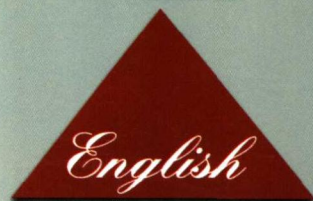


北京市普通高等学校重点立项系列教材



高等学校 专业英语阅读教程

(机电工程类)

李鹏飞 朱小燕 等 编著
吴树敬 审定

北京理工大学出版社

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北京市普通高等学校重点立项系列教材

Science Readers for Mechatronics

高等学校专业英语阅读教程

(机电工程类)

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内 容 简 介

本书是北京理工大学承担编写的北京市高校重点立项教材《大学本科生高年级专业英语系列教程》(机电工程类)分册,另两册为(电子信息类和化学化工类)。

该系列教材的机电工程分册是为机械制造、机电工程和工程力学等类专业本科生在学完大学英语四级后,进一步巩固和提高英语水平,特别是提高阅读综合科技书刊及本专业英文资料的能力而编写的,既可作这些专业学生专业英语阅读课的教材,也可供其他相关专业的读者进行阅读提高使用。

本书共分为 15 个单元,含 45 篇课文。总阅读量约为 100,000 词左右,课文后面编有系统的练习可供课堂教学使用。本书设有 6 个写作教学专题,以期对本书的使用者在科技论文写作方面给予一定指导。

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前 言

由国家教委颁发的《大学英语教学大纲》中有关专业阅读阶段的要求规定:专业阅读阶段的教学是通过指导学生阅读有关专业的书刊和文献,培养阅读英语科技资料的能力,使其能以英语为工具获取有关专业所需要的信息。根据上述规定,我们近年来对英语专业阅读这门课程的建设做出了一系列实践和探索,对本科生的英语教学实行了四年不断线的方针。在所有专业的本科生完成了基础英语学习任务之后,三年级按学科大类为他们分别开设专业科技英语课,并在四年级为其开设专业英语文献阅读课。这些作法的目的就是为了更加全面地贯彻大学英语教学大纲,更扎实地提高学生应用英语的能力,从而进一步提高教学质量,为争取新世纪初使大学英语教学跨上一个新台阶创造有利条件。

本书为我校主编的《专业英语系列教程》分册,另两册为电子信息类和化学化工类。作为该系列教材的第一分册(机电工程类),是为机械制造、机电工程和工程力学等专业本科生在学完大学英语四级后,进一步巩固和提高英语水平,尤其是提高阅读综合科技书刊及本专业英文资料的能力而编写的,体现了很多专家对本课程的改革思想。本书既可作上述专业学生专业英语阅读课的教材,也可供其他相关专业的读者使用。

本书共分为 15 个单元,按其中内容的相关程度划分为若干群落,每个群落反映出某个共同性的主题,如机械制造基本原理、加工工艺和机电一体化趋势就融为一个群落。汽车构造、内燃机原理、汽车文化和艺术发展历史及未来趋势为另一个群落。每单元编有 3 篇课文,共 45 篇课文。基本做到了“门类齐全,包罗万象,反差巨大,情趣多样。”

全书阅读量约为 100,000 词左右,可供 48~79 学时教学使用。本书的写作部分,有 6 个专题,分别为写科技论文的提纲(outline)、引言(introduction)、摘要(abstract)和结论(conclusion)等,以期给学习者一定的启发和指导。本书作为一本专业英语阅读教科书,所提供的练习系统规范,内容丰富,从客观性的多项选择、正误判断到主观性的信息加工处理、自由填空、英汉汉英互译到写论文摘要,其目的是帮助于高年级本科生能在学习专业英语这门课的同时,不断巩固基础英语阶段所学的语法和词汇知识。为使本书所提供的材料能够充分发挥作用。编者建议课文 A 可作主课文进行课堂讲练,教师可对课文 B 进行一定的教学提示。教师可根据所教的具体专业不同,也可将某些课文 B 作为主课文使用进行课堂讲练。

本书课文全部选自国外书刊、杂志和科学文献或机电专业教科书。科学性、知识性、趣味性和语言文字的规范化是本书选材的标准。为保证本系列教程编写的选材实用性及练习质量,在学校教务处及北京理工大学出版社领导和配合下,由我校专业英语教研室邀请相关专业数名教授专家组成了顾问组和以英语教师为主体的编写组,共同搜集资料,经过反复筛选而确定下来。本书的编写始于 1991 年。作为内部教材(定名为《英语专业阅读》(机械类))先期在北京理工大学使用。两年后由高等教育出版社公开发行(定名为《英语阅读》(机械类))。作为一本专业英语阅读教材得到长期使用,受到读者欢迎而长盛不衰,主要原因之一是它是相关专业的专家与英语教师长期共同合作奉献的结晶。书中编就的 45 篇课文选自国外近百种书刊杂志。为适应科学技术发展和相关专业学科内部相互之间交叉依赖演进的需要,这次

改编中换掉了初版中三分之二的课文,突出了机电一体化的总趋势,加进了多媒体、网络工程、质量全面管理、全球一体化制造等内容,加上原来的各个群落,体现了全书课文内容的经典性、系统性、时代性、趣味性和语言的规范流畅、丰富多彩。课文内容有教科书方面的,有机械汽车发展史料,也有名人传记,还有科技新闻综述、新技术未来发展方向探述和展望,其宗旨在于扩大学习者的专业知识视野,为阅读专业英语文献奠定坚实的基础,借以激发和鼓励他们对其所从事的专业的热爱。

本书的初版编写工作由我校外语教师吴树敬、李鹏飞、刘利君、陈大明四位老师担任。

这次重新编写由主管北京理工大学专业英语教研室的李鹏飞、朱小燕两位老师担任。并聘请刘利君老师编写了第2、3、4单元A篇课文练习及这三课课文翻译工作。编写完成后由我校人文学院副院长吴树敬教授进行了详细审阅。在本书初版编写出版策划过程中,陆晨同志作为当时北京理工大学教务处处副处长和我校承担的北京市高等学校重点教改项目《大学本科外语教学第二阶段的教学实践与探索》主要负责人,为本书的编写做了大量的组织工作。我校现任教务处处副处长韩峰博士、副处长王悦音副教授也对本书的出版给予了很大支持。参加本书顾问组的成员有:姚德源、朱小燕、陆晨、孙厚芳、辛企明、苑士华、刘福水、贾云得、刘培森、阎吉祥、孙志宏、文声敏、宋廷伦等。借此机会,向所有为本书的出版和改编作出贡献的诸位专家教授一并表示深切谢意。

由于时间和作者水平有限,书中如有不妥之处,诚望专家和广大读者不吝指正。

编著者谨识

2001年9月

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UNIT 1

Text A

What Is Manufacturing?

As you begin to read this article, take a few moments to inspect the different objects around you: your watch, chair, stapler, pencil, calculator, telephone, and light fixtures. You will soon realize that all these objects had a different shape at one time. You could not find them in nature as they appear in your room. They have been transformed from various raw materials and assembled into the shapes as you now see. A paper clip, for example, was once a piece of wire. The wire was once a piece of metal obtained from ores.

Some objects are made of one part, such as nails, bolts, wire or plastic coat hangers, metal brackets, and forks. However, most objects—automobile engines, ballpoint pens, toasters, bicycles, computers and thousands more—are made of a combination of several parts made from a variety of materials. A typical automobile, for example, consists of about 15,000 parts, and a C-5A transport plane is made of more than 4,000,000 parts. All are made by various processes that we call manufacturing. Manufacturing, in its broadest sense, is the process of converting raw materials into products. It encompasses the design and production of goods, using various production methods and techniques.

Manufacturing is the backbone of any industrialized nation. Its importance is emphasized by the fact that, as an economic activity, it comprises approximately one third of the value of all goods and services produced in industrialized nations. The level of manufacturing activity is directly related to the economic health of a country. Generally, the higher the level of manufacturing activity in a country, the higher is the standard of living of its people.

Manufacturing also involves activities in which the manufactured product is itself used to make other products. Examples are large presses used to form sheet metal for car bodies, metalworking machinery used to make parts for other products, and sewing machines used to make clothing. An equally important aspect of manufacturing activities is servicing and maintaining this machinery during its useful life.

The word *manufacturing* is derived from the Latin *manufactus*, meaning made by hand. The word *manufacture* first appeared in 1567, and the word *manufacturing* appeared in 1683. In the modern sense, manufacturing involves making products from raw materials by various processes, machinery, and operations, following a well-organized plan for each activity required. The word *product* means something that is produced, and the words *product* and *production* first appeared sometime dur-

ing the fifteenth century. The word production is often used interchangeably with the word manufacturing. Whereas *manufacturing engineering* is the term used widely in the United States to describe this area of industrial activity, the equivalent term in Europe and Japan is production engineering.

Because a manufactured item has undergone a number of changes in which a piece of raw material has become a useful product, it has a value—defined as monetary worth or marketable price. For example, as the raw material for ceramics, clay has a certain value as mined. When the clay is used to make a ceramic dinner plate, cutting tool, or electrical insulator, value is added to the clay. Similarly, a wire coat-hanger or a nail has a value over and above the cost of a piece of wire. Thus manufacturing has the important function of adding value.

Manufacturing is generally a complex activity, involving people who have a broad range of disciplines and skills and a wide variety of machinery, equipment, and tooling with various levels of automation, including computers, robots, and material-handling equipment. Manufacturing activities must be responsive to several demands and trends.

- A product must fully meet design requirements and specifications.
- A product must be manufactured by the most economical methods in order to minimize costs.
- Quality must be built into the product at each stage, from design to assembly, rather than relying on quality testing after the product is made.
- In a highly competitive environment, production methods must be sufficiently flexible so as to respond to changing market demands, types of products, production rates, production quantities, and ontime delivery to the customer.
- New developments in materials, production methods, and computer integration of both technological and managerial activities in a manufacturing organization must constantly be evaluated with a view to their timely and economic implementation.
- Manufacturing activities must be viewed as a large system, each part of which is interrelated to others. Such systems can be modeled in order to study the effect of factors such as changes in market demands, product design, material and various other costs, and production methods on product quality and cost.
- The manufacturing organization must constantly strive for higher productivity, defined as the optimum use of all its resources: materials, machines, energy, capital, labor, and technology. Output per employee per hour in all phases must be maximized.

Exercises

I. Comprehension

Choose the best alternative according to the text.

1. It is not easy to _____ the objects when they appear around you.
a. discover b. naturalize c. obtain d. categorize
 2. A toaster is usually made of _____ made from _____.
a. one part . . . various materials b. several parts . . . various materials
- 2 •

- c. one part... one material d. several parts... one material
3. _____ are made by various processes that we call manufacturing.
- a. The 15 000 parts of a typical automobile
 - b. The 4 000 000 parts of a C-5A transport plane
 - c. The 15 000 parts and the 4 000 000 parts
 - d. The automobile and the C-5A transport plane
4. In the industrialized nations _____ makes up one third of the value of all goods and services.
- a. manufacturing b. design
 - c. production methods d. production techniques
5. As manufacturing develops, the living standard _____
- a. will rise b. will not rise
 - c. will not necessarily rise d. will probably rise
6. Servicing and maintaining the machinery is _____
- a. manufacturing
 - b. the useful life of the machinery
 - c. also part of manufacturing
 - d. equally important
7. The word manufacturing means making products _____ in its modern sense.
- a. only by hand
 - b. only by machinery
 - c. by hand or by machinery
 - d. neither by hand nor by machinery
8. Used as the raw material for ceramics, clay _____ after it is obtained from a mine.
- a. does not have any value
 - b. does have some value
 - c. has an enormous value
 - d. has little value
9. Manufacturing is an industrial activity which does not involve _____.
- a. people b. machinery c. automation d. scoring
10. _____ is what a manufacturing organization tries its best to achieve.
- a. Higher productivity
 - b. Abundant supply of materials
 - c. Higher market price
 - d. Great consumption of products

II. Processing

Fill in the blanks with an illustrative/defining/equivalent word or phrase, using the information obtained from the text.

1. Objects made of one part are _____, _____, _____, _____, _____, _____.
2. Objects made of several parts are _____, _____, _____, _____, _____.
3. Manufacturing is the process of converting raw materials such as _____ into products.
4. Manufacturing consists of the _____ and _____ of goods as well as _____ and _____ the machinery in use.
5. In the word manufacturing, *manu* means hand, as can be found in several other words like _____ and _____.
6. A piece of raw material becomes a useful product when it has _____, or _____.
7. Manufacturing is a complex activity, involving _____, _____, _____, and _____.
8. _____ encompasses computers, robots, and material-handling equipment.
9. To update the production a manufacturing organization must constantly evaluate new developments in _____ and _____.
10. To raise productivity is to optimize the use of all resources; _____, _____, _____, and _____.

III. Questions and Answers

Answer the following questions according to the text.

1. manufacturing

2. value

3. production methods

IV. Translation

A. Put the closely-connected words or phrases into Chinese.

1. manufacturing, raw materials, convert, process, products
2. design, produce, assemble, service, maintain
3. an industrial activity, a well-organized plan
4. a value, monetary worth, a marketable price
5. materials, machines, energy, capital, labor, technology
6. automation, computers, robots, computer integration
7. product design, types of products, production methods, product quality, quality testing

8. market demands, material cost, product cost, on-time delivery

B. Put the following sentences into Chinese.

1. They have been transformed from various raw materials and assembled into the shapes that you now see.
2. However, most objects? automobile engines, toasters, bicycles, ball-point pens, computers and thousands more? are made of a combination of several parts made from a variety of materials.
3. Its importance is emphasized by the fact that, as an economic activity, it comprises approximately one-third of the value of a goods and services produced in industrialized nations.
4. When the clay is used to make a ceramic dinner electrical insulator, value is added to the clay.
5. Manufacturing is generally a complex activity, involving people who have a broad range of disciplines and skills and a wide variety of machinery, equipment, and tooling with various levels of automation, including computers, robots, and equipment

C. Translate the following sentences into English, paying attention to the ways of expressing tense-sequence (past-present-future), formation and transformation of things (A is made of B and C; A is converted into B; B and C constitute D); and illustration (things around parts made from a variety of materials).

1. 从这一批产品开始, 该厂将用新的方法制造汽车。自动化生产线将一直把各种原材料制成(transform)半成品, 最后组装成完整的商品汽车。
2. 制造通常指的是将原材料变为最终产品的全部过程, 它包括(include)产品的设计和生产, 在这些阶段中要用到设计思想和设计方法, 生产工艺和具体加工方法。
3. 制造通常被认为是一种复杂的生产活动, 它不仅涉及到(involve)要求大批具备设计和生产能力和技术的工人, 而且涉及到认真的管理和操作各种各样的机械设备和加工工具。
4. 新工艺正在改变(transform)着制造过程, 厂家非常重视使用新的制造技术以降低直接的劳动投入。
5. 从事制造业的工厂必须始终如一地努力追求更高的劳动生产率, 并充分地利用(use ...in the best way)自己的人力物力资源。

V. Reconstruction

Find out the error or errors in each statement and rewrite it with the correct message from the text.

1. Since manufacturing is the process of converting raw materials into products, it is not a case of manufacturing to form sheet metal for car bodies.
2. Manufacturing consists of material purchases, market. demands, product design, production methods and techniques product salesability; and retail outlets.

3. Quality must rely solely on quality testing after the product is made.

Text B

The Production Turn and Types

Manufacturing can be defined as the transformation of raw materials into useful products through the use of the easiest and least expensive methods. It is not enough, therefore, to process some raw materials and obtain the desired product. It is, in fact, of major importance to achieve that goal through employing the easiest, fastest, and most efficient methods. If less efficient techniques are used, the production cost of the manufactured part will be high, and the part will not be as competitive as similar parts produced by other manufacturers. Also, the production time should be as short as possible to enable capturing a larger market share.

The function of a manufacturing engineer is, therefore, to determine and define the equipment, tools, and processes required to convert the design of the desired product into reality in an efficient manner. In other words, it is the engineer's task to find out the most appropriate, optimal combination of machinery, materials, and methods needed to achieve economical and trouble-free production. Thus, a manufacturing engineer must have a strong background in materials and up-to-date machinery as well as the ability to develop analytical solutions and alternatives for the open-ended problems experienced in manufacturing. This is in addition to having a sound knowledge of the theoretical and practical aspects of the various manufacturing methods.

The standard of living in any nation is actually reflected by the products and services available to its people. In a nation with a high standard of living, a middle-class family usually owns an automobile, a refrigerator, an electric stove, a dishwasher, a washing machine, a vacuum cleaner, a stereo, and, of course, a television set. Such a family also enjoys health care that involves modern equipment and facilities. As you can easily see, all the above-mentioned goods, appliances, and equipment are actually raw materials that have been converted into manufactured products. Therefore, the more active in manufacturing raw materials the people of a nation are, the more plentiful those goods and services become; as a consequence, the standard of living of the people in that nation attains a high level. On the other hand, nations that have raw materials but do not fully exploit their resources by manufacturing those materials are usually poor and are referred to as "underdeveloped". It is, therefore, the know-how to and the capability of converting raw materials into useful products that basically determines the standard of living of a nation and not just the availability of minerals or resources within its territorial land. In fact, many industrial nations, such as Japan and Switzerland, import most of the raw materials which they manufacture and yet still maintain a high standard of living.

The Production Turn

In almost all cases, the main goal of a manufacturing project is to make a profit, the exception

being projects that have to do with the national security or prestige. Now, let us establish a simplified model that illustrates the cash flow through the different activities associated with manufacturing, so we can see how to maximize the profit. As shown in the Fig. , the project starts by borrowing money from a bank to purchase machines and raw materials and to pay the salaries of the engineers and other employees. Next, the raw materials are converted into products, which are the output of the manufacturing domain. Obviously, those products must be sold (through the marketing department) in order to get cash. The latter is, in turn, used to cover the running costs as well as required payments to the bank; any surplus money left is actually the profit.

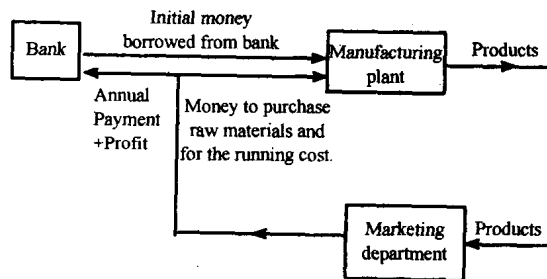


Fig. The production turn

We can see in this model that the sequence of events forms a continuous cycle (i.e., a *closed circuit*). This cycle is usually referred to as the *production turn*. We can also realize the importance of marketing, which ensures the continuity of the cycle. If the products are not sold, the cycle is obviously interrupted. We can also see that maximum profit is obtained through maximizing the profit per turn and/or increasing the number of turns per year (i.e., running the cycle faster). Obviously, these two conditions are fulfilled when products are manufactured in the easiest and least expensive way.

Types of production

Modern industries can be classified in different ways. These include classification by process, classification by product, and classification based on the production volume and the diversity of products. The classification by process is exemplified by casting industries, stamping industries, and the like. When classifying by product, industries may belong to the automotive, aerospace, and electronics groups. The third method, i. e., classification based on production volume, identifies three main distinct types of production, mass, job shop, and moderate. Let us briefly discuss the features and characteristics of each type.

Mass production is characterized by the high production volume of the same (or very similar) parts for a prolonged period of time. An annual production volume of less than 50 000 pieces cannot certainly be considered as mass production. As you may expect, the production volume is based upon an established or anticipated sales volume and is not directly affected by the daily or monthly orders. The typical example of mass-produced goods is automobiles. Since that type attained its modern status

in Detroit, it is sometimes referred to as the Detroit type.

Job-shop production is based on sales orders for a variety of small lots. Each lot may consist of 20 up to 200 or more similar parts, depending upon the customers' needs. It is obvious that this type of production is most suitable for subcontractors who produce varying components to supply various industries. The machines employed must be flexible to handle variations in the configuration of the ordered components, which are usually frequent. Also, the employed personnel must be highly skilled in order to handle a variety of tasks, which differ for the different parts that are manufactured.

Moderate production is an intermediate phase between the job-shop and the mass production types. The production volume ranges between 10 000 to 20 000 parts, and the machines employed are flexible and multipurpose. This type of production is gaining popularity in industry because of an increasing market demand for customized products.

Exercises

I. Comprehension

Read each of the following statements carefully and decide whether it is true or false according to the text.

1. It is also important to manufacture the desired product through employing the easiest, fastest, and most efficient methods.
2. To make a profit is the main goal of almost all manufacturing projects, including the national security-related ones.
3. The marketing department sells the products to get cash which is used to cover the costs of materials and machines, the payments to the engineers and other employees as well as those to the bank.
4. With a sound knowledge of materials, up-to-date machinery, problems in production, and various manufacturing methods, a manufacturing engineer can determine and define the equipment, tools, and processes required in production.
5. The production turn is the cycle of events which a manufacturing organization gets through by obtaining a loan from a bank, making and selling products and paying back the loan.
6. The profit per turn can be maximized and the number of turns per year can be increased until the products are manufactured in the most efficient way.
7. The established sales volume rather than the daily or monthly orders has a direct influence on the production volume of mass production.
8. Since the ordered components often change, the machines used in job-shop production must be adaptable enough to manufacture the required products.
9. The highly skilled personnel in the job-shop manufacturing can handle products of the same type in quantity.
10. Manufacturers adopting moderate production is winning larger share of the market by turning

out products which fit the special needs of the customers.

II. Processing

Fill in the blanks with an illustrative/defining/equivalent word or phrase, using the information from the text.

1. A manufacturing engineer should be able to determine and define the _____ , and _____ required to convert the design of the desired product into reality.
2. Engineers in manufacturing industry must have a sound knowledge of _____ , _____ , _____ , and _____ .
3. In an industrialized nation a middleclass family usually owns _____ , _____ , _____ , _____ , _____ , and _____ .
4. _____ is the poor nation that has raw materials but do not fully exploit their resources by manufacturing those materials. .
5. A manufacturing organization starts its business by borrowing money from a bank to purchase _____ and _____ and to pay the salaries of the _____ and _____ .
6. _____ of the manufacturing domain is the products converted from raw materials.
7. _____ is the surplus money left after a manufacturing organization undergoes a sequence of events referred to as the production turn.
8. Modern industries can be classified in different ways including _____ , _____ , _____ .
9. The classification of modern industries by product can be illustrated by, _____ , _____ , and _____ groups.
10. In its early stage mass production was best exemplified by the automobile industry in Detroit and so it is sometimes called _____ of production.

III. Questions and Answers

Answer the following questions according to the text.

1. the function of a manufacturing engineer

2. the living standard

3. types of production

IV. Translation

Put the following passage into Chinese.

The project starts by borrowing money from a bank to purchase machines and raw materials and to pay the salaries of the engineers and other employees. Next, the raw materials are converted into products, which are the output of the manufacturing domain. Obviously, those products must be sold in order to get cash. The latter is in turn, used to cover the running costs as well as required pay merits to the bank. The sequence of events forms a continuous cycle usually referred to as the production turn. Any surplus money left is actually the profit and maximum profit is obtained through maximizing the profit per turn and/or increasing the number of turns per year.

V. Reconstruction

Find Out the error or errors in the statement and rewrite them with the correct message from the text.

1. The availability of minerals or resources basically decide whether a nation enjoys a high living standard or not.
2. In the manufacturing process an engineer's task is to learn about materials, up-to-date machinery and various manufacturing methods.
3. The main goal of a manufacturing project is to transform raw materials into products which can be sold on the market.
4. To ensure the cycle of production we must adopt various types of production like mass, job-shop, and moderate productions.
5. Sales ability and maximum profits guarantee that products are manufactured in the most efficient way.

Text C

Management Can Make Manufacturing

There is some confusion in stating the difference between leadership and management. Sir John Harvey-Jones has said that 'leadership is about getting extraordinary performance out of ordinary people'. As an inspiration, this is ideal, but I would also add that good management is basic to success.

This was a lesson I learned clearly in my formative years. Having joined Rolls-Royce just before the 'success' of the RB211 engine project, founded on outstanding engineering design, I felt proud to be part of a major manufacturing achievement. I then looked on with horror as, a few years later, a number of my excolleagues lost their jobs. There had been much leadership, but little business and commercial management to back it up.