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全国职业技能英语系列教材

总主编 丁国声



*English for
Petroleum Engineering*

石油工程英语

郭凡 主编



北京大学出版社
PEKING UNIVERSITY PRESS

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ENGLISH FOR PETROLEUM ENGINEERING

石油工程英语

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总序

我国高职高专教育的春天来到了。随着国家对高职高专教育重视程度的加深,职业技能教材体系的建设成为了当务之急。高职高专过去沿用和压缩大学本科教材的时代一去不复返了。

语言学家 Harmer 指出:“如果我们希望学生学到的语言是在真实生活中能够使用的语言,那么在教材编写中接受技能和产出技能的培养也应该像在生活中那样有机地结合在一起。”

教改的关键在教师,教师的关键在教材,教材的关键在理念。我们依据《高职高专教育英语课程教学基本要求》的精神和编者做了大量调查,秉承“实用为主,够用为度,学以致用,触类旁通”的原则,历经两年艰辛,为高职高专学生编写了这套专业技能课和实训课的英语教材。

本套教材的内容贴近工作岗位,突出岗位情景英语,是一套职场英语教材,具有很强的实用性、仿真性、职业性,其特色体现在以下几个方面:

1. 开放性

本套教材在坚持编写理念、原则及体例的前提下,不断增加新的行业或岗位技能英语分册作为教材的延续。

2. 国际性

本套教材以国内自编为主,以国外引进为辅,取长补短,浑然一体。目前已从德国引进了某些行业的技能英语教材,还将从德国或他国引进优秀教材经过本土化后奉献给广大师生。

3. 职业性

本套教材是由高职院校教师与行业专家针对具体工作岗位、情景过程共同设计编写。同时注重与行业资格证书相结合。

4. 任务性

基于完成某岗位工作任务而需要的英语知识和技能是本套教材的由来与初衷。因此,各分册均以任务型练习为主。

5. 实用性

本教材注重基础词汇的复习和专业词汇的补充。适合于在校最后一学期的英语教学,着重培养和训练学生初步具有与其日后职业生涯所必需的英语交际能力。

本教材在编写过程中,参考和引用了国内外作者的相关资料,得到了北京大学外语编辑部的倾力奉献,在此,一并向他们表示敬意和感谢。由于本套教材是一种创新和尝试,书中瑕疵必定不少,敬请指正。

丁国声

教育部高职高专英语类专业教学指导委员会委员

河北省高校外语教学研究会副会长

河北外国语学院院长

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出版说明

本教材是在《全国职业技能英语系列教材》总主编、教育部高职高专英语教学指导委员会委员、河北外国语学院校长丁国声教授及北京大学出版社外语编辑部张冰主任的主持下,组织全国各地的二十余位英语教学专家讨论编写的,以服务职业培训为原则,将实用性、灵活性的理念融入具体的内容当中的一本技能教材。本教材是北京大学出版社出版的系列职业技能英语教材的一个部分,特点是注重职业仿真环境下工作语言情景的导入,让学生在了解岗位主要流程、工作内容、工作职责、相关知识、文化背景和职业操守的同时,达到能运用英语自如应对涉外工作的目的。

本书所选的职业岗位是石油工程(管道建设)中的一些涉外岗位,由系统内多年参加海外工程项目的专家,高、中级工程师杨会香、赵海鸿、史小波、高玉桂等同志反复商榷修改,吴春丽、赵亚平、唐江华、吴建中等同志给予了大力协助,在此表示衷心感谢。

此书的出版将填补本行业的空白,所涉及的内容具有非常强的实用性,可以为参与石油行业涉外工程的高级技术工人提供充分的语言保障,也可作为行业出国施工人员的培训教材。

由于时间仓促,错误在所难免,恳请广大读者批评指正。

编者

2008.3

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Unit 1



Pipeline Exploration and Design

管网勘探与设计

Look at the following activities involved in pipeline designing. Can you add more?

review of design process

document preparation

feasibility study

apparatus verification

responsibility

process design

process calculation

anti-corrosion engineering

electric design

cathodic protection

power supply

communication equipment operation

fire-fighting equipment

supervising control and data acquisition system

Now answer the following questions.



1. Can you sum up the above activities to two categories?
2. If you are a pipeline designer, what do you think is the most important quality in your job?
3. Suppose you are a worker dealing with process calculation, what tasks would you perform? How would you enrich your working experience?

VOCABULARY ASSISTANT

feasibility study 可行性研究
cathodic protection 阴极保护

data acquisition 数据采集
anticorrosion 防腐

Unit 1

Pipeline Exploration and Design

AIMS

- Preparation for Designing
- Execution of Designing



Part One Word Power

Find the definition in Column B which matches the word or expression in Column A.

A

1. pipeline flow diagram
2. field survey
3. mapping
4. seismicity of region
5. underground communication
6. working drawing
7. raw materials
8. maintenance
9. flow line
10. gathering line

B

- A means and apparatus of underground communicating
- B natural products which manufacturing processes turn into another
- C a pipeline running from the storage tanks in the field to a major pipeline
- D the repairing and protecting of pipelines
- E a pipeline running from a well to a larger line in the field
- F survey that is operated on the pipeline worksite
- G maps of pipeline construction
- H making a map of the field
- I factors of earthquake in a certain region
- J a diagram showing the development of a pipeline through different processes in a series

Part Two Listening

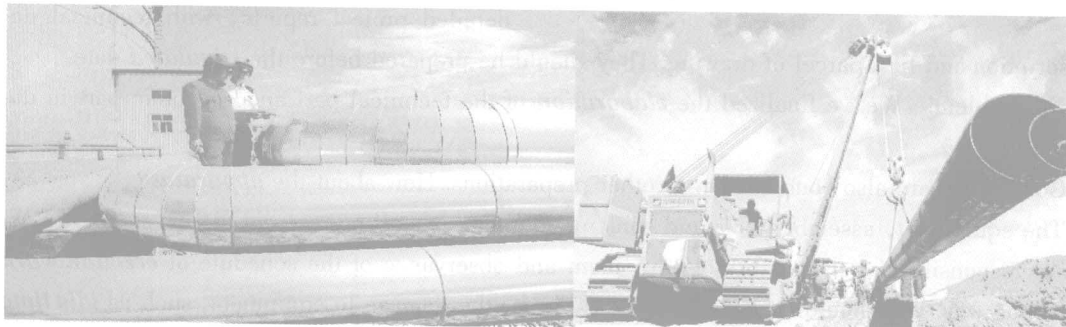
Listen to the following passage and fill in the blanks.

Oil and gas pipeline systems are
 1 for their 2 and low
 transportation cost. A number of studies
 of 3 efficiency have been made.
 The results vary widely. A recent more
 thorough investigation 4 that
 crude trunk lines 5 about 4.0% of the energy of the crude transported per 1,000 km.
 Products pipelines use about 0.5% of the energy of the 6 moved per 1,000. These rates
 are 7 with estimates of 0.8% for coal trains, 1.0% for oil movement by rail; 2.0% for
 natural gas pipelines; 3.2% for oil trucks; and 5.4% for coal trucks. Energy 8 for water
 transport is not known 9 but is estimated to be 0.8% for oil and 1.1% for coal. The study
 further indicates that 10 oil trunk lines consume about 250BTU/ton-mile.



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investigation 调查 crude trunk lines 原油干线
 products pipeline 成品油管线 estimate 估计
 consume 消耗



Part Three Dialogues

Design Limited Period

When prepare to design the working program, the time for carrying out design work is quite important. Look at the following cues, and try to make a dialogue with your partner.

1. As agreed between the parties, the date of receiving complete data should be the starting date for preparing the technical design.
2. In fact, since the time has been agreed upon, the design work will be prepared within 12 months.
3. The time also includes the period for the approval of design work, and we hope you take it into account.
4. Anyway, we'd like to ask you to consider the possibility of preparing the design work two months earlier.
5. We are well aware of your concern, but it is impossible.
6. We can assure you that there won't be any delay.

★ Dialogue One

The following is a discussion on limited period and other preparations between a designer and a proprietor. Read it carefully and answer the following questions.

(D=Designer P=Proprietor)

D: Now let's get down to the question of the time schedule for carrying out the design work.

P: As agreed between us, the date of receiving the complete data will be the starting date for preparing the technical design. However, could you prepare the design work one month earlier?

D: Well, it all depends. The design work is to be prepared within 12 months, including the approval period. We are well aware of your concern, but it's almost impossible...

P: I see. That's really difficult... We'd like your detailed project reports, with technical de-

scription and first parcel of drawing. They should be prepared before the **stipulated** date.

D: No problem! We've finalized the **elaboration** of the technical part and economic part in due time.

P: Good! We are also concerned with other preparations. How about the **apparatus**?

D: The equipment, assembly tools and construction materials all correspond to new standards. We are responsible for the quality of equipment and observance of the schedule of **erection work**. By the way, you shouldn't hold us responsible for the damage to equipment, such as **idle time**, unloading, maintenance and **preservation** of equipment.

P: I see. We will be in charge of it. And you should guarantee the safe, proper or **uninterrupted operation** of the equipment. Everything will be done on time.



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stipulated 规定的

apparatus 设备

idle time 停机[停歇,故障,中断运转]时间

uninterrupted operation 不间断运转

elaboration 详尽的细节

erection work 安装工作

preservation 保护,维护

Now answer the following questions according to the dialogue.

1. The design limited period is strictly scheduled; if one party wants to change it, how would they express their ideas?
2. What are necessary apparatuses for this project?
3. Why should both parties clarify their separate responsibilities?
4. Can you list other preparations for designing work?

★ Dialogue Two

● General Situation of Petroleum Pipeline

Two students are talking about the general situation of petroleum pipeline.

Jackson: Look at this picture...the pipeline is the main way to transport crude oil and products.

Jeremy: That's right! Pipelines have their own advantages, i.e. large transporting **capacity**; easy to manage; low energy consumption; short transporting distance; safe operation and low cost...

Jackson: I agree with you. Although pipelines are fit for **unidirectional fluid transportation** and less flexible than truck or **barge**, they still play an essential role in transportation. With developing **onshore** and **offshore** oil fields, the long-distance network is growing. Look at this!

Jeremy: Wow... so many types of pipelines!

Jackson: Generally speaking, pipelines fall into three parts—**gathering**, trunk or **transmission** and **distribution**. **Flow lines**, the first link in transporting chain from producing well to consumers, are used to gathering oil from individual wells for treatment and storage.

Jeremy: Oh, they look small and short, about two or three inches.

Jackson: Right! And the pressure in the pipe is low. The next link in the pipeline chain is gathering lines. They can transport oil from field processing and storage facilities to a large storage tank or tank farm. The tank farm accumulates oil and pumps into long-distance crude trunk line. Usually these gathering systems typically consist of lines ranging from 4 inches to 8 inches in diameter.

Jeremy: And... they operate at a high pressure?

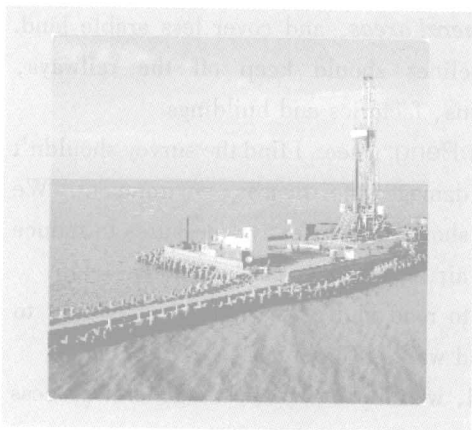
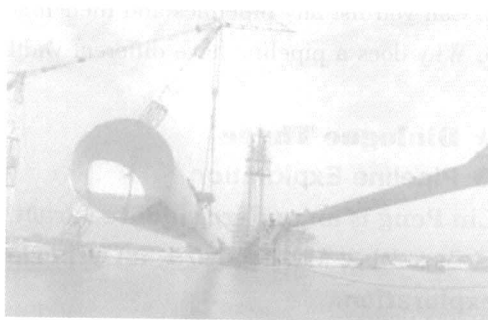
Jackson: Of course. The network of crude trunk lines **comprises** a wide variety of pipe sizes and capacities. Pumps are needed from the beginning to the end of trunk lines. So we can see pump stations for maintaining pipeline pressure.

Jeremy: Oh, I see. Look at this, some sections are wide, and some are narrow in one pipeline. Why are they different?

Jackson: They are designed to handle expected volumes. If new fields must be tied in by a new branch line, the capacity can be increased by installing more pump stations.

Jeremy: Good! I wonder how the pump station operates, too. Shall we discuss it next time?

Jackson: Ok. Thanks a lot!





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capacity 容量 unidirectional fluid transportation 单向流体运输 barge 驳船
 onshore 陆上的 offshore 海上的 gathering 集油(气)管网
 transmission 输油(气)干线管道 distribution 分配管网 flow line 出油(采气)管道
 comprise 包含

Answer the following questions according to the above dialogues.

1. What are the advantages and disadvantages of pipeline transportation?
2. Can you list any pipelines and their functions?
3. Why does a pipeline have different widths?

★ **Dialogue Three**

● **Pipeline Exploration**

Lin Peng is an undergraduate, practicing in a pipeline survey and design company. He's asking Mr. Steward, an experienced engineer, some questions about pipeline exploration.

Lin Peng: Morning, Mr. Steward. Are you free now?

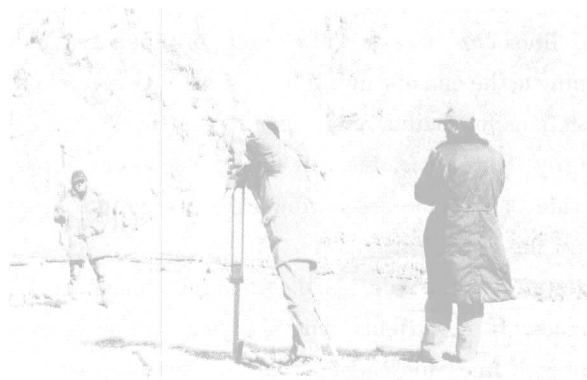
Mr. Steward: Yes. Can I help you?

Lin Peng: I'm not sure of some operations and rules about pipeline *exploration*. Will you give me some tips?

Mr. Steward: Of course. Go ahead!

Lin Peng: Well, there are a few principles to choose the route. Would you make it clear?

Mr. Steward: Mmm..., choosing the route plays a decisive role in pipeline survey. We should choose as straight as possible, with *slow slopes* and good construction conditions. Second, try to avoid intense earthquake sections and other *mineral areas*, and cover less arable land. Pipelines should keep off the railways, towns, factories and buildings.



Lin Peng: I see... I find the survey shouldn't damage the nearby environment. We should take effective measures to reduce air, water and noise pollution.

Mr. Steward: Exactly. And pipelines should be close to road and *grid*, because it is easy to supply power and materials. It also helps to repair and walk on pipelines.

Lin Peng: I will pay more attention to them. Mr. Steward, would you explain the general process in a survey?

Mr. Steward: Sure! The whole process is survey, *primary design* and *shop drawing reconnaissance*.

sance. Generally speaking, we should execute it step by step. Sometimes, survey and design are operated in turn.

Lin Peng: Then, what should we do first?

Mr. Steward: Before the survey, we must work out the plan and operation steps. To finish the plan, we have to collect lots of data about natural and economic conditions.

Lin Peng: Let me see... natural conditions are weather, geology and...

Mr. Steward: And *hydrology*, *hydrologic geology*, earthquake and so on. The economic conditions, such as traffic, power supply, large mines, labors and supplies of living necessities, should also be carefully watched and collected.

Lin Peng: Ah... I find the survey is a complex task and full of challenge, but we will be more cautious, patient and proud of working on it. Thank you very much, Mr. Steward.



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exploration 勘探 slowslope 缓坡 mineral area 矿区 grid 电网
primary design 初步设计 shop drawing 施工图 reconnaissance 勘察
hydrology 水文 hydrologic geology 水文地质

★ Dialogue Four

● Design of Gas Pipeline

Allen and Ricky are talking about design of gas pipeline.

Allen: Well, to calculate the gas flow in a pipeline, we have to account for so many *formulas*, like pressure effects, temperature, pipe diameter and length, specific gravity and...

Ricky: And pipe *roughness* and gas *deviation*.

Allen: You're right! I'm afraid I have to go over the steps to design gas pipeline!

Ricky: Actually I'm not sure, either. Why don't we turn to our experienced designer?

Allen: Sounds great! Let's go!

Allen and Ricky: Excuse me, Mr. Brown, would you please help us explain how to design gas pipelines?

Mr. Brown: Sure! Emm...An early step in gas pipeline or, say, gas *compressor* design, is analyzing the gas steam to be transported or compressed. As we know, natural gas is a mixture of several components. Do you know its components?

Ricky: Yes, you are right. The largest and significant amount is *methane*; and some natural gas contains *nitrogen*, *carbon dioxide*, *hydrogen sulfide* and water.

Allen: These components have different properties which decide the designing of a gas pipeline.

Mr. Brown: Exactly! Only do we clearly calculate the physical properties of natural gas we can design and construct pipes. For instance, the mixture gravity is needed in gas flow equations. Other properties are required for other design steps, including pressure ratio, temperature and pressure and so on.

Ricky: Really a complex process!

Mr. Brown: With the common use of computer program today, the calculation process is becoming easier. You must be a master of computer!

Allen and Ricky: (Laugh...)

Mr. Brown: There are also pipeline design problems involve many branches, sections of different pipe diameters and weights and other complexities. Compression and pumping must be considered; they should be designed as a system.

Ricky: I think the design of gas pipeline will affect the size and number of compressors or pumps. The design of compressors or pumps stations will affect pipeline operation conditions.

Mr. Brown and Allen: Excellent summary!



VOCABULARY ASSISTANT

formulas 公式,规则 roughness 粗糙度 deviation 偏差 compressor 压缩机
methane 甲烷 nitrogen 氮 carbon dioxide 二氧化碳
hydrogen sulfide 硫化氢

Answer the following questions according to the above dialogues and try to sum up useful expressions.

1. What are the main steps to design gas pipelines?
2. What is the decisive factor of pipeline designing?
3. It is a complex process to design a gas pipeline. Do you believe that you will finish it? How can you achieve it?

There are some useful expressions. Can you list more?

Can I help you? / Is there anything I can do for you? / Anything to help?

Yes, please. / That's very kind of you. / That would be fine.

Please don't worry, thank you just the same. / Thanks, but I think I can manage.

I'm afraid I have to... / I'm not sure... / I've got no idea about...

Would you make it clearer? / Could you tell us more about it?

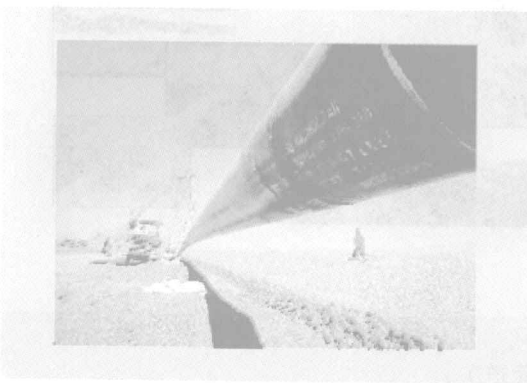
Part Four Reading

Read the passage and translate some sentences into Chinese.

Products Pipelines

The industry's products pipeline system is a *sophisticated* transportation network. Many *segments* of the system are highly flexible in both capacity and the products that can be transported.

One part of this system moves refined petroleum from refineries to storage and *distribution terminals* in consuming areas. Products shipped include the several grades of gasoline, aviation gasoline, *diesel*, and home heating oils. In the U.S., much of this movement is from Gulf Coast refining centers to the East and Southeast. But significant volumes of these products are also shipped from the Gulf Coast to the upper Midwest. In other countries products pipelines may move refined products from coastal refineries or tanker unloading terminals to the interior of the country to supply populated areas.



Another group of products pipelines is used to transport liquefied petroleum gases (LPG) and natural gas liquids (NGL) from *processing plants* in oil and gas-producing areas to refineries and *petrochemical plants*. In some cases, a mixed stream of liquid *hydrocarbons* separated from natural gas at field processing plants is moved to a fraction plant where the mixed stream is separated (*fractionated*) into individual products, including ethane, propane, and butanes.

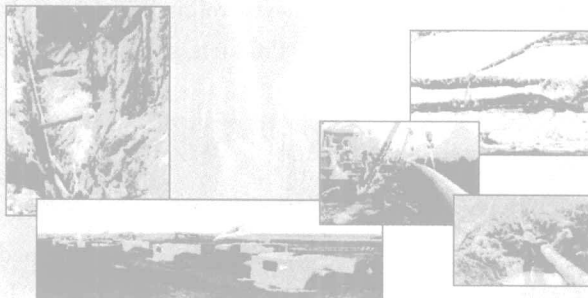
Products pipelines can often carry several different products in the same pipeline. Though there is a short length of the pipeline in which two such "*batched*" products may be mixed, operating methods allow the purity of each product to be maintained. Batching is done either with or without a physical barrier separating the two products. Where no physical barrier is used between different products, the difference in density of the two materials maintains the separation (under pressure



and in turbulent flow) with only a short length interval in which mixing occurs. The position of batch and the extent of mixing can be monitored at points along the line by measuring the density of the fluid in the line. Sphere batching is also used. A sphere can be inserted in the pipeline to form a physical barrier between batches of different products to maintain separation.

Movement of more than one product in a single pipeline obviously calls for even more sophisticated monitoring and control than is required for continuous movement of a single product.

Products pipelines must operate at a higher pressure than crude pipelines because the material being transported is lighter than crude. Products being shipped must remain in a liquid phase rather than become a mixture of gas and liquid. If gas allowed entering the liquid pumps on the pipeline, pump efficiency is lowered and pump damage may result. In general, lighter (lower-density) material requires a higher operating pressure to prevent formation of gas in the pipeline. For instance, one products pipeline that moves ethane from ethane extraction facilities to ethylene manufacturing facilities and underground storage sites has a maximum operating pressure of 1,440 *psi*. To prevent *vaporization*, design criteria for this pipeline call for a minimum pump suction pressure of 650 *psi*. Ethane is the lightest hydrocarbon transported in products pipeline; the pressure at which vaporization occurs decreases as the density of the material being shipped increases.



OCABULARY ASSISTANT

sophisticated 复杂的 segment 部分(这里指管道)

distribution terminals 分配油库 diesel 柴油 processing plant 处理站

petrochemical plant 石油化工厂 hydrocarbon 烃, 碳氢化合物

fractionate 精馏 batched 混油 vaporization 蒸发

psi (pounds per square inch) 磅 / 英寸 $2.1 \text{ psi} = 6.895 \text{ kPa (千帕)} = 0.068 \text{ atm (大气压)}$

Please translate the following sentences into Chinese.

1. Many segments of the system are highly flexible in both capacity and the products that can be transported.