramids** to today's **thin shell structures**, are the results of the development in civil engineering. Communication lines like roads, railways, bridges, etc., without which development is impossible, are fruits of civil engineers' work.

Any discipline of engineering is a vast field with various specializations. The major specializations of civil engineering are listed below:

1. Structural Engineering

Structural engineering is the most important specialization in civil engineering. The construction of a structure needs efficient planning, design and method of construction to serve the purpose fully. Generally, there are five major steps in any construction project. These include the following:

- 1) Positioning and arranging the various parts of the structure into a definite form to achieve best utilization.
- 2) Finding out the magnitude, direction and nature of various forces acting on the structure.
- 3) Analyzing the structure to know the **behavior** of the various parts of the structure subjected to the above forces.
- 4) Designing the structure so that its stability under the action of various loads is ensured.
- 5) Executing the work with selected construction materials and skilled workers.

2. Geotechnical Engineering

For the efficient functioning of any structure built on earth, the behaviour of soil must be known. Geotechnical engineering gives the basic idea about the soil. This branch also deals with the following aspects:

- The properties and behaviour of soil as a material under "soil mechanics".
- The various types of foundations for a structure, a machine, etc. and their suitability.

Geotechnical engineering also deals with the analysis, design and construction of foundation.

3. Fluid Mechanics, Hydraulics and Hydraulic Machines

Fluid mechanics deals with the properties and behaviour of fluids at rest or in mo-

tion. The principles of fluid mechanics can be applied to daily life as in the case of the flight of planes, the movement of fish in water, and the circulation of blood in the veins⁵.

The design of hydraulic structures, such as dams and **regulator**, require the force exerted by water and the behaviour of water under pressure.

Machines which utilize the hydraulic energy are called **hydraulic machines**. For example, **turbines** use potential energy of water to generate power. Pumps are devices which utilize mechanical energy to lift water. The efficient working of the above machines depends upon the fluid behaviour which is dealt with in this discipline.

4. Transportation Engineering

The development of a nation mainly depends on the communication facilities available. A nation's wealth is measured in terms of the road and airway facilities available. There are three modes of transportation—land, water and air⁶. This specialization deals with the design, construction and **execution** of the communication routes.

The different branches of transportation engineering include the following: Highway engineering deals with the planning and designing of roads, railway engineering deals with the railway tracks, **harbour engineering** deals with the harbours and **airport engineering** deals with the airport.

5. Water Supply, Sanitary and Environmental Engineering

Without food man can survive for days but not without water⁷. The responsibility of providing **potable (drinking) water** to the public and disposing the waste water safely is that of a civil engineer. The sources of water are **precipitation** and underground water.

Water supply engineering deals with the location and collection of water, its treatment methods, tests for standard limits and efficient supply of water.

Used water, solid wastes, toxic wastes, etc. can not be disposed directly since these affect the environment. Hence these have to be treated and tested for the standard limits and then disposed. **Sanitary engineering** deals with the collection of used water, their treatment methods and effective disposal which **safeguards** the whole world. The natural and artificial wastes generated and released into the atmosphere have upset the natural equilibrium. **Anthropogenic** or human-induced pollutants have overloaded the system⁸.

The role of an environmental engineer is to build a bridge between biology and technology by applying all the techniques to the job of cleaning the debris⁹. Environment engineering deals with the methods of protecting the environment from the delete-

rious effects of human activity, which would result in the improvement of environmental quality for the well being of mankind¹⁰.

6. Irrigation Engineering

Irrigation maybe defined as the process of supplying water by man-made methods for the purpose of land cultivation. Irrigation engineering includes the study and design of works related to the control of river water and the drainage of **waterlogged** areas. Thus, irrigation engineering deals with the controlling and harnessing of various resources of water, by constructing dams, reservoirs, canal, **head works** and distribution channels to the cultivable land.

7. Surveying, Leveling and Remote Sensing

Before starting any important civil engineering project, such as the construction of railways, highways, dams and buildings, it becomes necessary to have a detailed survey map showing accurate boundary of the project area. Surveying is defined an art of collecting data for mapping the relative positions of points on the surface of earth in a horizontal plane¹¹. **Leveling** is the process of determining the relative heights of the points on the surface of earth in a vertical plane.

The main purpose of the survey work is to prepare the plan of the object to be surveyed. Various instruments are used to measure and collect the necessary information to draw the plan. Remote sensing is the technique of obtaining the data about an area by taking **aerial photographs**. The intelligent **interpretation** gives a clear picture of the **terrain**.

New Words and Expressions

mill *n.* 碾, 水碾, 磨, 磨房

consideration *n.* 体谅, 考虑, 需要考虑的事项

play *vi.* 行为, 举动; *n.* 作用

cater *vi.* 备办食物, 满足 (需要)

shelter *n.* 掩蔽处, 掩蔽, 保护, 庇护所, 掩体; *vi.* 掩蔽, 躲避

pyramid *n.* 角锥, 棱锥, 金字塔

behaviour *n.* 行为, 举止, 习性, 性质, 特性, 特征

vein *n.* 血管, 静脉, 矿脉, 纹理

regulator *n.* 校准者, 调整器, 标准仪

turbine *n.* 涡轮, 涡轮机

execution *n.* 实行, 完成, 执行, 制作

precipitation *n.* 沉淀, 沉淀作用, 降雨, 降雨量, (雪, 雨) 降落

safeguard *n.* 安全装置, 安全措施; *vt.* 维护, 保护, 捍卫

anthropogenic *adj.* 人类的, 人类学的, 人类学上的

deleterious *adj.* 有害的, 有毒的

waterlogged *adj.* 水涝的, (木材等)