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UNIT 1

Engineering Drawing (工程制图)

Part I Reading and Translating

Section A Types of Views (视图的种类)

- 1.1 Basic Views
- 1.2 Sectional Views
- 1.3 Broken Views
- Exercises

Section B Mechanical Drawings and Dimensioning (机械制图及标注)

- 1.4 Dimensioning
- 1.5 Detail Drawings
- 1.6 Assembly Drawings
- Exercises

Part II Listening and Speaking

Part III Writing: Description of First-angle Projection (第一视觉投影)

Part I Reading and Translating

▶▶ Section A Types of Views (视图的种类) ▶▶

Engineering drawing is a graphic language shared by people in different nations. It deals with the means of representation of a designer's idea by lines or marks on the surface. In engineering environment, drawings or views are chosen to describe material objects like machine parts. Therefore, only the minimum number of views or drawings is used to portray the size and shape of a part completely, as shown in the following.

1.1 Basic Views

The First-angle Projection

Generally, there are **six principle views** to represent a machine part. These views are obtained by projecting to six principle projection-planes (Fig. 1-1). Frequently, in industry, three views are chosen to show fully the shape of an object, which consists of three adjacent views — the top, front and left side views, called first-angle projection. In first-angle projection, the “top” view is pushed down to the floor of the box, and the “front” view is pushed back to

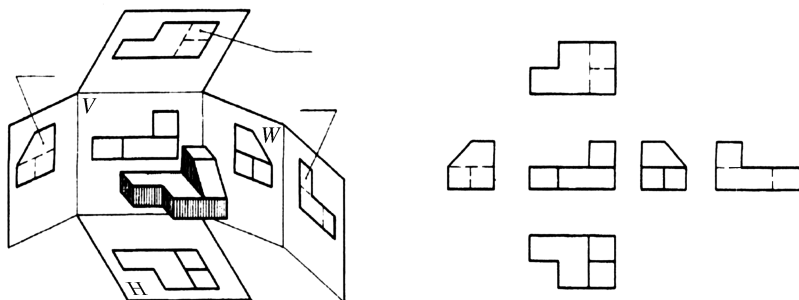


Fig. 1-1 Six Principle Views

the rear wall; and the representation of the “left” view is projected in the right sight of the object (Fig. 1 - 2).

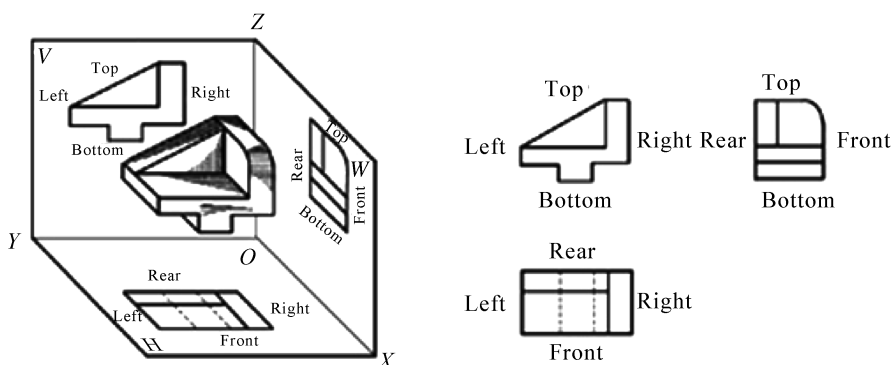


Fig. 1 - 2 Three Views

Auxiliary Views

If necessary, an auxiliary view will be combined with a partial view. An auxiliary view is another orthographic projection on a plane (not one of the principle planes). One of its characteristics is a projection on a plane perpendicular to one of the principle planes (Fig. 1 - 3).

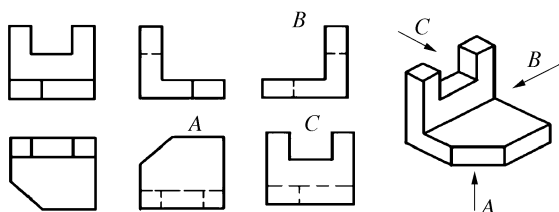


Fig. 1 - 3 Auxiliary Views of an Object

Partial Views

Principle views are generally used to represent an object. If some part of an object is not shown clearly and it is not necessary to draw the whole principle view, but to project the local part of the object to the principle plane, we can get a projection view of this part, called partial view as shown in Fig. 1 - 4.

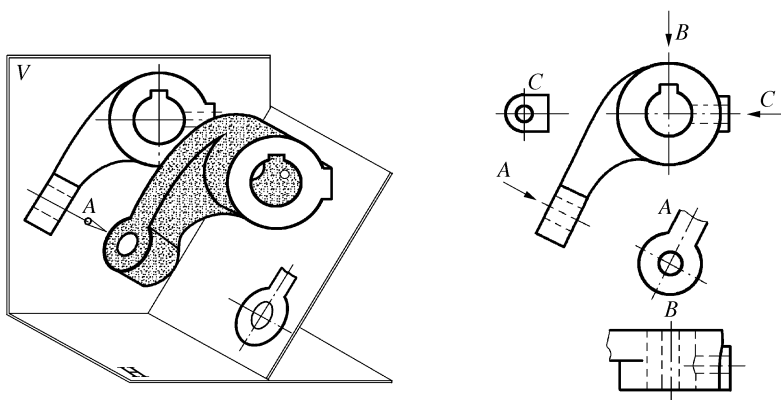


Fig. 1-4 Partial View

1.2 Sectional Views

A simple object may have an invisible and complicated internal design, while a view “in section” can clearly display the detailed structure. A sectional view is supposed to have a cutting plane. Its front part is removed and this leaves the remainder exposing the interior features. Representations of this kind are specified mainly by full and half views.

Full View

A full view is derived from a cutting plane passing entirely through an object. The resulting section will show the whole model on the datum plane (Fig. 1-5).

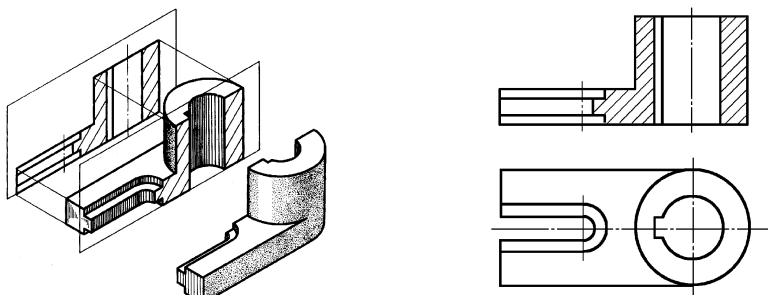


Fig. 1-5 Full-sectional Views of an Object

Half View

If the cutting plane cuts only half-way across the object, usually symmetrical, a half view of the section appears. A sectional view of this type deals with the representation of both the interior and exterior construction of a symmetrical object, as shown in Fig. 1 - 6.

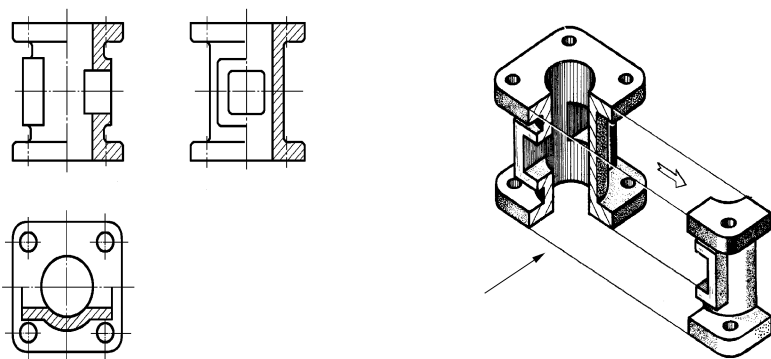


Fig. 1 - 6 Half-section View of an Object

1.3 Broken Views

From a geometric point of view, a broken view is an orthographic projection of an object from the position of a plane. View of this type is used to display only a cross-section of a body for a particular view (Fig. 1 - 7). More plainly, it is supposed to cut an object perfectly along a cutting plane, where the parallel cross section can be drawn.

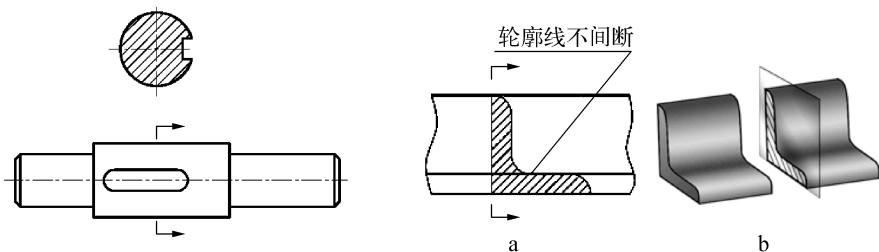


Fig. 1 - 7 Broken View

NEW WORDS

1. graphic /'græfɪk/ *a.* 图形的, 图表的
2. minimum /'mɪnɪmə/ *a.* 最小的
n. 最小值
3. portray /pə:'treɪ/ *v.* 描绘, 描画
4. plane /pleɪn/ *n.* 平面
v. 刨, 刨平
5. project /'prɒdʒekt/ *v.* 投映
6. adjacent /ə'dʒeɪsənt/ *a.* 邻近的, 接近的
7. partial /'pɑ:ʃəl/ *a.* 部分的, 局部的
8. outline /'əʊtlaɪn/ *n.* 轮廓, 略图
v. 描画轮廓, 略述
9. auxiliary /ɔ:g'zɪlɪəri/ *a.* 辅助的, 补助的
10. combination /ˌkɒmbɪ'neɪʃən/ *n.* 结合, 联合
11. orthographic /ɔ:θə'græfɪk/ *a.* 正交的, 直线的
12. perpendicular /ˌpɜ:pən'dɪkjələ/ *a.* 垂直的, 正交的
n. 垂线
13. complicated /'kɒmplɪkeɪtɪd/ *a.* 复杂的, 难解的
14. internal /ɪn'tɜ:nl/ *a.* 内在的; 国内的
15. detail /'di:teɪl, dɪ'teɪl/ *v.* 详述, 细说
n. 细节, 详情
16. section /'sekʃən/ *n.* 截面, 断片
17. remainder /rɪ'meɪndə/ *n.* 残留(人/物)
a. 剩余的
18. expose /ɪks'pəʊz/ *v.* 使暴露, 揭露
19. feature /'fi:tʃə/ *n.* 特征, 特色
v. 是……的特色
20. represent /ˌrɪ:prɪ'zent/ *v.* 表现, 描绘

representation /ˌreprɪzən'teɪʃən/ <i>n.</i>	表现, 表述
21. specify /'spesɪfaɪ/ <i>v.</i>	指定, 详细说明
specification /ˌspesɪfɪ'keɪʃən/ <i>n.</i>	规格, 说明书
22. datum /'deɪtəm/ <i>n.</i>	基准面; 数据; 资料
23. symmetrical /sɪ'metrɪkəl/ <i>a.</i>	对称的, 均匀的
24. interior /ɪn'tɪəriə/ <i>a.</i>	内部的
<i>n.</i>	内部
25. exterior /eks'tɪəriə/ <i>a.</i>	外部的, 表面的
<i>n.</i>	外部, 表面
26. geometric /dʒɪə'metrɪkəl/ <i>a.</i>	几何的; 几何学的

TECHNICAL EXPRESSIONS

1. engineering drawing	工程制图
2. the first-angle projection	第一视角投影
3. projection view	投影图
4. projection-plane	投影面
5. partial view	局部视图
6. auxiliary view	辅助视图
7. sectional view	剖视图
8. full view	全剖视图
9. half view	半剖视图
10. broken view	断面图
11. section view/drawing	剖面图
12. section-lining	剖面线
13. cross-section	横截面

Notes

1. Engineering drawing is a graphic language shared by people in different

nations.

工程制图是世界各国人们都使用的一种绘图语言。

句中 shared by people in different nations 为过去分词短语作后置定语,修饰前面的先行词 a graphic language,相当于定语从句。

2. These views are obtained by projecting to six principle projection-planes.

这类视图是由向 6 个基本投影面的投影而形成。

projecting to six principle projection-planes 为动名词短语作介词 by 的宾语。

3. A sectional view is supposed to have a cutting plane.

剖视图有一个假想的剖切面(切削平面)。

to have a cutting plane 为不定式短语作主语补足语。

4. A full view is derived from a cutting plane passing entirely through an object.

The resulting section will show the whole model on the datum plane.

当剖面通过全部物体时,所得到的是一幅全剖视图,所得到的剖面在该基准面上展示出整个物体的模型。

passing entirely through an object 为现在分词短语作 a cutting plane 的后置定语。

5. One of its characteristics is a projection on a plane perpendicular to one of the principle planes.

它的一个主要特征就是其在一个平面上所产生的投影与其他几个基本投影面之一互为垂直。

6. It is not necessary to draw the whole principle view, but to project the local part of the object to the principle plane.

没有必要绘出完整的基本视图,只需将这一局部形状向基本投影面投射。

not ... but ... 为一固定结构。

7. In mechanical drawing, a broken view is also an orthographic projection of an object from the position of a plane.

机械绘图中,断面图也是一个物体“面”的正投影。

8. More plainly, it is supposed to cut an object perfectly along a cutting plane, where the parallel cross section can be drawn.

更确切地讲,假想的剖切平面将物体的某一处截断,仅就截断面处的形状绘成图形。

where 引导了一个非限制性定语从句修饰 a cutting plane。



Exercises

I. Tell whether each of the following statements is true or false.

1. Graphic representation means dealing with the expression of ideas by lines or marks impressed on the surface.
2. In engineering environment, three views are chosen to show fully the shape of an object; these drawings include the top, front and left side views.
3. Sectional views extremely serve the purpose of displaying the detailed structure of an object.
4. A view “in section” is one obtained by imagining the object cut by a cutting plane, the front portion being removed in order to show clearly the interior features.
5. An auxiliary view is derived from projecting to an inclined surface at an angle larger than 90 degrees, or a more inclined plane.
6. A broken section needs to remove a section between two points in order to make the two remaining sections close together.
7. Not all views are necessarily used, and the determination of what surface constitutes the front, back, top and bottom depends on the projection used.
8. In first-angle projection, the “top” view is under the front view, the right view is at the left of the front view.

II. Match the items listed in the following columns.

- | | |
|----------------|---------------------------------------|
| a. minimum | 1. inside of something |
| b. adjacent | 2. close to |
| c. complicated | 3. the shape of an object or a figure |
| d. internal | 4. not easy to understand or analyze |
| e. partial | 5. a flat or level surface |
| f. plane | 6. only a part; not total |
| g. expose | 7. to make visible |
| h. outline | 8. to cause to lean; slant |

- i. incline
- j. exterior
- 9. outside part of anything
- 10. the least possible quantity or degree

III. Fill in each blank with a proper word beginning with the letter given.

Section Drawings

Many objects have c _____ interior details, which cannot be clearly shown by m _____ of front, top, side or pictorial views. Section views enable the engineers to show the i _____ in such a way. Features of section drawings are cutting-plane symbols, which show where i _____ cutting planes are passed to produce the sections, a _____ section-lining which appears in the section view on all p _____ that have been in contact with the cutting plane. When only a part of the o _____ is to be shown in section, conventional r _____ such as a revolved, rotated or broken-out section is used. Thus, c _____ engineering drawings will be a combination of top and front views, and p _____ or pictorial views.

IV. Translate the following sentences.

1. 图样是一种在平面上用线条及符号来表达设计者思想的一种手段。(deal with ...)
2. 在制造业中,通常只用规定的几类视图来展示某一物体的形状。(portray)
3. 迫于就业的压力,学生必须从金工实训中学到实用知识。(derive ... from ...)
4. 剖视图可让设计人员更好地表现某一物体的内部细节。(enable)

▶▶ Section B Mechanical Drawings and Dimensioning (机械制图及标注) ▶

Mechanical drawings can be classified in two ways. They are recognized as detail drawings and assembly drawings. However, before they are recommended for manufacturing, dimensioning and identifying are required.

1.4 Dimensioning

As the purpose of an engineering drawing is to convey the ideas of the

designer to workshop, any drawing must be given adequate information, so a part can be manufactured. Before they are introduced to the workshop, careful identifications and labels should be given for the final product or process. Thus, the complete, detailed specification of the elements is required for the completion of this stage of design. In the detailed stage, the task will involve describing the size, shape, orientation, color, material and so on.

1.5 Detail Drawings

A detail drawing is obtained by taking a portion of an existing view and giving complete information for the production of a part. So it is necessary to be indicated with clear dimensions, finished surfaces, the number and manufacturing materials (Fig. 1 – 8).

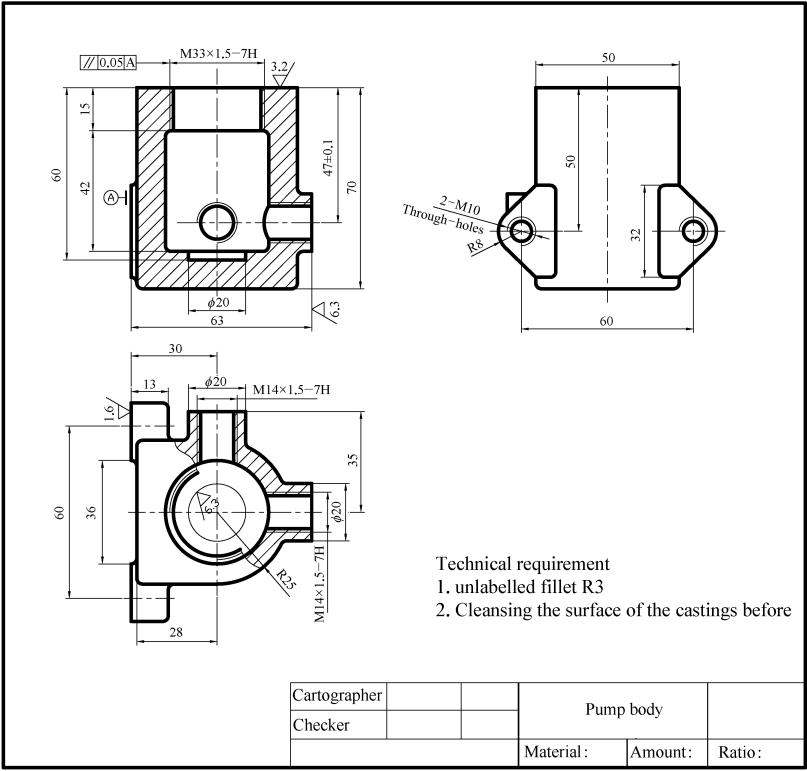


Fig. 1 – 8 A Detail Drawing

1.6 Assembly Drawings

There are several types of such drawings: design assemble drawings, working assemble drawings, unit assemble drawings, installation diagrams, and so on. A general assembly drawing deals with the parts of a machine or machine unit assembled in their relative working positions (Fig. 1 - 9). A set of working drawings should include detail drawings of all parts and all relative information.

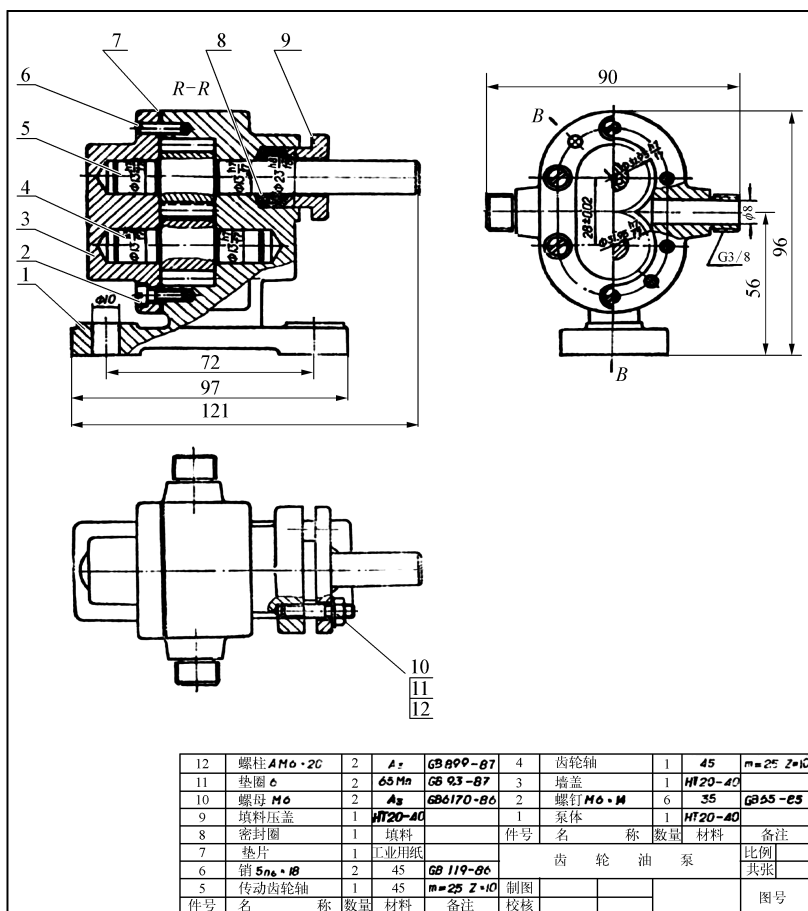


Fig. 1 - 9 An Assemble Drawing

NEW WORDS

- | | |
|--------------------------------------|------------|
| 1. classify /'klæsɪfaɪ/ v. | 分类, 分等 |
| classification /klæsɪfɪ'keɪʃn/ n. | 分类, 分级 |
| 2. identify /aɪ'dentɪfaɪ/ v. | 识别, 确定 |
| identification /aɪdentɪfɪ'keɪʃən/ n. | 鉴定, 认同 |
| 3. standard /'stændəd/ n. | 标准, 水准 |
| 4. indicate /'ɪndɪkeɪt/ v. | 指出, 预示 |
| 5. finished /'fɪnɪʃt/ a. | 精加工过的, 完工的 |
| 6. relative /'relətɪv/ a. | 有关系的, 相对的 |
| 7. label /'leɪbl/ v. | 为……标注 |
| n. | 标签 |
| 8. process /prə'ses/ n. | 过程, 程序 |
| v. | 加工, 处理 |
| 9. orientation /ˌɒ(ː)riən'teɪʃən/ n. | 方位, 定向 |
| 10. assemble /ə'sembl/ v. | 装配, 集合 |
| assembly /ə'sembli/ n. | 装配, 集结 |
| 11. dimension /dɪ'menʃən/ n. | 尺寸, 尺度 |
| v. | 标注 |

TECHNICAL EXPRESSIONS

- | | |
|-----------------------------|-------|
| 1. detail drawing | 零件图 |
| 2. assembly drawing | 装配图 |
| 3. design assemble drawing | 设计装配图 |
| 4. working assemble drawing | 施工装配图 |
| 5. general assemble drawing | 总装配图 |
| 6. installation diagram | 安装图 |



Notes

1. They are recognized as detail drawings and assembly drawings.
它们被称为零件图和装配图。
2. A detail drawing is obtained by taking a portion of an existing view and giving complete information for the production of a part.
零件图是一种用现有视图上的一部分为零件生产提供完整信息的图样。
existing 是现在分词作定语。
3. In the detailed stage, the task will involve describing the size, shape, orientation, color, material and so on.
标注阶段的工作就是将零件的尺寸、形状、方位、颜色、材料等进行详细描述。
involve 表示“包括”等意思,后接动名词。
4. A general assembly drawing deals with the parts of a machine or machine unit assembled in their relative working positions.
总装配图是一种展示机器部件或装配在相对工作位置的机械装置的图样。
assembled in their relative working positions 是过去分词短语,在句中作定语,
相当于定语从句 which are assembled in their relative working positions.



Exercises

- I. Choose the best answer for each of the following statements or questions according to the text.
1. Among the variety of engineering drawings, only _____ is recognized as an acceptable standard in today's modern manufacturing industry.
A. the detail drawing B. the assembly drawing
C. the sectional drawing D. the multi-view drawing
 2. What differentiates a detail drawing from an assembly drawing is that _____.
A. it should be given complete information for the manufacturer,

- describing the work with the adequate dimensions to the part's size
- B. it should be given more views to portray the size and shape of an object
- C. it is unnecessary to show shop operations
- D. it should be given an additional assemble drawing for manufacturing the part
3. Which of the following statements does the classification of the assemble drawings **NOT** include?
- A. Multi-view drawings. B. Design assemble drawings.
- C. Working assemble drawings. D. Installation diagrams.
4. _____ is called detailing stage.
- A. Selecting the kinds of components that will be used to make the process or product
- B. Revision and further improvement of the product
- C. Finding and using information in machine design
- D. Showing dimensions and describing the shape of objects
5. Engineering drawing is referred to as a “universal language”. It can be understood and used by _____.
- A. people interested in art and languages
- B. engineers and other technical personnel associated with the engineering profession
- C. groups and nations in farming and fishing industry
- D. those who live outside space of the earth

II . Complete each of the following sentences with one suitable word or phrase from the box. Change the word form when necessary.

specified	indicate	identify	finished	assemble
deals	construction	involve	recognized	classify

1. There are two _____ classes of drawings. They are detail drawings and assembly drawings.

2. The parts must be manufactured within the _____ limits.
3. Raw materials make up only a small proportion of the cost of the _____ product.
4. Fundamentally, engineering design _____ with the process of problem solving.
5. The cracking of the ice _____ a change of temperature.
6. They needed to _____ the object and make sure it would actually being a UFO because UFO is an unidentified flying object.
7. When you buy furniture from IKEA you must _____ it yourself.
8. The matter is serious because it _____ your reputation.
9. Elements are usually _____ as metals or non-metals.
10. In a developed city, such as Beijing, everywhere you go you see building under _____.

III. Translate the following sentences.

1. Layout drawings of different types are used in different manufacturing fields for various purposes.
2. As the purpose of engineering drawing is to express graphically the ideas and information necessary to others, many drawings must show dimensions so that workers can manufacture parts that will fit together.
3. Usually, a set of working drawings includes detail drawing of all parts and an assembly drawing of the complete unit.
4. A typical general assembly drawing should include specific use of sectioning and identification of each part with a numbered balloon.

Part II Listening and Speaking

I. Fill in the blanks with what you hear on the CD only once.

1. Engineering drawing _____ a graphic language shared by people in

different nations.

2. It deals with the means of representation of a designer's idea by lines or marks _____ the surface.
3. Only the minimum number of views or drawings is _____ to portray completely the size and shape of a part.
4. Generally, there are _____ principle views to represent a machine part.
5. In industry, three views are usually _____ to show fully the shape of an object.
6. Even a simple object may _____ an invisible and complicated internal design.
7. A front part is removed, and this _____ the remainder exposing the interior features.
8. A full view is derived _____ the cutting plane passing entirely through an object.
9. If the section of an object is symmetrical, typically, a partial view will be used. _____, two views are sufficient to detail the internal design.
10. A broken section needs to remove a section between two points _____ make the two remaining sections close together.

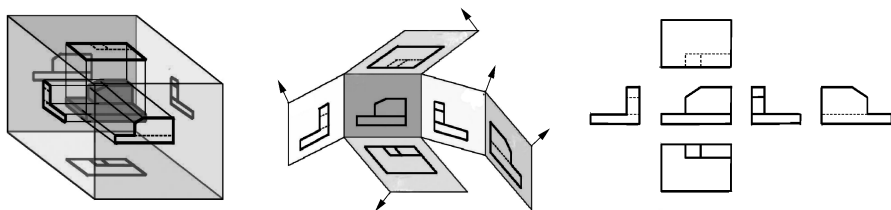
II . Listen to the following paragraph three times and try to fill in the blanks with the words you hear on the CD.

An engineering drawing is a type of 1. _____ used to represent a designer's idea by lines or marks 2. _____. Its purpose is to accurately and clearly seize all the geometric features of a product or a component. The end goal of an engineering drawing is to convey 3. _____ that will allow a manufacturer to produce that component. The process of producing engineering drawings, and the skill of producing them, is often 4. _____ as technical drawing, although technical drawings are also required for disciplines that would not ordinarily 5. _____ as parts of engineering.

Ⅲ. Read aloud the following paragraph so that your classmate can understand what you are reading.

Engineering drawing is a graphic language shared by people in different nations. It deals with the means of representation of a designer's idea by lines or marks on the surface. In engineering environment, drawings or views are chosen to describe material objects like machine parts. Therefore, only the minimum number of views or drawings is used to portray the size and shape of a part completely.

Ⅳ. Describe the following pictures of first-angle projection in your own words.



Part Ⅲ Writing: Description of First-angle Projection (第一视觉投影)

This part is to test your ability to do practical writing. You are required to write a short passage to describe the first-angle projection according to the above pictures in the exercise Ⅳ.
