普通高等教育“十二五”规划教材

机械工程专业英语

主编　郑兰霞　陈艳艳

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内 容 提 要

本书是依据高职高专新一轮教学改革的方向，以培养机械工程专业英语综合能力和强化实际应用进行编写的。

全书共有10个单元，分别是机械工程、工程材料、电工电子、机械零件、机构、机械设计与制造、成型工艺、机电一体化、汽车和工程机械等。每个单元都包括3篇以上的课文，共计43篇课文。附录1为机械工程常用英语缩略语，附录2为常用工具、量具和机械零部件英文名。

本书适合高职高专机械工程类专业的专业英语教学使用，也可供专业英语自学者及工程技术人员参考。

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前言

本书依据高职院校“以就业为导向，以职业能力培养为目标”的指导思想，按照机械工程类专业的教学计划要求，以追求通俗易懂、简明扼要、便于教学和自学为前提进行编写的。本书具有以下特点：

（1）图文并茂。对于具有一定机械工程基础的读者而言，通过书中配套清晰图例便可揣摩出各段文字的大意，能通过专业知识促进专业英语水平的提高。

（2）注重“方法论”的教学思想。“授之以鱼，不如授之以渔”。教材的每个单元后都配有“听、说、读、写、译”的专业英语能力技巧，有助于专业英语的技能训练。

（3）注重“知识应用”。每篇课文后都有与之对应的阅读材料和练习，并且对其中的重点和难点语言、语法现象均有详细的注释，有助于实现“教、学、练、做一体化”的教学模式。

（4）内容覆盖面广。内容包括机械工程类专业的基础知识、专业知识、常用工具和量具、机械工程常用缩略语等。专业知识包括机械制造技术、模具设计制造、车辆工程、机电一体化等方面，可较好地满足机械工程类多个方向专业英语的教学需要。

本书共有 10 个单元，分别是机械工程、工程材料、电工电子、机械零件、机构、机械设计与制造、成型工艺、机电一体化、汽车和工程机械等。每个单元都包括 3 篇以上的课文，共计 43 篇课文。附录 1 为机械工程常用英语缩略语，附录 2 为常用工具、量具和机械零部件英文名。

本书可作为高职高专机械设计与制造、机电一体化技术、数控技术、模具设计与制造、汽车检测与维修、工程机械运用与维护等机械工程类的专业英语课程的教材，也可作为广大专业英语自学者及工程技术人员的参考书。建议教师根据教学实际情况，不受教材编排顺序的限制，进行适当的删选；学生可根据自己的兴趣或需要自学其中的部分内容。

本书由黄河水利职业技术学院郑兰霞、陈艳艳任主编，黄河水利职业技术学院李冰、连萌、宋新、王慧、杨芊任副主编，陈晗凝、牛聪、仝蓓蓓参加编写。黄河水利职业技术学院徐翔民博士主审全书。

由于时间仓促，编者水平有限，书中难免会出现错误和不足之处，恳请广大读者批评指正。

编者

2013 年 10 月

目录

Unit 1 Mechanical Engineering

Passage 1 Manufacturing and Designing of Production

1.1 Manufacturing of Production

Making parts and putting them together is manufacturing. If you make parts and put them together to make a product, you are manufacturing. The manufacturing industry is important in our society and economy. An economy is a system for producing and distributing products and services. Many people work in manufacturing. They help produce products, and they buy products with the money that they earn. The more products people buy, the more products are manufactured. And this allows more people to work. Manufacturing is also important to the economy in another way. A piece of material is worth more after it is been changed into a useful product. That is value added. Value is increased by the manufacturing process.

Manufacturing can be defined as the transformation of raw materials into useful products through the use of the easiest and least-expensive methods[1]. 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[2]. 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 find out the most appropriate, optimal combination of machinery, materials, and methods needed to achieve economical and trouble-free production. In other words, it is the engineer's task to determine and define the equipment, tools, and processes required to convert the design of the desired product into reality in an efficient manner. 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[3].

1.2 Designing of Production

The cost of a product depends on raw materials, production costs for machines and labor, management and sales, warehousing and logistics, and overhead. Machine and labor

costs are inexorably related and make up, long with raw materials expenditures, the bulk of production costs[4]. When a material is chosen, the process, including the machine, is frequently specified. Alternatively, if a machine is available, the raw material that can be processed on that machine may be utilized. One could say that the purpose of economical production is to produce a product at a profit. This infers that the cost must be acceptable and competitive; also, a demand for the product must exist or must be created[5].

Efficiency in Production

Since the first use of machine tools, there has been a gradual trend toward making machines more efficient by combining operations and transferring more skill to the machine, thus reducing time and labor[6]. To meet these needs, machine tools have become complex both in design and in control. Automatic features have been built into many machines, and some are completely automatic. This technical development has made it possible to attain the high production rate with low labor cost that is essential for any society wishing to enjoy high living standards[7]. Computer-aided design and manufacturing are significant steps of progress.

Along with the development of production machines, the quality in manufacturing must be maintained. Quality and accuracy in manufacturing operations demand that dimensional control be maintained for that parts which are interchangeable. For mass production, any one of a quantity of parts must fit in a given assembly. A product made of interchangeable parts is quickly assembled, lower in cost, and easily serviced[8]. To maintain this dimensional control, appropriate inspection facilities must be provided.

Three criteria that determine economical production are:

(1) A functional but simple design that has appropriate aesthetic quality.

(2) A material choice that represents the best compromise among physical properties, appearance, cost, and workability or machinability.

(3) Selection of the manufacturing processes that will yield a product with no more accuracy or better surface finish than necessary.

Product Engineering and Design

It is important that the product be designed with material, manufacturing, and engineering to be competitive. For any manufactured product it is possible to specify a stronger, a more corrosion-resistant, or a longer life material, for example, but it is the engineer's obligation not to overlook the opportunity of economical production. This leads to value engineering, which is elimination of costly materials or unnecessary operations.

To produce parts of greater accuracy, more expensive machine tools and operations are necessary, more highly skilled labor is required, and rejected parts may be more numerous. Products should not be designed with greater accuracy than the service requirements. A good design should consider the finished appearance, because a product is often judged for appearance as well as function and operation. Many products, such as those

made from colored plastics or other special materials, are more saleable because of appearance[9]. In most cases the function of the part is the deciding factors. This is particularly true where great strength, wear, corrosion-resistant, or weight limitations are encountered.

For mass produced parts the design should be adaptable to mass production machines. Whenever a part is loaded, stored, and reloaded into another machine, costs are involved that may not add value to the product.

New Words and Technical Phrases

definition *n.* 定义，词义
raw *a.* 未加工的
transformation *n.* 转变
process *n.* &*v.* 过程，制法，程序
efficient *a.* 有效的
technique *n.* 技术，技法
competitive *a.* 竞争的
define *v.* 划定……界限
convert *v.* &*n.* 转换，改变
optimal *a.* 最理想的，最令人满意的
background *n.* 背景，经历
sound *a.* &*ad.* 坚实的（地），充足的（地）
logistics *n.* （复）后勤供应
overhead *n.* 经常费用，营业费用
warehousing *n.* 库存（量）
inexorable *ad.* 不留情地，无法改变地
expenditure *n.* 支出，经费，使用
bulk *n.* 大量，大多数
utilize *v.* 利用
profit *n.* 利润，收益
complex *a.* 复杂的 *n.* 复合体
automatic *a.* 自动的，机械的
devote (to) *v.* 把……奉献，把……专用
maintain *v.* 维持，保持，维护
interchangeable *a.* 可互换的，可交换的
facility *n.* 工具，设备
criterion *n.*（复数 criteria）标准，准则
aesthetic *a.* 审美的，艺术的
compromise *n.* 妥协，折中办法
machinability *n.* 可加工性
yield *v.* 产生，出产
obligation *n.* 义务
substitution *n.* 替换，代替
elimination *n.* 排除
reject *v.* 抵制，抛弃
coat *v.* 覆以（外加）涂层
adaptable *a.* 能适应的，适应性强的
setup *n.* 机构，装置
up-to-date 当今的，最新的
open-ended 无限制的
to be defined as 定义为……
as...as possible 尽可能的……
find out 发现
make up 构成
along with 随着
the bulk of 大多数
at a profit 获益
computer-aided design (CAD) 计算机辅助设计
mass production 大量生产
corrosion-resistant 抗腐蚀性的
value engineering 价值工程

NOTES

[1] Manufacturing can be defined as the transformation of raw materials into useful products through the use of the easiest and least-expensive methods.

本句为被动语态，省略了主语 we。

全句译为：制造是指采用最便利和最经济的方法将原材料加工成有用产品的转换过程。

[2] 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 pans produced by other manufacturers.

全句译为：如果采用低效率的技术，则加工零件的生产费用将提高，从而使该零件无法与其他工厂生产的类似零件进行竞争。

[3] This is in addition to having a sound knowledge of the theoretical and practical aspects of the various manufacturing methods.

全句译为：此外，就是要在各种制造方法方面具有坚实的理论基础知识和实践经验。

[4] Machine and labor costs are inexorably related and make up, along with raw materials expenditures, the bulk of production costs.

全句译为：机器和劳工费用，以及原材料的消耗构成产品价格的主要部分。

[5] This infers that the cost must be acceptable and competitive; also, a demand for the product must exist or must be created.

全句译为：这意味着产品费用必须是可以接受和具有竞争力的，且对该产品的需求必须是存在和可以激发的。

[6] Since the first use of machine tools, there has been a gradual trend toward making machines more efficient by combining operations and transferring more skill to the machine, thus reducing time and labor.

全句译为：自从开始使用机器以来，就逐渐趋向于通过操作组合及使机器具有更多功能来提高机器效率，减少劳动时间和人力的消耗。

[7] This technical development has made it possible to attain the high production rate with low labor cost that is essential for any society wishing to enjoy high living standards.

全句译为：这项技术的发展使用低劳动成本获得高生产率成为可能，它正是任何希望拥有高生活水平的社会的基础。

[8] A product made of interchangeable parts is quickly assembled, lower in cost, and easily serviced.

全句译为：由可互换的零件制成的产品装配更快、费用更低且更易于维修。

[9] Many products, such as those made from colored plastics or other special materials, are more saleable because of appearance.

全句译为：很多产品因为外观精美，如由彩色塑料或其他特殊材料制成，而使其更加畅销。

EXERCISES

Ⅰ. Answer the questions

(1) What is the definition of manufacturing?

(2) Why should the production time be as short as possible?

(3) What is the function of a manufacturing engineer?

(4) Why must manufacturing engineer have strong background knowledge?

(5) What do you learn from this article?

(6) What is the cost of a product consisted of?

(7) What is the purpose of economical production?

(8) What are the criteria for economical production?

(9) What is the meaning of value engineering?

(10) Why should a product have a good appearance?

Ⅱ. Choose from Column B an appropriate object for each of the words in Column A

A	B
( ) 1. raw materials	A. 价值工程
( ) 2. trouble-free production	B. 互换性零件
( ) 3. overhead	C. 原材料
( ) 4. computer-aided design	D. 优质产品
( ) 5. production rate	E. 尺寸精度
( ) 6. dimensional control	F. 企业管理费用
( ) 7. interchangeable parts	G. 生产率
( ) 8. value engineering	H. 计算机辅助设计
( ) 9. wear	I. 耐用性

Ⅲ. Fill in the blank in each sentence below with a proper phrase. Change the form if necessary

A. as... as possible

B. depend on

C. along with

D. one could say that

E. be adaptable to

(1) He _____ a new job.

(2) As you roll out of bed, last night's headlines and sports scores are read to you _____ today's weather forecast.

(3) It is being forced to again re-tool for the new production techniques and tools, and to _____ a new form of labor.

(4) Once the mixture has been burned it must be removed from the cylinder _____ quickly _____.

(5) _____ a year's plan starts with spring.

Ⅳ. True or false, mark "√" in the blank if true and "×" if false

(1) Process some raw materials and obtain the desired product is enough as definition of manufacturing. ( )

(2) The production time should be as short as possible to enable capturing a larger market share. ( )

(3) Warehousing and logistics make up the bulk of production costs. ( )

(4) A product made of interchangeable parts is quickly assembled, lower in cost, and easily serviced. ( )

(5) A good design only considers the function of the part. ( )

Ⅴ. Translate the passage below into Chinese

In the future, many of the more prestigious positions in factory automation management will be taken by persons with well-rounded technical skills as well as by those with demonstrated management skills. They would have arrived at this position from a series of previous assignments Including product engineering and manufacturing, production support and quality control. Such managers will have been in positions requiring an interaction with superiors, peers, and subordinate co-workers, positions that were successful because of the interactions of and with people.

Readings: What is needed for Manufacturing

Manufacturing product requires tools, materials, and processes. Materials are what products are made of. Processing converts (changes) materials into useful products. Tools are used in Processing.

1. Tools

A tool is a device that a person uses to perform work. Tools used in manufacturing come in a variety of sizes and shapes. Basically, they can be classified into three main categories:

- Hand tools
- Portable power tools
- Machines and equipment

Hand tools Simple tools powered by humans are called hand tools. You have probably used some. Hammers, screwdrivers, and wrenches are all hand tools. Special hand tools are often used in manufacturing.

Portable power tools If a tool is powered by electricity or air and is small enough to carry, and then it is a portable power tool. Portable electric or air powered tools, like drills, grinders, and wrenches are used.

Machines and equipment This category includes the large, powerful machines used in manufacturing. They are usually installed permanently. This means they are not movable. Saws, milling machines, and drill presses are examples of manufacturing machines. Equipment includes ovens, paint booths, and welding outfits.

2. Materials

Products are made from one or more materials. Metals and plastics are materials commonly used in manufactured products. There are two categories of materials:

- Raw materials

· Industrial materials

Raw materials All materials are first raw materials. Most materials are not usable in their natural form. Iron ore, found in the earth, is a raw material. For use in products, it can be changed into steel. Aluminum and other metals are also mined as an ore from the earth. Plastics are made from petroleum materials (crude oil) that are pumped out of the ground. Textiles (cloth) can be made from plant fibers such as cotton.

Industrial materials Raw materials are converted into industrial materials. These are materials in a form that can be used to make products. Industrial materials are usually made as standard stock. This means that the material is formed or packaged in a widely used (standard) size, shape, or amount that is easy to ship and to use. Standard stock includes sheets of plywood, steel, and aluminum. Bolts of cloth and barrels of liquid chemicals are also standard stock.

Passage 2 Engineering Graphics and Computer-Aided Design

2.1 Computer-Aided Design

Computer-aided design (CAD) refers to a system that uses computers with advanced graphics hardware and software to create precision drawings or technical illustrations[1]. If the system is being used to design parts to be manufactured, the designer can draw and manipulate a 3-D image of the part without having to build a physical model.

CAD systems can be broadly classified as two-dimensional (2-D) CAD and three-dimensional (3-D) CAD. Two-dimensional CAD systems are basically glorified electronic drawing boards, replacing paper, pencil, and the T-square. Three-dimensional CAD is also called geometric modeling. There are three methods of modeling in three dimensions: wireframe modeling, surface modeling, and solid modeling. An example of a wire model is shown in Figure 1.1. The intended purpose of the image dictates the appropriate model.

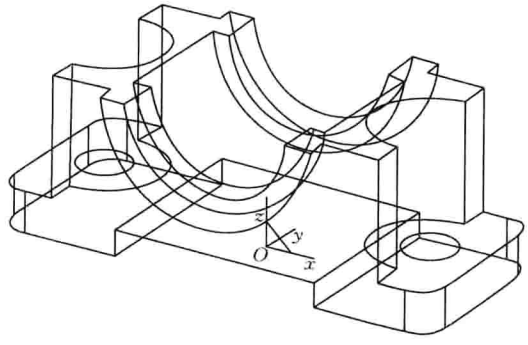


Figure 1.1 A Wire Model

Wireframe, the simple 3-D modeling, represents objects by line elements that provide exact information about edges, corners, and surface discontinuities[2]. With these models, there is no way to distinguish between the inside and the outside of the object. Surface modeling, on the other hand, defines precisely the outside of the object being modeled. Surface models connect various types of surface elements by line segments. Solid mod-

els make use of topology, the interior volume and mass of an object is defined. Surface models appear similar to solid models, but the interior of the surface model is empty.

Every CAD system has a set of elements or primitives out of which the designs are created[3]. In a 2-D system, the primitives are points, lines, and surfaces. In 3-D systems, the primitive shapes are cubes, wedges, cylinders, or spheres. If the CAD system is being used as a real design tool, the designer can try out ideas and immediately see the results.

2.2 Engineering Graphics

2.2.1 Technical Drafting

Technical drawings are the means for describing something that must be processed, manufactured, or built[4]. Engineers, designers, and architects use technical drawings as a means of communicating their ideas.

Until the 1950s and the advent of the computer, technical drawings were done at the drafting table with paper, pencil, and T-squares.

Now most technical drawings are done on the computer. What began as the automation of drafting has expanded into techniques and capabilities that a draftsperson in 1950s could not have imagined[5]. An example of a technical drafting is shown in Figure 1.2.

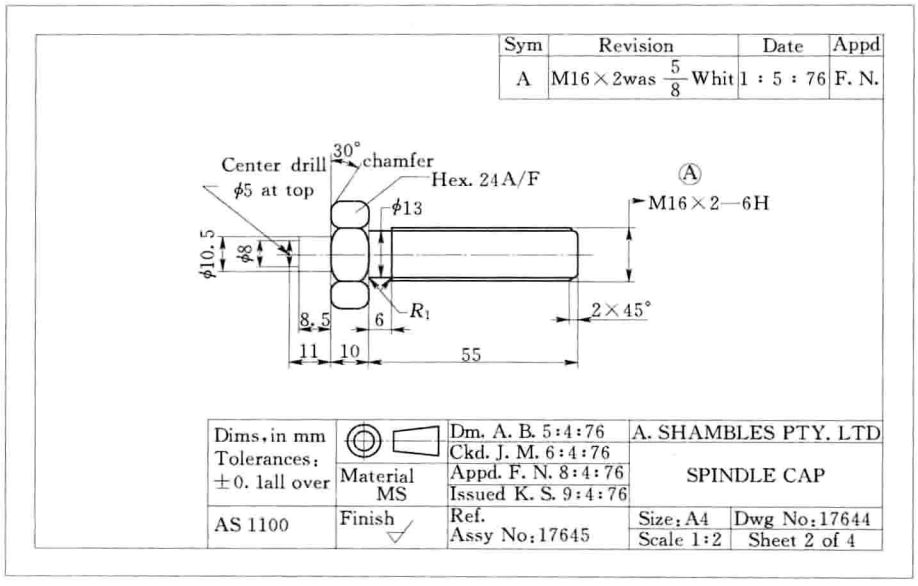


Figure 1.2 Technical Drafting

2.2.2 Projections and Three Views

The projections are orthographic projections of an object as seen from the front, top, or other sides. The three views are that the top, front, and side views, arranged closer together are shown in Figure 1.3[6].

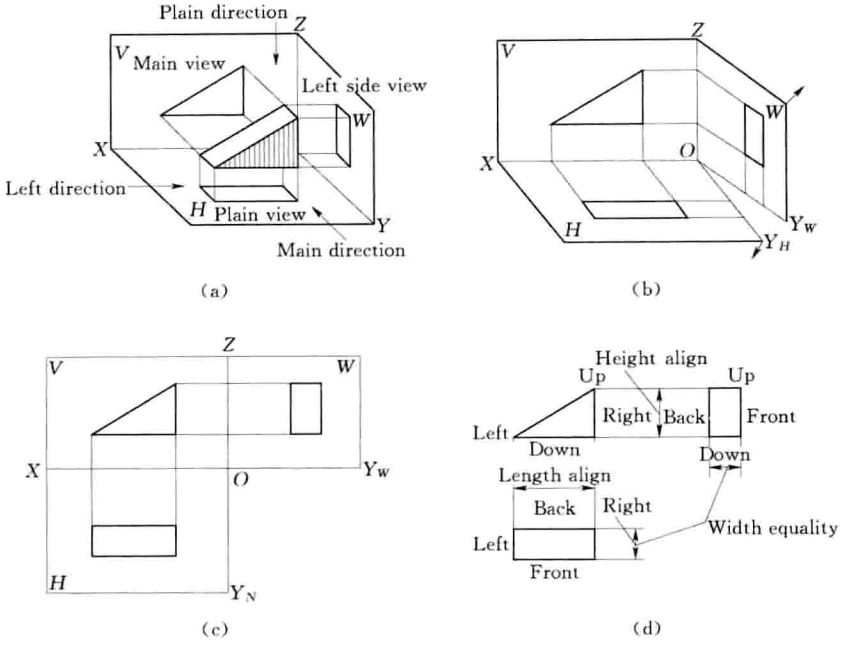
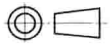


Figure 1.3 Projections and Three Views

2.2.3 Title Block and Item Block

Title block

UNLESS STATED OTHERWISE ALL DIMENSIONS IN mm TOLERANCES LINEAR: ANGULAR		DRAWN BY MY FULL NAME IS VERY LONG ME 000000 SEC 01A DATE: 04/07/2005	UNIVERSITI TENAGA NASIONAL		
	MATERIAL CAST STEEL		DRAWING TITLE		
	FINISH AS MACHINE	CHECKED BY	SCALE 1 : 1	DWG NO. 001	SHEET 1 OF 1

Item block

5					
4					
3					
2					
1					
Part No.	Detail ref.	Name of part	Material	Heat treatment	No. off
Scale		Projection	Drn		
Drg. No.		Name of Firm			

New Words and Technical Phrases

precision *n.* 精确性
illustration *n.* 插图，图表，实例
manipulate *n.* 操作，操纵，控制，回转
glorify *v.* 美化，赞美，使……增色
T-square *n.* 丁字尺
geometric *a.* 几何的
dictate *v.* 指示，命令
wireframe *n.* 线框
discontinuity *n.* （连续性）中断，不连续性
distinguish *v.* 区分，辨别．显示……特色
segment *n.* 段，环节，（分割的）部分
solid *a.* 实体的，立体的，三维的
topology *n.* 拓扑学，拓扑结构
interior *a.* 内部的
volume *n.* 体积
mass *n.* 质量
primitive *n.* 单元，原始单元，基本数据
cube *n.* 立方体，立方形
wedge *n.* 楔（形物，形体，形图，块）
cylinder *n.* 圆柱体
sphere *n.* 球（体，形，面）
advent *n.* 出现，到来，来临
draftsperson *n.* 制图员，绘图员
projection *n.* 视图，投影图
detail *n.* 零件，元件
scale *n.* 比例
CAD 计算机辅助设计
2D (2-D) 二维，two-dimensional 的缩写
3D (3-D) 三维，three-dimensional 的缩写
technical drawings 工程制图
three views 三视图
orthographic projection 正交投影
title block 标题栏
item block 明细栏
Drn 绘图，Drawn by 的缩写
Chd 校对，Checked by 的缩写
Appd 审核，Approved by 的缩写
Part No. 零件序号，Part number 的缩写
Detail ref. 零件图号，Detail reference 的缩写
Name of part 零件名称
Heat treatment 热处理
No. off 件数，Number off 的缩写
Drg. no 图号，Drawing number 的缩写

NOTES

[1] Computer-aided design (CAD) refers to a system that uses computers with advanced graphics hardware and software to create precision drawings or technical illustrations.

以 that 引导的定语从句修饰说明先行词 system，with 为介词，译为“利用，运用”，其宾语为 advanced graphics hardware and software。全句可翻译为“计算机辅助设计（CAD）指的是一种用具有高级图形处理硬件和软件的计算机来创建精确图像或技术图表的系统”。

[2] Wireframe, the simplest 3-D modeling, represents objects by line elements that provide exact information about edges, corners, and surface discontinuities.

the simplest 3-D modeling 作为插入语，解释 wireframe。that 引导定语从句修饰 line elements，相当于……，and line elements provide exact information... 全句可翻译为“线架建模法（最简单的 3D 建模法）通过线条表示对象，该线条提供了有关边界、角落和曲面连续性中断的精确信息”。

[3] Every CAD system has a set of elements or primitives out of which the designs are created.

which 引导定语从句，其先行词为 a set of elements or primitives。此句可换为 Every CAD system has a set of elements or primitives, and the designs are created out of the set Of elements or primitives. 全句可翻译为“每个 CAD 系统都有一套用于生成各种设计的元素，即原始单元”。

[4] Technical drawings are the means for describing something that must be processed, manufactured, or built.

工程制图是用于描绘所要处理、制造或建造的事务的手段。

mean 的复数（means）表示：方法，手段。

[5] What began as the automation of drafting has expanded into techniques and capabilities that a draftsperson in 1950s could not have imagined.

制图自动化的技术和能力已经达到了 20 世纪 50 年代的绘图师们无法想象的地步。

[6] The three views are that the top, front, and side views, arranged closer together are shown in Figure 1.3.

三视图是由俯视图、主视图、侧视图一起组成的视图，如图 1.3 所示。

Are shown in Figure 1.3 为被动语态，可译为“如图 1.3 所示。”

EXERCISES

Ⅰ. Full in the blanks according to the text

A. refer to　　E. make use of

B. be classified as　　H. try out

C. represent... by...　　I. use... as

D. distinguishes between... and...

(1) Recessing _____ cutting a groove on the inside of a hole.

(2) This type of reactor _____ graphite _____ the moderator.

(3) Since velocity has direction, we may _____ it _____ a line.

(4) When you get to Rome, you can _____ the free airport shuttle service to reach the rail train station.

(5) Computer may _____ analog and digital.

(6) The engineer must build on the traditions of past experience as well as _____ new ideas.

(7) It is important to _____ chemical _____ physical changes in substances.

Ⅱ. Choose from Column B an appropriate object for each of the words in Column A

A	B
(　　) 1. 计算机辅助设计（CAD）	A. wireframe modeling
(　　) 2. 创建精确的图像或技术图表	B. Computer-aided design (CAD)
(　　) 3. 二维	C. options
(　　) 4. 丁字尺	D. engineering graphics