交通职业教育教学指导委员会推荐教材
高职高专院校道路桥梁工程技术专业教学用书

高等职业教育规划教材

专业英语

主编 郭 霞 主审 薛廷河

人民交通出版社
China Communications Press

交通职业教育教学指导委员会推荐教材
高职高专院校道路桥梁工程技术专业教学用书

高等职业教育规划教材

专 业 英 语

Zhuanye Yingyu

主编 郭 霞
主审 薛廷河

人民交通出版社

内 容 提 要

本书是交通职业教育教学指导委员会推荐教材，由路桥工程学科委员会组织编写。全书共分15个单元，课文和阅读材料均选自英文原版书刊，内容涵盖了公路与桥梁工程设计、施工、管理和养护方面常用的专业词汇及专业知识。

本书是高职高专院校道路桥梁工程技术专业教学用书，也可供相关专业教学使用，或作为有关专业继续教育及职业培训教材。

图书在版编目（CIP）数据

专业英语/郭霞主编．—北京：人民交通出版社，2005.7

ISBN 7-114-05613-3

Ⅰ.专… Ⅱ.郭… Ⅲ.①道路工程-英语-高等学校：技术学校-教材②桥梁工程-英语-高等学校：技术学校-教材 Ⅳ.H31

中国版本图书馆CIP数据核字（2005）第066802号

书　　名：专业英语
著 作 者：郭　霞
责任编辑：富砚博
出版发行：人民交通出版社
地　　址：(100011)北京市朝阳区安定门外外馆斜街3号
网　　址：http://www.ccpress.com.cn
销售电话：(010)85285838,85285995
总 经 销：北京中交盛世书刊有限公司
经　　销：各地新华书店
印　　刷：北京牛山世兴印刷厂
开　　本：787×1092　1/16
印　　张：12.75
字　　数：320千
版　　次：2005年8月第1版
印　　次：2005年8月第1次印刷
书　　号：ISBN 7-114-05613-3
印　　数：0001～5000册
定　　价：23.00元

交通职业教育教学指导委员会
路桥工程学科委员会

出版说明

CHUBAN SHUOMING

为深入贯彻落实《高等教育面向21世纪教学内容和课程体系改革计划》及全国普通高等学校教学工作会议的有关精神，深化教育教学改革，提高道路桥梁工程技术专业的教学质量，按照教育部"以教育思想、观念改革为先导，以教学改革为核心，以教学基本建设为重点，注重提高质量，努力办出特色"的基本思路，交通职业教育教学指导委员会路桥工程学科委员会在总结教育部路桥专业教学改革试点的6所交通高职高专院校办学实践经验的基础上，经过反复调研和讨论，制定了三年制"高职高专院校道路桥梁工程技术专业教学指导方案"，随后又组织全国20多所交通高职高专院校道路桥梁工程技术专业的教师编写了18门课程的规划教材。

本套教材依据教育部对高职高专人才培养目标、培养规格、培养模式及与之相适应的知识、技能、能力和素质结构的要求进行编写。为使教材中所阐述的内容反映最新的技术标准和规范，路桥工程学科委员会还组织有关人员参加了新技术和新规范学习班。

按照2004年10月路桥工程学科委员会所确定的编写原则，本套教材力求体现如下特点：

1. 结构合理性。按照道路桥梁工程技术专业以培养技能型人才为主线的要求，对传统的专业技术基础课和专业课程进行了整合，教材的体系设计合理，循序渐进，符合学生心理特征和认知及技能养成规律。所编写的教材更适合高职教育的特点，强调现代教学技术应用的需要和教学课件的应用，以节省教学成本和提高教学效果。每章列有教学要求、本章小结和复习思考题，便于学生学习本章核心内容。

2. 知识实用性。体现以职业能力为本位，以应用为核心，以实用、实际、实效为原则，紧密联系生活、生产实际，及时反映现阶段公路交通行业发展和公路交通科技进步对道路桥梁工程技术专业人才的需要，采用最新的技术标准、规范和规程。加强教学针对性，与相应的职业资格标准相互衔接。在内容的取舍方面，在以适应当前工作岗位群实际需要为主基调的同时，为将来的发展趋势留有接口。

3. 职业教育性。渗透职业道德和职业意识教育，体现就业导向，有助于学生树立正确的择业观。教材中所选编的习题、例题，均来自工程实际，不仅代表性强，而且对解决实际问题具有较强的针对性。在教材编写中注重培养学生爱岗敬业、团队精神和创业精神，树立安全意识和环保意识。

4. 使用灵活性。本套教材体现了教学内容弹性化，教学要求层次化，教材结构模块化，

有利于按需施教，因材施教。

《专业英语》是高职高专院校道路桥梁工程技术专业规划教材之一，内容涵盖了公路与桥梁工程设计、施工、管理和养护方面常用的专业词汇及专业知识。

参加本书编写工作的有：内蒙古大学职业技术学院郭霞（编写第一至第七单元），河南交通职业技术学院王穗平（编写第八至第十一单元），重庆交通学院应用技术学院汪贵平（编写第十二至第十五单元）。全书由郭霞担任主编，浙江交通职业技术学院薛廷河担任主审。

本套教材是路桥工程学科委员会委员及长期从事道路桥梁工程技术专业教学与工程实践的教师们工作经验的总结。但是，随着各项改革的逐步深化，书中难免有错误之处，敬请广大读者批评指正。

本套教材在编写过程中，得到了交通职业教育教学指导委员会的关心与指导，全国各交通职业技术学院的领导也给予了大力支持，在此，向他们表示诚挚的谢意。

交通职业教育教学指导委员会
路桥工程学科委员会
2005年5月

目 录
MULU

Unit 1

TEXT

Mix Design

Introduction

In a hot-mix asphalt paving mixture, asphalt and aggregate are blended together in precise proportions. The relative proportions of these materials determine the physical properties of the mix, and ultimately, how the mix will perform as a finished pavement. There are two commonly-used design methods for determining suitable proportions of asphalt and aggregate in a mixture. They are the Marshall Method and the Hveem Method.

Both design methods are widely used for the design of hot-mix paving. The selection and use of either of these mix design methods is principally a matter of engineering preference, since each method has certain unique features and advantages. Either method can be used with satisfactory results.

Mixture Characteristics and Behavior

When a sample paving mixture is prepared in the laboratory, it can be analyzed to determine its probable performance in a pavement structure. The analysis focuses on four characteristics of the mixture and the influence those characteristics are likely to have on mix behavior. The four characteristics are:

Mix density;

Air voids;

Voids in the mineral aggregate;

Asphalt content.

1. Mix Density

The density of the compacted mix is its unit weight (the weight of a specific volume of mix). Density is particularly important to the inspector, because high density of the finished pavement is essential for lasting pavement performance①.

In mix design testing and analysis, density of the compacted specimen is usually expressed in pounds per cubic foot (lb/ft^3) or kilograms per cubic meter (kg/m^3). It is calculated by multiplying the bulk specific gravity of the mix by the density of water [62.416 lb/ft^3 (1,000 kg/m^3)]. The density determined in the laboratory becomes the standard by which density of the finished pavement is determined to be adequate or inadequate. Because on-site compaction rarely can achieve the densities achieved by standard laboratory compaction methods, specifications usually require pavement density to be a percentage of laboratory density.

2. Air Voids

Air voids are small air spaces or pockets of air that occur between the coated aggregate particles in the final compacted mix. A certain percentage of air voids is necessary in all dense-graded highway mixes to allow for some additional pavement compaction under traffic and to provide spaces into which small amounts of asphalt can flow during this subsequent compaction②. The allowable percentage of air voids (in laboratory specimens) is between 3 percent and 5 percent for surface courses and base courses, depending on the specific design.

The durability of an asphalt pavement is a function of the air-void content. The reason for this is the fact that the lower the air voids, the less permeable the mixture becomes. Too high an air-void content provides passageways through the mix for the entrance of damaging air and water. Too low a voids content, on the other hand, can lead to flushing, a condition in which excess asphalt squeezed out of the mix to the surface.

Density and void content are directly related. The higher the density, the lower the percentage of voids in the mix, and vice versa. Job specifications usually require pavement density that allows as low an air void contents as is practical, preferably less than 8 percent.

3. Voids in Mineral Aggregate

Voids in the mineral aggregate (VMA) are the air-void spaces that exist between the aggregate particles in a compacted paving mixture, including spaces filled with asphalt③.

VMA represents the space that is available to accommodate the effective volume of asphalt (i. e., all of the asphalt except the portion lost by absorption into the aggregate) and the volume of air voids necessary in the mixture. The more VMA in the dry aggregate, the more space is available for the films of asphalt. Based on the fact that the thicker the asphalt film on the aggregate particles the more durable the mix, specific minimum requirements for VMA are recommended and specified as a function of the aggregate size. Table 1.1 presents specific requirements.

Minimum VMA values should be adhered to so that a durable asphalt film thickness can be achieved. Increasing the density of the gradation of the aggregate to a point where below-minimum VMA values are obtained leads to thin films of asphalt and a dry-looking, low durability mix. Therefore, economizing in asphalt content by lowing VMA is actually counter-productive and detrimental to pavement quality.

4. Asphalt Content

The proportion of asphalt in the mixture is critical and must be accurately determined in the la-

Table 1.1 **Voids in Mineral Aggregate** (VMA Requirements)

Minimum Percent Voids in Mineral Aggregate (VMA)		
U.S.A. Standard Sieve Designation	Nominal Maximum Particle Size (in.)	Minimum Voids in Mineral Aggregate (percent)
1.18 mm (No.16)	0.0469	23.5
2.36 mm (No.8)	0.093	21
4.74 mm (No.4)	0.187	18
9.5 mm (3/8 in.)	0.375	16
12.5 mm (1/2 in.)	0.5	15
19.0 mm (3/4 in.)	0.75	14
25.0 mm (1 in.)	1.0	13
37.5 mm (1 1/2 in.)	1.5	12
50mm (2 in.)	2.0	11.5
63 mm (2 1/2 in.)	2.5	11

boratory and then precisely controlled on the job. The asphalt content for a particular mix is established by using the criteria (discussed later) dictated by whichever mix design method is being used.

The optimum asphalt content of a mix is highly dependent on aggregate characteristics such as gradation and absorptiveness. Aggregate gradation is directly related to optimum asphalt content. The finer the mix gradation, the larger the total surface area of the aggregate and the greater the amount of asphalt required to uniformly coat the particles. Conversely, because coarser mixes have less total aggregate surface area, they demand less asphalt.

New words and Expressions

1. asphalt['æsfælt]	*n.* 沥青
2. pave[peiv]	*v.* 铺(路等), 铺设
3. mixture['mikstʃə]	*n.* 混合, 混合物
4. aggregate['ægrigeit]	*n.* 骨料,集料;*v.* 聚集
5. precise[pri'sais]	*a.* 精确的, 准确的;*n.* 精确
6. proportion[prə'pɔːʃən]	*n.* 比例;*vt.* 使成比例
7. property['prɔpəti]	*n.* 所有权, 性质, 特性
8. engineering['endʒi'niəriŋ]	*n.* 工程(学)
9. feature['fiːtʃə]	*n.* 特征;*vi.* 起重要作用

10. density['densiti] *n.* 密度
11. void[vɔid] *n.* 空间;*a.* 空的
12. compact['kɔmpækt] *a.* 紧密的;*n.* 合同
13. inspect[in'spekt] *v.* 检查, 视察
14. specimen['spesimin] *n.* 范例, 标本
15. express[iks'pres] *a.* 急速的;*v.* 表达
16. bulk[bʌlk] *n.* 大批;*vt.* 显得重要
17. course[kɔːs] *n.* 进程, 课程
18. durability['djuərə'biliti] *n.* 经久, 耐久力
19. passageway['pæsidʒwei] *n.* 过道, 出入口
20. flush[flʌʃ] *a.* 泛滥的;*vi.* 奔涌
21. squeeze[skwiːz] *n.* 挤;*v.* 压榨, 挤
22. specification[ˌspesifi'keiʃən] *n.* 详述, 说明书, 规范
23. accommodate[ə'kɔmədeit] *vt.* 供应, 容纳
24. absorption[əb'sɔːpʃən] *n.* 吸收
25. recommend[rekə'mend] *vt.* 推荐, 介绍
26. adhere[əd'hiə] *vi.* 坚持;*v.* 坚持
27. gradation[grə'deiʃən] *n.* 分等级, 级配
28. economize[i(ː)'kɔnəmaiz] *v.* 节省, 有效地利用
29. coarse[kɔːs] *a.* 粗糙的
30. dense-graded 密级配
31. Marshall Method 马歇尔法
32. Hveem Method 维姆稳定仪法
33. base course 基层
34. optimum asphalt content 最佳沥青含量

Notes

① Density is particularly important to the inspector, because high density of the finished pavement is essential for lasting pavement performance. 全句可译为:因为成品路面的高密度对保持路面性能是必需的,因此,密度对检查员特别重要。

② A certain percentage of air voids is necessary in all dense-graded highway mixes to allow for some additional pavement compaction under traffic and to provide spaces into which small amounts of asphalt can flow during this subsequent compaction. 全句可译为:考虑到行车对路面的进一步压实,以及在这一后期压实过程中微量沥青有空间流动,各种密级配公路混合料中存在一定比例的气孔率(以百分率表示)是必要的。

③ Voids in the mineral aggregate (VMA) are the air-void spaces that exist between the aggregate particles in a compacted paving mixture, including spaces filled with asphalt. 全句可译为:矿

物集料的孔隙(VMA)是在压实的铺面混合料中的集料颗粒之间存在的空间,其中包括沥青所填充的空间。

Exercises

I. Translate the following into Chinese.

1. hot-mix asphalt paving mixture
2. Marshall Method
3. unique feature
4. pavement structure
5. mix density
6. air voids
7. voids in the mineral aggregate
8. asphalt content.
9. compacted mix
10. inspector
11. compacted specimen
12. on-site compaction
13. mineral aggregate
14. sieve designation
15. particle size

II. Translate the following into Chinese.

1. Properties of various asphalts and aggregates have a pronounced effect on the workability of mixes at different temperatures.
2. These properties, and the temperature of the mix at the time of compaction, must be considered when deciding on a compaction procedure.
3. Gradation, surface texture and angularity are primary aggregate characteristics that affect workability of the mix.
4. Similarly, a rough surface texture, as opposed to a smooth, glassy aggregate surface, results in a more stable mixture and requires greater compactive effort.
5. Natural sands are often added to mixes in the interests of economy. Too much sand, particularly in the middle particle sizes [around the 0.60mm mesh sieve (No. 30)] will result in tender mixes (mixes with high workability, but low stability). Tender mixes are easily over-stressed by heavy rollers and too much rolling.

III. Select the appropriate word(s) from the below to fill in the blank(s) of the sentence.

1. The density of the compacted mix is its ______(the weight of a specific volume of mix).
2. Too high an air-void content provides ______ through the mix for the entrance of damaging air and water.

3. Job specifications usually require pavement density that allows as low an ______ as is practical, preferably less than 8 percent.
4. The stability of a mixture depends on ______ and cohesion.
5. Generally, durability of a mixture can be enhanced by three methods. They are: using maximum ______ , using dense gradation of ______, and designing and compacting the mixture for maximum ______.
6. During road building, asphalt pavers or rollers must compact ______ while it is still hot in order to reach its final degree of density and specified properties.

a. asphalt content	b. stripping-resistant aggregate
c. unit weight	d. passageways
e. impermeability	f. internal friction
g. freshly laid asphalt	h. air void content

IV. Read the following passages carefully and then translate the underlined sentences into Chinese.

Introduction to Superpave

Superpave is a product of the Strategic Highway Research Program (SHRP). This research effort led to a new system for design of hot mix asphalt bases upon mechanistic concepts. The Superpave™ has been fully implemented by most of the state highway agencies. Superpave is an acronym for Superior Performing Asphalt Pavements. The superpave system accounts for materials characteristics in light of climatic and traffic conditions. Perhaps the most significant component of Superpave is its new asphalt binder grading system, which is designed to link with pavement performance. The superpave methodology is believed to be the best available at this time. However, it is an evolving methodology, and as such there are various asphalt characterization routines that are under consideration as future additions to the Superpave.

In-Vehicle Information System

The goal of in-vehicle information system (IVIS) technology is to increase the safety, mobility, efficiency, and convenience of the motoring public. Examples of these technologies include in-vehicle navigation/route-guidance systems, advanced traveler information system (ATIS), and collision-warning systems. While the deployment of these technologies will help to reduce the number of crashes and fatalities on our highways, there is some concern about the potential for these systems to add to the problem of driver distraction.

Driving a vehicle imposes a particular load on drivers' attentional resources. Attentional resources can be thought of as a pool from which all tasks and mental activities are drawn. These attentional resources are used to safely perform the primary tasks of driving the vehicle (which includes vehicle control, navigation, and hazard detection). Interaction with an IVIS can increase the load on these attentional resources, possibly interfering with the driver's ability to perform the primary task of driving. Therefore, the design characteristics of an IVIS affect not only the amount of driver attention needed for the IVIS, but also the amount available for the driving task.

READING MATERIAL

Properties Considered in Mix Design

Good hot-mix asphalt pavements function well because they are designed, produced and placed in such a way as to give them certain desirable properties. There are several properties that contribute to the quality of hot-mix pavements. They include stability, durability, impermeability, workability, flexibility, fatigue resistance and skid resistance.

Ensuring that a paving mixture has each of these properties is a major goal of the mix-design procedure. Therefore, the inspector should be aware of what each of the properties is, how it is evaluated, and what it means in terms of pavement performance.

Stability

Stability of an asphalt pavement is its ability to resist shoving and rutting under loads (traffic). A stable pavement maintains its shape and smoothness under repeated loading; an unstable pavement develops ruts (channels), ripples (washboarding or corrugation) and other signs of shifting of the mixture.

Because stability specifications for a pavement depend on the traffic expected to use the pavement, stability requirements can be established only after a thorough traffic analysis. Stability specifications should be high enough to handle traffic adequately, but not higher than traffic conditions require. Too high a stability value produces a pavement that is too stiff and therefore less durable than desired.

The stability of a mixture depends on internal friction and cohesion. Internal friction among the aggregate particles (interparticle friction) is related to aggregate characteristics such as shape and surface texture. Cohesion results from the bonding ability of the asphalt. A proper degree of both internal friction and cohesion in a mix prevents the aggregate particles from being moved past each other by the force exerted by traffic.

Durability

The durability of an asphalt pavement is its ability to resist factors such as changes in the asphalt (polymerization and oxidation), disintegration of the aggregate, and stripping of the asphalt films from the aggregate. These factors can be the result of weather, traffic, or a combination of the two.

Generally, durability of a mixture can be enhanced by three methods. They are: using maximum asphalt content, using dense gradation of stripping-resistant aggregate, and designing and compacting the mixture for maximum impermeability.

Maximum asphalt content increases durability because thick asphalt films do not age and harden as rapidly as thin ones do. Consequently, the asphalt retains its original characteristics longer. Also, maximum asphalt content effectively seals off a greater percentage of interconnected air voids in the pavement, making it difficult for water and air to penetrate. Of course, a certain percentage of air voids must be left open in the pavement to allow for expansion of the asphalt in hot weather.

Impermeability

Impermeability is the resistance of an asphalt pavement to the passage of air and water into or through it. This characteristic is related to the void content of the compacted mixture, and much of the discussion on voids in the design sections relates to impermeability. Even though void content is an indication of the potential for passage of air and water through a pavement, the character of these voids is more important than the number of voids. The size of the voids, whether or not the voids are interconnected, and the access of the voids to the surface of the pavement all determine the degree of impermeability.

Workability

Workability describes the ease with which a paving mixture can be placed and compacted. Mixtures with good workability are easy to place and compact; those with poor workability are difficult to place and compact. Workability can be improved by changing mix design parameters, aggregate source, and/or gradation.

Harsh mixtures (mixture containing a high percentage of coarse aggregate) have a tendency to segregate during handling and also may be difficult to compact. Through the use of trial mixes in the laboratory, additional fine aggregate and perhaps asphalt can be added to a harsh mix to make it more workable. Care should be taken to ensure that the altered mix meets all other design criteria.

New words and Expressions

1. stability[stə'biliti] *n.* 稳定性
2. impermeability *n.* 不渗透性
3. workability[ˌwəːkə'biliti] *n.* 可使用性
4. flexibility[ˌfleksə'biliti] *n.* 弹性,适应性
5. fatigue[fə'tiːg] *n.* 疲乏,疲劳,累活
6. skid[skid] *v.* (汽车轮)滑溜
7. shove[ʃʌv] *n.* 挤;*vt.* 猛推;*vi.* 推
8. smoothness ['smuːðnis] *n.* 平滑,光滑,平坦
9. ripple['ripl] *n.* 波纹;*v.* 起波纹
10. washboard['wɔʃbɔːd] *n.* 洗衣板;*a.* 搓板状的
11. corrugation[ˌkɔru'geiʃən] *n.* 起皱,皱状
12. shift[ʃift] *n.* 移动,移位,变化

13. segregate['segrigeit] *v.* 隔离，离析

Translating Skills

翻 译 简 介

1 翻译的实质

翻译是把一种语言(原语)所表达的信息用另一种语言(译语)表达出来。有了翻译这个工具,说不同语言的人们才能互相交往、互相了解。

各种语言分别具有其独特的形式,构成语言间的差异。因此,翻译中能直接对等地进行翻译的内容不多,大部分内容的翻译是通过不同的翻译方法和翻译手段来实现的。

2 翻译的过程

把原语表达的意思用另一种语言翻译出来,是由理解到表达的过程。在翻译过程中,理解是前提,只有正确地理解原文,才能正确地进行翻译。为了透彻地理解原文,译者往往需要借助工具书,根据上下文进行合乎逻辑的推断,避免理解错误。

【例 1】 This method of measurement is as simple as practical.

这种测量方法既简单又实用。

在翻译过程中,只有正确理解原文,用恰当的译语形式把原文的意思流畅地表达出来,才算完成了翻译的任务。

3 翻译的标准

关于翻译的标准,从翻译家严复提出的“信、达、雅”,到鲁迅先生的“信”与“顺”,一直到当前翻译界普遍接受的“忠实”和“通顺”,都强调了两个方面:一是保持被译语的全部语言内容;二是译文的语言符合译成语的规范标准,使译文具有可读性。

科技语体的基本特点是大量使用科技专业术语,语言标准、精练,逻辑严谨。因此,翻译强调准确无误,译文不得任意增删及发挥原有内容的含义。

4 翻译的方法

翻译的基本方法有两种, 即直译和意译。

4.1 直译

直译(literal translation)是在两种语言的结构体系比较接近的前提下,使译文的语句结构及语言色彩保持原文的形式,获得“原汁原味”的翻译效果。然而,无论语言之间的形式和内容如何相近,总会有一定的区别。因此,在直译过程中,不要求语言对等,必要时需进行词语