21世纪
高等学校
本科系列教材

2002年全国大学版协优秀畅销书

土木工程专业英语

Tumu Gongcheng Zhuanye Yingyu

田文玉　主编
杨全红　主审

重庆大学出版社

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内 容 提 要

本书收集了土木工程材料、道路设计、道路施工、桥梁工程、房屋建筑工程、交通工程、工程招标、工程合同、工程监理以及科技文章写作等有关英文资料，目的是让学生通过学习，能够尽可能多地掌握与本专业有关的英文术语，为日后在工作中查阅英文资料打下基础。

本书适合土木工程专业的本科学生学习使用。

图书在版编目(CIP)数据

土木工程专业英语/田文玉主编. —重庆：重庆大学出版社，2005.8

(土木工程本科系列教材)

ISBN 7-5624-3460-3

Ⅰ.土… Ⅱ.田… Ⅲ.土木工程—英语—高等学校—教材 Ⅳ.H31

中国版本图书馆 CIP 数据核字(2005)第 080198 号

土木工程专业英语

田文玉 主编

杨全红 主审

责任编辑：谭 敏 版式设计：谭 敏

责任校对：李定群 责任印制：秦 梅

*

重庆大学出版社出版发行

出版人：张鸽盛

社址：重庆市沙坪坝正街 174 号重庆大学(A 区)内

邮编：400030

电话：(023) 65102378 65105781

传真：(023) 65103686 65105565

网址：http://www.cqup.com.cn

邮箱：fxk@cqup.com.cn (市场营销部)

全国新华书店经销

重庆升光电力印务有限公司印刷

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开本：787×1092 1/16 印张：10.25 字数：256 千

2005 年 8 月第 1 版 2005 年 8 月第 1 次印刷

印数：1—4 000

ISBN 7-5624-3460-3 定价：15.00 元

前言

专业英语是大学中英语教学的一个重要组成部分，是学生从普通英语学习到将英语用到实际工程中的一个有效过渡。本着覆盖面广、知识面宽、信息量大的原则，《土木工程专业英语》充分结合土建专业特点，收集了土木工程材料、道路设计、道路施工、桥梁工程、房屋建筑工程、交通工程、工程招标、工程合同、工程监理以及科技文章写作等有关英文资料，目的是让学生通过学习，能够尽可能多地掌握与本专业有关的英文术语，为日后在工作中查阅英文资料打下基础。

《土木工程专业英语》共25个UNITS，每一个UNIT包含Text A和Text B两部分。不同专业方向可根据自身专业特点选择使用。

全书由田文玉主编，杨全红主审。其中UNIT 7 Text B、UNIT 8 Text B、UNIT 9 Text A由王燕编写，UNIT 1 Text B、UNIT 5 Text B、UNIT 6 Text A及Text B、UNIT 7 Text A由郑智能编写，其余部分由田文玉编写。全书由田文玉负责统稿。

由于编者水平有限，时间仓促，书中不足之处，恳请读者指出，以利于今后改进。

编 者

2005年6月

Contents

UNIT 1

Text A Careers in Civil Engineering

Engineering is a profession, which means that an engineer must have a specialized university education. Many government jurisdictions also have licensing procedures which require engineering graduates to pass an examination, similar to the examination for a lawyer, before they can actively start on their careers.

In the university, mathematics, physics, and chemistry are heavily emphasized throughout the engineering curriculum, but particularly in the first two or three years. Mathematics is very important in all branches of engineering, so it is greatly stressed. Today, mathematics includes courses in statistics, which deals with gathering, classifying, and using numerical data, or pieces of information. An important aspect of statistical mathematics is probability, which deals with what may happen when there are different factors, or variables, that can change the results of a problem. Before the construction of a bridge is undertaken, for example, a statistical study is made of the amount of traffic the bridge will be expected to handle. In the design of the bridge, variable such as water pressure on the foundation, impact, the effects of different wind forces, and many other factors must be considered.

Because a great deal of calculation is involved in solving these problems, computer programming is now included in almost all engineering curricula. Computers, of course, can solve many problems involving calculations with greater speed and accuracy than a human being can. But computers are useless unless they are given clear and accurate instructions and information—in other words, a good program.

In spite of the heavy emphasis on technical subjects in the engineering curriculum, a current trend is to require students to take courses in the social science and the language arts. The relationship between engineering and society is getting closer; it is sufficient, therefore, to say again that the work performed by an engineer affects society in many different and important ways that he

or she should be aware of. An engineer also needs a sufficient command of language to be able to prepare reports that are clear and, in many cases, persuasive. An engineer engaged in research will need to be able to write up his or her findings for scientific publications.

The last two years of an engineering program include subjects within the student's field of specialization. For the student who is preparing to become a civil engineer, these specialized courses may deal with such subjects as geodetic surveying, soil mechanics, or hydraulics.

Active recruiting for engineers often begins before the student's last year in the university. Many different corporation and government agencies have competed for the services of engineers in recent years. In the science-oriented society of today, people who have technical training are, of course, in demand. Young engineers may choose to go into environmental or sanitary engineering, for example, where environmental concerns have created many openings; or they may choose construction firms that specialize in highway work; or they may prefer to work with one of the government agencies that deal with water resource. Indeed, the choice is large and varied.

When the young engineer has finally started actual practice, the theoretical knowledge acquired in the university must be applied. He or she will probably be assigned at the beginning to work with a team of engineers. Thus, on-the-job training can be acquired that will demonstrate his or her ability to translate theory into practice to the supervisors.

The civil engineer may work in research, design, construction supervision, maintenance, or even in sales or management. Each of these areas involves different duties, different emphases, and different uses of engineer's and also the development and testing of new structural materials.

Civil engineering projects are almost always unique; each has its own problems and design features. Therefore, careful study is given to each project even before design work begins. The study includes a survey both of topography and subsoil features of the proposed site. It also includes a consideration of possible alternatives, such as a concrete gravity dam or an earth-fill embankment dam. The economic factors involved in each of the possible alternatives must also be weighed. Today, a study usually includes a consideration of the environmental impact of the project. Many engineers, usually working as a team that includes surveyors, specialists in soil mechanics, and experts in design and construction, are involved in making these feasibility studies.

Many civil engineers, among them the top people in the field, work in design. As we have seen, civil engineers work on many different kinds of structures, so it is normal practice for an engineer to specialize in just one kind. In designing buildings, engineers often work as consultants to architectural or construction firms. Dams, bridges, water supply systems, and other large projects ordinarily employ several engineers whose work is coordinated by a system engineer who is in charge of the powerhouse and its equipment. In other cases, civil engineers are assigned to work on a project in another field; in the space program, for instance, civil engineers were necessary in the design and construction of such structures as launching pads and rocket storage facilities.

Construction is a complicated process on almost all engineering projects. It involves scheduling the work and utilizing the equipment and the materials so that costs are kept as low as possible. Safety factor must also be taken into account, since construction can be very dangerous. Many civil

engineers therefore specialize in the construction phase.

Words and Expressions

specialized *a.* 专业的,专门的
jurisdiction *n.* 管辖权,权限
curriculum *n.* 课程,学习计划
probability *n.* 概率
variable *n.* 变量
persuasive *a.* 有说服力的
geodetic *n.* 大地测量学
hydraulics *n.* 水力学
recruit *v.* 招聘,征募新人
demonstrate *v.* 展示,演示
topography *n.* 地形学
subsoil *n.* 地基下层土
gravity *n.* 重力,地心引力
geodetic surveying 大地测量
soil mechanics 土力学
feasibility study 可行性研究
consultant *n.* 咨询师,顾问
coordinate *v.* 合作
system engineer 系统工程师
launching pads (火箭等的)发射台
schedule *v.* 订计划
construction phase 施工阶段

Notes

①the bridge will be...:为定语从句,省略了关系代词"which"。

②It is sufficient, therefore, to say...:句中,it 为形式主语,to say 为真实主语,that the work... 为宾语从句,that he or she... 为定语从句,修饰 ways。

Text B The Field in Civil Engineering

From the pyramids of Egypt to the space station Freedom, civil engineers have always faced the challenges of the future-advancing civilization and building our quality of life.

Today, the world is undergoing vast changes—the technological revolution, population growth,

environmental concerns, and more. All create unique challenges for civil engineers of every specialty. The next decades will be the most creative, demanding, and rewarding of times for civil engineers, and now is the best time to find the right career for you.

Today, civil engineers are in the forefront of technology. They are the leading users of sophisticated high-tech products-applying the very latest concepts in computer-aided design (CAD) during design, construction, project scheduling, and cost control.

Civil engineering is about community service, development, and improvement—the planning, design, construction, and operation of facilities essential to modern life, ranging from transit systems to offshore structures to space satellites. Civil engineers are problem solvers, meeting the challenges of pollution, traffic congestion, drinking water and energy needs, urban redevelopment, and community planning.

Our future as a nation will be closely tied to space, energy, the environment, and our ability to interact with and compete in the global economy. You, as a civil engineer, will perform a vital role in linking these themes and improving quality of life for the 21st century. As the technological revolution expands, as the world's population increases, and as environmental concerns mount, your skills will be needed. There is no limit to the personal satisfaction you will feel from helping to make our world a better place to live. Whatever area you choose, be it design, construction, research, teaching, or management, civil engineering offers you a wide range of career choices for your future. Civil Engineering is grouped into seven major divisions of engineering: Structural; Environmental; Geotechnical; Water Resources; Transportation; Construction; and Urban Planning. In practice, these are not always hard and fixed categories, but they offer a helpful way to review a very diverse and dynamic field.

Structural

As a structural engineer, you will face the challenge of designing structures that support their own weight and the loads they carry, and that resist wind, temperature, earthquake, and many other forces. Bridges, buildings, offshore structures, space platforms, amusement park rides, and many other kinds of projects are included within this exciting discipline. You will develop the appropriate combination of steel, concrete, as visit the project site to make sure the work is done properly.

Environmental

The skills of environmental engineers are becoming increasingly important as we attempt to protect the fragile resources of our planet. Environmental engineers translate physical, chemical, and biological processes into systems to destroy toxic substances, remove pollutants from water, reduce non-hazardous solid waste volumes, eliminate contaminates from the air, and develop groundwater supplies. In this field, you may be called upon to resolve issues of providing safe drinking water, cleaning up sites contaminated with hazardous materials, disposing of wastewater, and managing solid wastes.

Geotechnical

Geotechnical engineering is required in all aspects of civil engineering, because most projects are supported by the ground. As a geotechnical engineer, you might develop projects below ground, such as tunnels, foundations, and offshore platforms. You will analyze the properties of soil and rock that support and affect the behavior of these structures. You may evaluate the potential settlements of buildings, the stability of slopes and fills, the seepage of ground water and the effects of earthquakes. You will investigate the rocks and soils at a project site and determine the best way to support a structure in the ground. You may also take part in the design and construction of dams, embankments, and retaining walls.

Water Resources

Water is essential to our lives, and as a water resources engineer, you will deal with issues concerning the quality and quantity of water. You will work to prevent floods, to supply water for cities, industry, and irrigation, to treat wastewater, to protect beaches, or to manage and redirect rivers. You might be involved in the design, construction, or maintenance of hydroelectric power facilities, canals, dams, pipelines, pumping stations, locks, or seaport facilities.

Transportation

Because the quality of a community I directly related to the quality of its transportation system, your function as a transportation engineer will be to move people, good, and materials safely and efficiently. Your challenge will be to find ways to meet our everincreasing travel needs on land, air, and sea. You will design, construct, and maintain all types of transportation facilities, including highways, railroads, airfields, and ports. An important part of transportation engineering is to upgrade our transportation capability by improving traffic control and mass transit systems, and by introducing high-speed trains, people movers, and other new transportation methods.

Construction

As a construction engineer, you are the builder of our future. The construction phase of a project represents the first tangible result of design. Using your technical and management skills will allow you to turn designs into reality—on time and within budget.

You will apply your knowledge of construction methods and equipment, along with the principles of financing, planning, and managing, to turn the designs of other engineers into successful projects.

Urban Planning

As a professional in this area, you will be concerned with the entire development of a community. Analyzing a variety of information will help you coordinate projects, such as projecting street patters, identifying park and recreation areas, and determining areas for industrial and

residential growth. To ensure ready access to your community, coordination with other authorities may be required to integrate freeways, airports, and other related facilities. Successful coordination of a project will require you to be people-oriented as well as technically knowledgeable.

Words and Expressions

forefront *n.* 最前部,最前线,最活动的中心
structural *a.* 结构的,建筑的;结构,构造
environmental *a.* 周围的,环境的
geotechnical *a.* 岩土的
water resources 水资源
transportation *n.* 交通,运输
urban planning 城市规划

UNIT 2

Text A Development of Roads

When we speed along a modern highway, we rarely stop to think what it is we are riding on[①]. To understand what a road is, we must study the ways in which people have traveled in the past.

The very first roads were really tracks beaten in the ground by wild animals in prehistoric time. People followed these winding trails because they provided an easy and quick way to get through thick forests. In time, people began to improve the paths by filling holes with earth and laying logs across soft, boggy spots. These attempts were crude, but they were the beginning of road construction.

As people began to transport goods over longer distances, they developed new ways of traveling. First they packed their wares on animals. Then they invented various kinds of sleds. Finally, after the invention of the wheel, they built wagons. Each advancement brought a need for better traveling routes.

Later in history, when well-traveled routes were made sturdier with rocks and stones, the path was raised above the surrounding land, it became a "high way".

The great civilization throughout history were also the great road builders[②]. Roads were necessary to control and extend empires, to permit trade and travel, and to move armies.

Most of these early roads were simply hard-packed dirt, but some were paved with stone blocks or burnt bricks.

The Romans bound their empire together with an extensive system of roads radiating in many directions from Rome. Some of these early roads were of elaborate construction. For example, an Appian Way[③], built southward about 312 BC, illustrates one of the procedures used by the Romans. First a trench was excavated to such a depth that the finished surface would be at ground level. The pavement was placed in three courses: a layer of small broken stones, a layer of small stones with mortar and firmly tamped into place, and a wearing course of massive stone blocks, set

and bedded in mortar. Some of the Roman roads are still in existence today. And many modern highways follow the ancient Roman routes.

Few roads were built during the early history of the United States since most of the early settlements were connected with the nearest wharf, but the connecting road usually was just a clearing through the forest. Before the Revolutionary War, travel was mainly on foot or horseback, and roads were merely trails clearing to greater width. Development was extremely slow for a time after the war's end in 1783.

Between 1795 and 1830 numerous turnpikes, particularly in the northeastern states, were built by companies organized to gain profits through toll collections. Few of them were financially successful. During this period many stagecoach lines and freight-hauling companies were organized.

The extension of turnpikes in the United States was abruptly halted by the development of the railroads. In 1830 Peter Cooper constructed America's first steam locomotive, the Tom Thumb, which at once demonstrated its superiority over horse-drawn vehicles. Rapid growth of the railroad for transportation over long distances followed. Cross-country turnpike construction practically ceased, and many already completed fell into disuse. Rural roads served mainly as feeders for the railroads; improvements primarily led to the nearest railroad station and were made largely by local authorities and were to low standards. When it rained, the roads were slippery, and in dry weather they were dusty. People using horses and wagons accepted this. But with the beginning of the 20th century a new invention, the automobile, began to take over the road. The first two decades of the twentieth century saw the improvement of the motor vehicle from a "rich man's toy" to a fairly dependable method for transporting persons and goods. There were strong demands not only from farmers but from bicyclists through the League of American Wheelmen④ for rural road improvement, largely for roads a few miles in length connecting outlying farms with towns and railroad stations. This development has been aptly described as "getting the farmer out of the mud".

From 1920 to 1935, highway development was focused primarily on the completion of a network of all-weather rural roads comparable to the street systems undertaken by local governments. By 1935 highway activities in rural areas have been devoted mainly to an attempt to provide facilities of highway standards and with greater capacity and load-carrying ability. During the same period, increasing attention has been focused on urban area, which have been struck simultaneously by rapidly increasing population, however population densities resulting from a "flight to the suburbs", and a shift from mass transportation to the private automobile. Indications are that only minor additions to road mileage will be made in the future.

New Words and Expressions

track *n.* 踪迹,小径
beat tracks 开辟路径
prehistoric *a.* 史前的
trail *n.* 足迹,小路

boggy *a.* 多沼泽的
crude *a.* 粗糙的,不精细的
wares *n.* (复数)货物,商品
sled *n.* 雪橇,雪车(以木质或金属长条代轮之交通工具)
wagons *n.* 四轮运货马(或牛)车
sturdy *a.* 结实的,坚固的
radiate *v.* 向各方伸展,辐射
elaborate *a.* 精细的,复杂的
trench *n.* 沟,沟渠
excavate *v.* 挖掘
mortar *n.* 砂浆,胶泥
tamp *v.* 捣固,夯实
settlement *n.* 新殖民地,定居点,居民点
bay *n.* 海湾
wharf *n.* 码头
clearing *n.* 开辟出来的空地
turnpike *n.* (泛指)公路
stagecoach *n.* 公共马车
freight *n.* 货物,货运
haul *v.* 搬运,拖运
locomotive *n.* 机车,火车头
cross-country *a.* 越野的
feeder *n.* 支线
motor-vehicle 机动车,汽车
outlying *a.* 远离中心的,地处郊区的
apt *a.* 恰当的,巧妙的
simultaneous *a.* 同时的,同时发生的
mileage *n.* 里程,英里数
in time 过了一段时间以后
well-traveled routes 经常行走的路线
hard-packed dirt 压紧或夯实的土
wearing course 磨(耗)损层
toll-collections 征收路税,收取过路费
all-weather roads 晴雨通车路,全天(年)候道路
tamp into place 夯实到位
take over 接管,控制
load-carrying ability 运载能力
mass transportation 公共交通

Notes

①... what it is we are riding on... 我们是在什么上面驾车行驶。这是强调句型 it is... that...，句中被强调部分是疑问词 what，关系代词 that 被省去了。例如：You don't know what it is (that) you are doing. It's a mischief!

②本句不宜直译为"历史上伟大的文明也是伟大的道路建设者"，可意译为"历史上伟大的文明时期都是道路的大发展时期"或者"在人类历史上，文明昌盛之时即道路大发展之期"。

③是古罗马最著名的大道，建于公元前 312 年，全长 350 多公里，其主干部分保留至今。公元 1784 年，罗马教皇庇护六世修建了新的 Appian Way，由罗马通向 Albano，与旧大道平行。

④the League American Wheelmen　美国驾车人联合会。

Text B　Return To the Turnpikes

Toll roads, *or turnpikes*, which charge a fee for use, have became important again in the better roads movement. This is the second time they have appeared in America. They were first introduced in Europe during the late 18th century when roads were privately owned and fees collected for using the roads. Poles armed with sharp spikes called pikes stopped the traveler at toll stations. The poles were turned aside after payment, hence the term *turnpike*.

Turnpike were first introduced into America in 1785. By 1850 there were over 400 in New York State alone. They were the first improved roads in this country. For one type of surface, trunks of tree were placed across the roads and allowed to settle into the roadbed. These were called "corduroy" road.

Some turnpikes were faced with wooden planks. First used in Russia, they were introduced into North America by Sir Charles Edward, governor general of Canada. He built a few miles of plank road near Toronto in 1836. The first plank road in the United States was built in 1845-1846 from Syracuse, N. Y., to Oneida Lake, a distance of about 14 miles.

Most of the turnpikes were between the large cities, such as the Lancaster Turnpike between Philadelphia and Lancaster, Pennsylvania. It was built between 1790 and 1794 and was the first important *macadamized* road in America.

A Scottish engineer, John L. MacAdam (1756—1836), devised the road surface which bears his name. It was made of loosely packed broken stone using water as a binder. Today macadamized surfaces are generally mixed (impregnated) with hot asphalt, tar, or some similar binder. This type of road surface is called *bituminous macadam*.

Turnpike fell into disuse by the middle of the 19th century. The railroad had arrived and proved to be a better means of travel over long distances. Canals too took passenger and freight business from the turnpikes.

The Pennsylvania Turnpike, which was opened in 1940, was the first of the modern turnpikes.