



高等职业教育“十二五”创新型规划教材

机电专业英语

JIDIAN ZHUANYE YINGYU

◎主 编 凌淑莉

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内 容 简 介

本书由机电类专业通识知识、特色模块及必要的专业英语语法知识等组成。以培养学生阅读和理解机电类专业英语的能力为目标,并能在毕业时的求职面试中得心应手。内容包括:识图与制图、机械零件、控制装置及类型、加工方法及刀具类型、数控机床及刀具系统、编程知识及技术、数控机床控制面板识读及机床维护、CAD/CAM、求职面试等。

本书可作为机电一体化技术、数控技术及机电类其他专业的专业英语教材,也可供相关专业人员参考使用。

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前 言

随着科学技术的迅猛发展,国际化的技术交流与经济合作更加频繁,所以培养高素质技能型人才,提高学生综合素质、职业能力及可持续发展潜质,已成为高职高专院校在新形势下的基本任务。本教材正是在这种国际形势及党的十八大对职业教育提出新的要求下研究、设计、编写的;根据机械类专业培养目标及课程标准,以项目为切入点,按对应岗位对英语的需求,重组内容结构,更新并增加教学内容,按照“实用为主,够用为度”的原则,通过对本专业相对应的用人单位进行调研,校企合作共同研发编写;从内容设计到案例的选取,体现出实用性、典型性和先进性。

本教材内容分为两大部分:第一部分为机械类专业通识知识,突出基础性和通用性;第二部分为特色模块,针对机电、数控等专业选取特定教学内容,突出针对性,各专业可以根据情况进行选学。具体内容涉及识图与制图、机械零件、加工方法及刀具、数控设备及编程与操作、CAD/CAM 及应用、求职申请等,并添加专业英语相关的语法知识及面试技巧等。内容由浅入深,由易到难,循序渐进,系统性强。

本教材既是大学英语的延续,又是专业课程在更广泛领域的拓展。编写过程中,我们始终坚持以就业为导向,突出实用性,体现技能性、应用性的特点,引入学生就业后将接触到的产品简介、操作说明、维修指南等方面的素材。所选语言材料具有多元性、趣味性、时代性、前瞻性,注重学生在生产中对英语的实际需求,减少高深的理论、复杂的概念,培养学生具有扎实的英语基本功,突出学生可持续发展能力的培养。

由于编者的水平有限,时间仓促,错误和疏漏及不妥之处在所难免,请各位读者和同行海涵并指教。

编 者

2012 年 11 月

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Part 1 Text

Unit 1 Engineering Drawing

Lesson 1 Coordinate Systems and Types of Views



Technical Terms

Cartesian coordinate system

笛卡尔坐标系

projection

投影视图

auxiliary

辅助视图

multiview

多视图

third-angle projection

第三角投影



Questions for Text Discussion

- 1) What is a coordinate system composed of?
- 2) What is called a projection?
- 3) Why do we call engineering drawing an abstract universal language?



Text

1.1 Coordinate systems

The basic of all input AutoCAD is the Cartesian coordinate system, and the various methods of input (absolute or relative) rely on this system.

The fixed Cartesian coordinate system locates all points on an AutoCAD drawing by defining a series of positive and negative axes to locate positions in space. Fig. 1-1(a) illustrates the axis for two-dimension (2D) drafting. There is a permanent origin point (0,0) which is referenced, an X axis running horizontally in a positive and negative direction from the origin, and a Y axis travelling perpendicularly in a vertical direction. When a point is located, it is based on the origin point unless you are working in the three dimensions, in which case, you will have a third axis, called the Z axis (Fig. 1-1(b)).

1.2 Types of views

There are many view types which may be shown, as illustrated in Fig. 1-2.

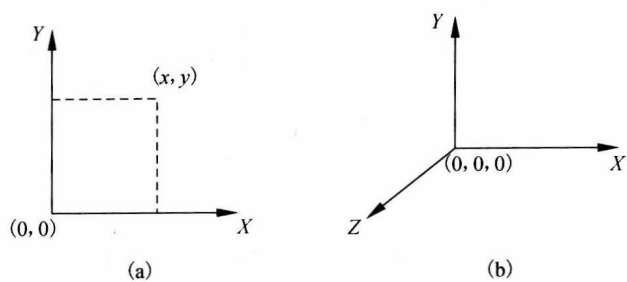


Fig. 1 - 1 Coordinate systems

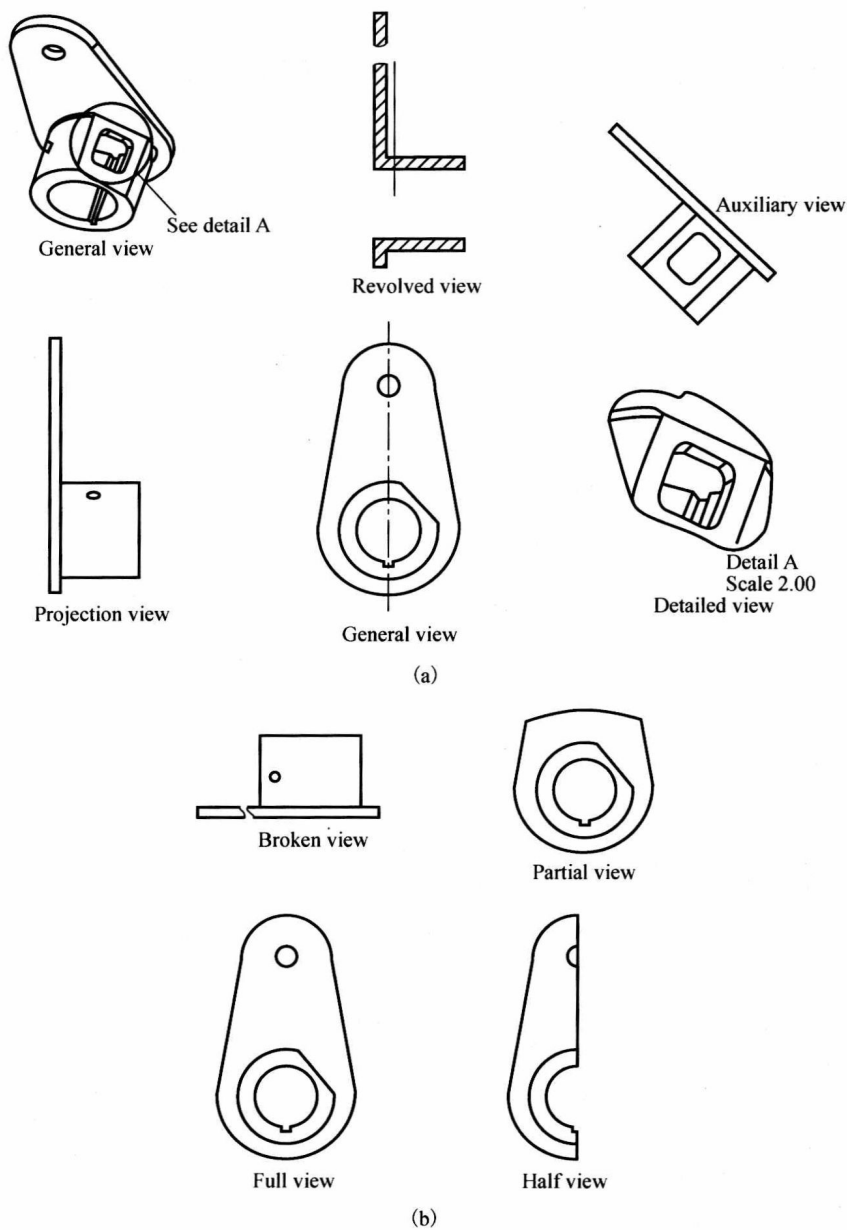


Fig. 1 - 2 Types of views

(a) Five main types of views; (b) Some other commonly used views

(1) Projection

An orthographic projection of an object as seen from the front, top, right side, etc.

(2) Auxiliary

Any view created by projecting 90° to an inclined surface, datum plane, or along an axis.

(3) General

Any view which is oriented by the user and is not dependent upon any other view for its orientation.

(4) Detailed

Any view which is derived by taking a portion of an existing view and scaling it for dimensioning and clarification purposes.

(5) Revolved

A planar, area cross-section is revolved 90° degrees about the cutting plane line and offset alone, its length.

(6) Full view

Shows the entire model.

(7) Half view

Shows only the portion of the model on one side of a datum plane.

(8) Broken view

Used on large objects to remove a section between two points and move the remaining sections close together.

(9) Section

Displays a cross-section for a particular view.

(10) Exploded drawing

The exploded drawing (Fig. 1 – 3) is a type of pictorial drawing designed to show several parts in their proper locations prior to assembly. Although the exploded view is not used as the working drawing for the machinist, it has an important place in mechanical technology. Exploded views appear extensively in the manuals and handbooks that are used for the repair and assembly of machines and other mechanisms.

(11) Partial view

When a symmetrical object is drafted, two views are sufficient to represent it (Typically, one view is omitted). A partial view can be used to substitute one of the two views. Sectional and auxiliary views are also commonly used to present part detail. Sectional views are extremely useful in displaying the detailed design of a complicated internal configuration. If the section is symmetrical around a centerline, only the upper half needs to be shown. The lower half is typically shown only in outline. Casting designers often employ sectional views to explode detail. When a major surface is inclined to three projection planes, only a distorted picture can be seen. An auxiliary plane that is parallel to the major surface can be used to display an undistorted view.

Machine assembly exploded view :

Study this diagram describing mate, align, orient and insert assembly constraints (Fig. 1 – 4).

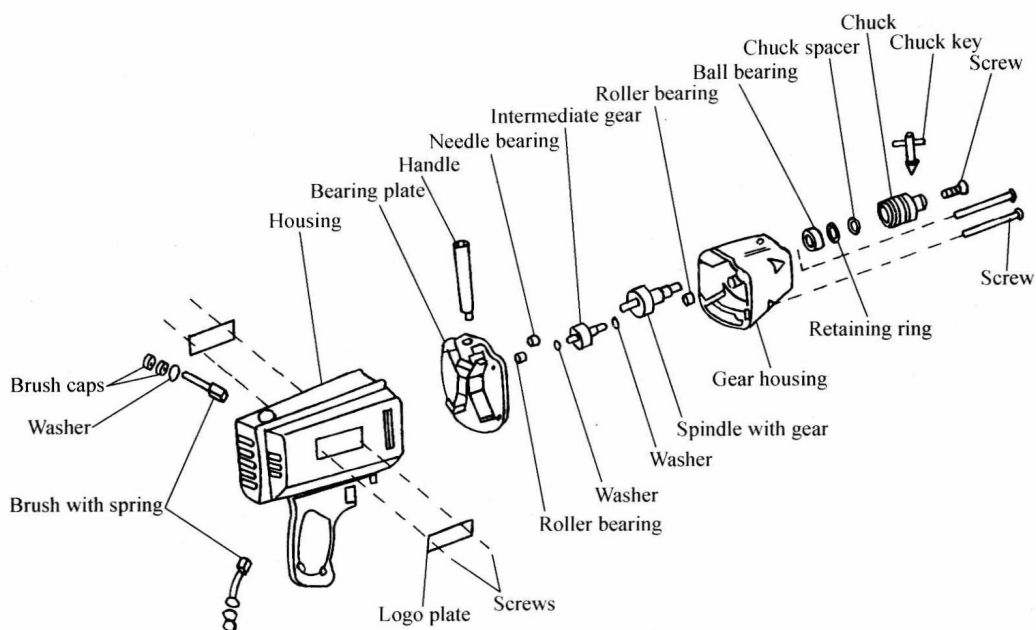


Fig. 1 - 3 The exploded drawing

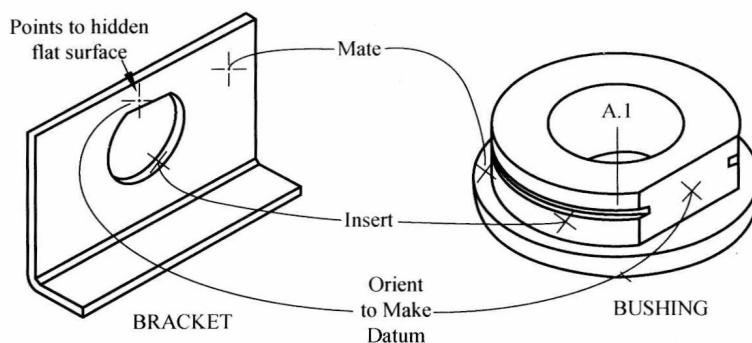


Fig. 1 - 4 Constrains for assembly the BRACKET and BUSHING parts

1.3 Multiview Drawing

Engineering drawing is an abstract universal language used to represent a designer's idea to others. It is the most accepted medium of communication in all phases of industrial and engineering work.

Any object can be viewed from six mutually perpendicular directions. These six views may be drawn if necessary. The top, front, and bottom views align vertically, while the rear, left-side, front, and right-side views align horizontally. To draw a view out of place is a serious error and is generally regarded as one of the worst possible mistakes in drawing.

A drawing for use in production should contain only those views needed for a clear and complete shape description of the object. These minimum required views are referred to as the necessary views. In selecting views, the drafter should choose those that best show essential contours or shapes and have the least number of hidden lines.

The three principle dimensions of an object are width, height, and depth. In technical drawing, these fixed terms are used for dimensions taken in these directions, regardless of the shape of the object. The terms “length” and “thickness” are not used because they cannot be applied in all cases. The top, front, and right-side views are arranged closed together. These are called the three regular views because they are the views most frequently used.



New Words and Expressions

- illustrate *vi.* 举例 *vt.* 图解
dimension *n.* 尺寸
horizontal *adj.* 水平的
permanent *adj.* 永久的
projection *n.* 投射
orthographic *adj.* 直角的
auxiliary *adj.* 辅助的
partial *adj.* 局部的
perpendicular *adj.* 垂直的
mutual *adj.* 共同的
rear *n.* 后面 *adj.* 后面的, 背面的
distinctive *adj.* 与众不同的, 有特色的
in this case 在这种情况下
a series of 一系列……
result from 原因是……
prior to 在……以前
be generally regarded as 一般地被看作……
be referred to 称为, 被认为是



Notes to the Text

1. The exploded drawing is a type of pictorial drawing designed to show several parts in their proper locations prior to assembly.

分解图是一种局部视图, 设计用来在产品装配之前, 显示在适当位置上的各个组成部分。

句中 designed to show several parts... 为过去分词短语做后置定语; to show several parts..., 不定式短语做目的状语。

2. An auxiliary plane that is parallel to the major surface can be used to display an undistorted view.

辅助平面平行于主要表面, 用来显示出并不歪曲的视图。

句中 that is parallel to the major surface 为定语从句, 修饰 plane。

3. To draw a view out of place is a serious error and is generally regarded as one of the worst possible mistakes in drawing.

将视图绘制在不适当的位置是一个严重的错误,而且常常被认为是绘图过程中可能出现的最为严重的错误之一。

To draw a view out of place 为不定式短语,在句中做主语;句中 out of place 可译为“不合适,不在适当的位置”;is generally regarded as 可译为“常常被认为……”。

4. In technical drawing, these fixed terms are used for dimensions taken in these directions, regardless of the shape of the object.

不论物体的形状如何,在技术制图中,这些固定术语常常用于了解这些方向的尺寸。In technical drawing 在句中做状语,可译为“在技术制图中”; regardless of 做“不管、不顾、不论……如何”解; taken in 可译为“了解”。



Exercises

1. Translate the following phrases and expressions.

Cartesian coordinate system

two-dimension drafting

broken view

坐标原点

局部视图

2. Fill in the blanks with the proper forms of the words given below.

(1) The _____ (fix) Cartesian coordinate system locates all points on an AutoCAD drawing by defining a series of positive and negative axes to locate positions in space.

(2) Auxiliary is a view created by _____ (project) 90° to an inclined surface, datum plane, or along an axis.

(3) When a symmetrical object is drafted, two views are sufficient to _____ (represent) it.

(4) Any object can be viewed from six _____ (mutual) perpendicular directions, as shown in Figure 1-5(a).

(5) In selecting views, the _____ (draft) should choose those that best show essential contours or shapes and have the least number of hidden lines.

3. Translate the following sentences into Chinese.

(1) There is a permanent origin point (0,0) which is referenced, an X axis running horizontally in a positive and negative direction from the origin, and a Y axis travelling perpendicularly in a vertical direction.

(2) The exploded drawing is a type of pictorial drawing designed to show several parts in their proper location prior to assembly.

(3) Engineering drawing is an abstract universal language used to represent a designer's idea to others.

(4) A drawing for use in production should contain only those views needed for a clear and complete shape description of the object.

(5) These are called the three regular views because they are the views most frequently used.

Lesson 2 Tolerances and Fits



Technical Terms

interchangeable manufacturing

互换性生产

interchangeability

可互换性

tolerance

允差,公差

clearance

间隙,间隙配合

interference

过盈,过盈配合

transition

过渡,过渡配合



Questions for Text Discussion

- 1) Why is it impossible to make anything to the exact size?
- 2) What is tolerance?
- 3) What are the three classes of fits?



Text

2.1 Tolerances

Interchangeable manufacturing allows parts made in widely separated locations to be brought together for the end assembly. That the parts all fit together properly is an essential element of mass production. Without interchangeable manufacturing, modern industry could not exist, and without effective size control by the engineer, interchangeable manufacturing could not be achieved.

However, it is impossible to make anything to the exact size. Parts can be made to very close dimensions, even to a few millionths of an inch or thousandths of a millimeter, but such accuracy is extremely expensive.

Fortunately, exact sizes are not needed. The need is for varying degrees of accuracy according to functional requirements. A manufacturer of children's tricycles would soon go out of business if the parts were made with jet-engine accuracy, no one would be willing to pay such price. So what is wanted is a means of specifying dimensions with whatever degree of accuracy is required. The answer to the problem is the specification of a tolerance on each dimension.

The tolerance is the total amount that a specific dimension is permitted to vary; it is the difference between the maximum and minimum limits for the dimension. In engineering when a product is designed, it consists of a number of parts and these parts mate with each other in some form. In the assembly it is important to consider the type of mating or fit between two parts which will actually define the way the parts are to behave during the working of the assembly.

2.2 Fits

The fit between two mating parts is the relationship which results from the clearance or interference obtained. There are three classes of fits, namely, clearance, transition and interference; these conditions are shown in Fig. 2 - 1.

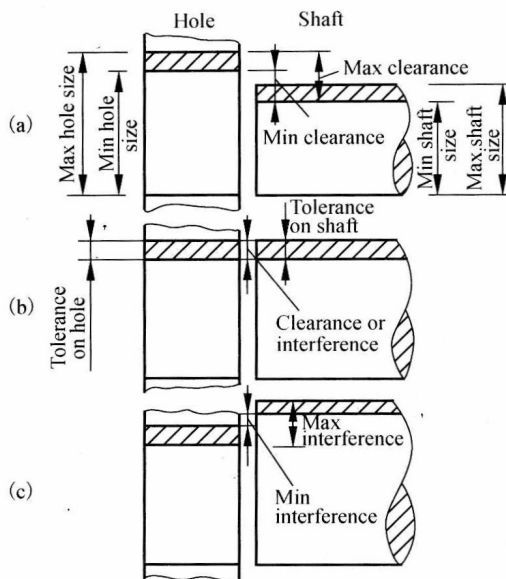


Fig. 2 - 1 Conditions of the fit between a hole and a shaft

- (a) Clearance fit (note that the shaft is always smaller than the hole);
- (b) Transition fit (note that the limits are such that the condition may be of clearance or interference fit);
- (c) Interference fit (note that the shaft is always larger than the hole)

(1) Interchangeability

An interchangeable part is one that can be substituted for a similar part manufactured to the same drawing. The interchangeability of component parts is based upon these two functions.

- 1) It is necessary for the relevant mating parts to be designed incorporating limits of size.
- 2) The parts must be manufactured within the specified limits.

(2) Limits of size

In deciding the limits necessary for a particular dimension, there are three considerations: functional importance, interchangeability and economics. The first necessitates the knowledge of what the component is required to do, the second its replacement in the event of failure, and the third the avoidance of unnecessary time and money being spent in production. The decision as to the degree of tolerance that can be utilized calls for discretion in the compromise between accuracy and economy. To assist the designer in his choice of limits and fits and to encourage uniformity throughout industry (home and abroad), a number of limit-and-fit systems have been published.

2.3 Symbols for tolerance of position and form

Since traditional narrative notes for specifying tolerance of position (location) and form (shape) may be confusing or unclear, may require too much space, and may not be understood internationally, most multinational companies have adopted symbols for such specifications. These symbols provide an accurate and concise means of specifying geometric characteristics and tolerances in a minimum of space. The symbols may be supplemented by notes if the precise geometric requirements cannot be conveyed by the symbols.



New Words and Expressions

interchangeable *adj.* 可互换的, 可交换的

assembly *n.* 装配; 集合

millimeter *n.* 毫米

accuracy *n.* 精确度, 准确性

tricycle *n.* 三轮车

tolerance *n.* 公差

clearance *n.* 间隙量

interference *n.* 过盈量

transition *n.* 转换

fit *n.* 配合

as a means of 作为……的工具

be termed as 被叫作, 被称作

result from 原因是……

be willing to... 乐于做……

in the event of... 在……时候



Notes to the Text

1. Interchangeable manufacturing allows parts made in widely separated locations to be brought together for the end assembly.

互换性生产允许将不同地点加工的零件汇到一起, 做最后的装配。

句中 made in widely separated locations 为过去分词短语, 做后置定语, 修饰 parts; to be brought together for the end assembly 为不定式短语, 做宾语补足语, 补充说明 parts。

2. A manufacturer of children's tricycles would soon go out of business if the parts were made with jet-engine accuracy, no one would be willing to pay such price.

如果童车制造商将童车制造成喷气式发动机一样的精度, 制造商将会很快退出童车市场, 而且也没有人情愿支付昂贵的价格购买。

此句为虚拟语气用法, 表示对现在所发生事情的一种虚拟, 句中 go out of business 可译为“退出市场”;

3. So what is wanted is a means of specifying dimensions with whatever degree of accuracy is

required.

因此,需要什么精度,就将其作为具体尺寸所要达到的精度等级。

what is wanted 为主语从句; whatever degree of accuracy is required 做介词 with 的宾语。

4. The tolerance is the total amount that a specific dimension is permitted to vary; it is the difference between the maximum and minimum limits for the dimension.

公差是具体尺寸允许变化的总量,是尺寸最大和最小极限之间的变化值。

句中 that a specific dimension is permitted to vary 为定语从句,修饰 amount; between the maximum and minimum limits for the dimension 为介词短语,做定语,修饰 difference。

5. The fit between two mating parts is the relationship which results from the clearance or interference obtained.

配合就是两个相互匹配的零件之间所产生的间隙量和过盈量所决定的关系。

句中 which results from the clearance or interference obtained 为定语从句,修饰 relationship。



Exercises

1. Translate the following phrases and expressions.

mass production

go out of business

the maximum and minimum limits

互换性制造

间隙配合

过渡配合

过盈配合

2. Judge true or false according to the text.

(1) Interchangeable manufacturing allows parts made in widely separated locations to be brought together for the end assembly. ()

(2) It is not impossible to make anything to the exact size. ()

(3) A manufacturer of children's tricycles would soon go out of business if the parts were not made with jet-engine accuracy. ()

(4) The tolerance is the total amount that a specific dimension is permitted to vary; it is the difference between the maximum and minimum limits for the dimension. ()

(5) In deciding the limits necessary for a particular dimension, there are two considerations: functional importance and interchangeability.

3. Translate the following sentences into Chinese.

(1) Without interchangeable manufacturing, modern industry could not exist, and without effective size control by the engineer, interchangeable manufacturing could not be achieved.

(2) The symbols may be supplemented by notes if the precise geometric requirements cannot be conveyed by the symbols.

(3) It is necessary for the relevant mating parts to be designed incorporating limits of size.

(4) The fit between two mating parts is the relationship which results from the clearance or in-

terference obtained.

(5) In engineering when a product is designed, it consists of a number of parts and these parts mate with each other in some form.



Useful Skills

科技英语的特点

科技英语作为科技专业范围内的应用语言,除具有普通英语相同的共性外,又具有个性,有自己独特的语言方式和文献体裁。为了能更加准确、完整地阅读、理解和翻译科技英语,现将它与普通英语相比所具有的特点做一说明。

一、无人称 (Impersonal)

科技英语第一个显著的特点就是句子通常没有人称代词,即所说的无人称句。科技文章描述和讨论的大多都是科学发现或科技事实。它所报道的主要是科技活动的结果或自然规律,而不是报告这些结果或自然规律是谁发现或完成的。因此,科技文章多使用无人称句。

例如: The exploded drawing is a type of pictorial drawing designed to show several parts in their proper locations prior to assembly.

分解图是一种局部视图,用于在装配前,说明各个零件所处的适当位置。

An important function of NOT gate is to produce an output signal that is opposite in nature to the input signal.

非门的重要功能是产生与输入相反的输出。

但需要说明的是,无人称不是绝对的。有时由于行文等的需要,也使用人称代词。但总的来说,人称句在科技文章中的比例是很小的。

例如: When a point is located, it is based on the origin point unless you are working in the three dimensions, in which case, you will have a third axis, called the Z axis.

我们是基于原点来确定点的位置的,除非你涉及三维空间,这时,你就会用到第三个轴,也就是 Z 轴。

二、语气正式 (Formal in speech)

由于人们对待科技活动的态度向来十分严肃,所以科技文章在用词和语气上也较正式。

例如: The parts must be manufactured within the specified limits.

零件必须在指定的极限范围内加工。

By directivity is meant the ability of the microphone to pick up sounds from various directions. 所谓方向性,指的就是话筒从各个方向接受声音的能力。

在第一个例句中,语气很干脆、直接、正式;后一个例句中则用了一个固定句式,即一个部分倒装句型,使语气显得比较正式。

三、陈述客观、准确 (Objective and accurate in statement)

由于科技文章是反映客观事物的,所以在文章中不能掺杂个人的主观意识,对客观事物的陈述必须客观、准确。定性讨论客观、定量分析准确是科技文章的显著特征之一。

例如: A clutch is a device for quickly and easily connecting or disconnecting a rotary shaft with a rotating coaxial shaft.