



职业教育院校机电类专业规划教材

机械工程专业英语

English Course for
Mechanical Engineering

王晓江 ◎ 主编



机械工业出版社
CHINA MACHINE PRESS

职业教育院校机电类专业规划教材

机械工程专业英语

English Course for Mechanical Engineering

主 编 王晓江
参 编 吴 兵 卢端敏 魏康民
张兆隆 李学哲 肖春艳
主 审 王兆奇



机械工业出版社

本书中的课文和阅读材料均选自英、美等国专业教材和专业刊物中的原文,共60余篇。全书分10章、26个单元。每个单元分别由课文、生词和短语、难句注解、专业术语、练习、阅读材料六部分组成。本书内容包括机械制造基础,工具材料及热处理,工程材料成形方法,刀具、夹紧原理和夹具,机床,机械加工工艺,CAD/CAM和数控机床,特种加工,现代制造技术,加工零件的表面质量。

本书内容全面,图文并茂,难度适中,融知识性和趣味性于一体,使读者在掌握机械工程专业英语的同时,能够进一步学习机械制造专业的有关知识。为了便于学习,本书附录A、B、C、D分别给出了常用计量单位英汉对照表、部分专业标准名称英汉对照、专业英语翻译技巧和课文参考译文。

本书可作为职业院校机电类专业学生的专业英语教材,也可作为机械类各专业及其他相近专业的教学参考书,同时还可供机械制造专业工程技术人员学习和参考。

图书在版编目(CIP)数据

机械工程专业英语/王晓江主编. —北京:机械工业出版社,2011.2

职业院校机电类专业规划教材

ISBN 978-7-111-33300-5

I. ①机… II. ①王… III. ①机械工程—英语—高等学校:技术学校—教材 IV. ①H31

中国版本图书馆CIP数据核字(2011)第017577号

机械工业出版社(北京市百万庄大街22号 邮政编码100037)

策划编辑:汪光灿 责任编辑:汪光灿 王海霞

版式设计:霍永明 责任校对:纪敬

封面设计:王伟光 责任印制:乔宇

北京瑞德印刷有限公司印刷(三河市胜利装订厂装订)

2011年4月第1版第1次印刷

184mm×260mm·11.25印张·278千字

0001—3000册

标准书号:ISBN 978-7-111-33300-5

定价:24.00元

凡购本书,如有缺页、倒页、脱页,由本社发行部调换

电话服务

网络服务

社服务中心:(010)88361066

门户网:<http://www.cmpbook.com>

销售一部:(010)68326294

教材网:<http://www.cmpedu.com>

销售二部:(010)88379649

读者购书热线:(010)88379203

封面无防伪标均为盗版

前言

本书是职业教育院校机电类专业规划教材,根据“机械工程专业英语”课程教学大纲编写而成。编写本书的目的是帮助机电类专业学生进一步适应本专业发展的需要,提高阅读英语原文和翻译有关专业英语书刊的能力,学习和借鉴国外先进的制造技术,从而大力推进我国机械制造行业的快速发展。本书中的内容均选自英、美等国专业教材及专业刊物中的原文,共60多篇(其中课文26篇,阅读材料40多篇;涉及专业词汇500个左右,专业术语800余条)。本书分10章、26个单元。每个单元由课文、生词和短语、难句注解、专业术语、练习、阅读材料六部分组成。内容涉及机械制造基础、工具材料及热处理、工程材料成形方法,刀具、夹紧原理和夹具,机床,机械加工工艺,CAD/CAM和数控机床,特种加工,现代制造技术,加工零件的表面质量。

本书可供职业教育院校机电类专业学生使用,也可供有关机械制造类企业工程技术人员参考。在教学中,各院校可根据实际情况调整授课顺序或删减有关内容。

本书由陕西工业职业技术学院王晓江主编,(编写第1、第2、第3章,附录A、B、D);参加编写的人员有陕西工业职业技术学院吴兵(编写第4、第5章)、魏康民(编写第10章),张家界航空工业职业技术学院卢端敏(编写第9章),河北机电职业技术学院张兆隆(编写第6章),沈阳职业技术学院李学哲(编写附录C),陕西工业职业技术学院肖春艳(编写第7、第8章)。本书由陕西工业职业技术学院王兆奇教授主审,陕西工业职业技术学院澳大利亚籍教师 Paul Conroy 审阅了全书。

本书在编写过程中得到了田峰社、徐惠、张普礼、殷城、侯会喜、钱泉森等同志的大力支持。他们对教材提出了许多宝贵的修改意见,在此表示衷心的感谢。由于编者水平有限,加上时间紧迫,经验不足,书中难免会有缺点和错误,欢迎读者批评。

编者

CONTENTS

前言

Chapter 1 Fundamentals of Machine

Manufacturing 1

Unit 1 Third-angle Projection 1

Unit 2 Tolerances 6

Unit 3 Properties of Engineering Materials 10

Chapter 2 Tool Materials and Heat

Treatment 14

Unit 1 Tool Materials 14

Unit 2 Cutting Tool Materials 18

Unit 3 Heat Treating of Tool Steels 22

Chapter 3 Engineering Materials Forming

Methods 28

Unit 1 Foundry Processes 28

Unit 2 Soldering and Welding 32

Unit 3 Hot Working and Cold Working Processes 37

Chapter 4 Cutting Tools, Workholding and

Fixtures 43

Unit 1 Cutting Tools 43

Unit 2 Workholding Principles 48

Unit 3 Jig and Fixture Design 52

Chapter 5 Machine Tools 58

Unit 1 Lathes 58

Unit 2 Milling Machines 63

Unit 3 Shapers and Planers 68

Unit 4 Grinding Machines 74

Chapter 6 Machining Processes 81

Unit 1 Manufacturing Process 81

Unit 2 Forming of Gear Teeth 87

Chapter 7 CAD/CAM and Numerical Control

Machines 92

Unit 1 CAD/CAM 92

Unit 2 NC Machines 96

Chapter 8 Nontraditional Manufacturing 102

Unit 1 Nontraditional Material Removal Processes 102

Unit 2 Electrodishcharge Machines 106

Chapter 9 Modern Manufacturing

Technology 111

Unit 1 Rapid Prototyping and Manufacturing 111

Unit 2 High-speed Machining 115

Chapter 10 Qualities of Machined

Surface 120

Unit 1 Surface Quality 120

Unit 2 Measuring and Gaging Instruments 124

Appendices 130

Appendix A Tables of Weights and Measure 130

Appendix B Standards 133

Appendix C Translation Knowledge 135

Appendix D Translated Texts 156

References 176

Chapter 1 Fundamentals of Machine Manufacturing

Unit 1 Third-angle Projection

Text

The six views. Any object can be viewed from six mutually perpendicular directions, as shown in Figure 1-1-1a. The six views may be drawn if necessary, as shown in Figure 1-1-1b. The six views are always arranged as shown, which is the American National Standard arrangement. 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. ^①

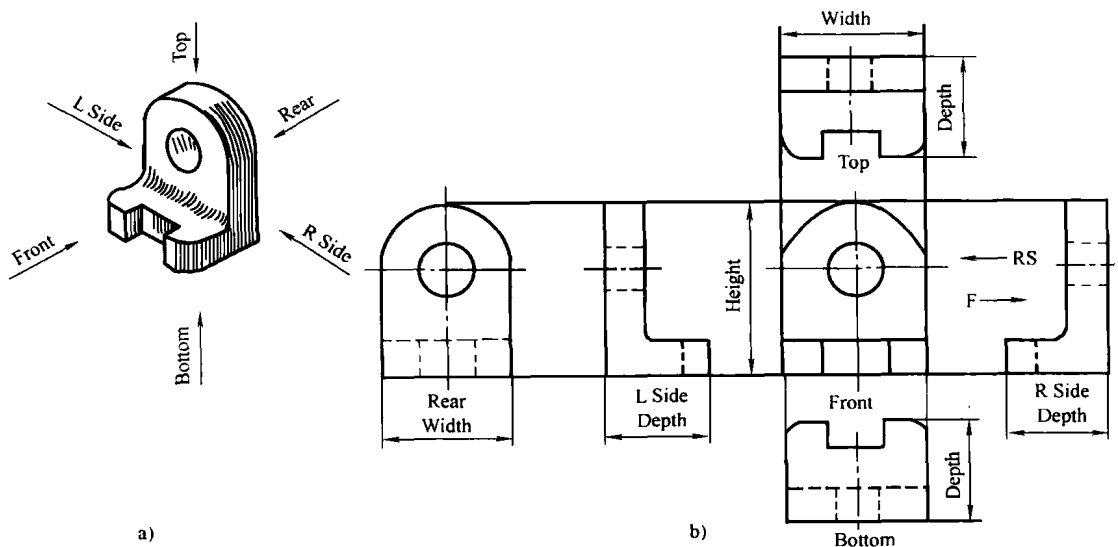


Figure 1-1-1 The six views

Note that height is shown in the rear, left-side, front, and right-side views; width is shown in the rear, top, front, and bottom views; and depth is shown in the four views that surround the front view—namely, the left-side, top, right-side, and bottom views. Each view shows two of the principal dimensions. Note also that in the four views that surround the front view, the front of the object faces toward the front view.

Adjacent views are reciprocal. If the front view in Figure 1-1-1 is imagined to be the object itself, the right-side view is obtained by looking toward the right side of the front view, as shown

by the arrow RS. Likewise, if the right-side view is imagined to be the object, the front view is obtained by looking toward the left side of the right-side view, as shown by the arrow F. The same relation exists between any two adjacent views.

Necessary views. 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.

As shown in Figure 1-1-1, three distinctive features of this object need to be shown on the drawing: rounded top and hole, seen from the front; rectangular notch and rounded corners, seen from the top; and right angle with filleted corner, seen from the side.

The three principal 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.^② The terms “length” and “thickness” are not used because they cannot be applied in all cases. The top, front, and right-side views, arranged close together, are shown in Figure 1-1-1. These are called the three regular views because they are the views most frequently used.

New Words and Expressions

1. projection /prə'dʒekʃən/ *n.* 投影, 发射
2. view /vju:/ *n.* 视图; *vt.* 观察
3. mutual /'mju:tʃuəl/ *a.* 相互的, 共同的
4. perpendicular /ˌpə:pən'dikjulə/ *a.* 垂直的, 正交的; *n.* 垂直
5. draw /drɔ:/ *vt.* 拉, 拖, 绘制, 描写; *vi.* 制图
6. arrange /ə'reindʒ/ *vt.* 整理, 排列; *vi.* 安排, 准备
7. top /tɒp/ *n.* 顶端, 上部; *a.* 最高的, 顶上的
8. front /frʌnt/ *n.* 正面, 前面; *a.* 正面的; *vt. & vi.* 面向
9. align /ə'lain/ *vt. & vi.* 使成一直线, 排列成一行
10. rear /riə/ *n.* 后部, 后面; *a.* 后面的, 后部的
11. adjacent /ə'dʒeɪsənt/ *a.* 接近的, 毗邻的
12. reciprocal /ri'sɪprəkəl/ *a.* 相互的, 相应的; *n.* 倒数
13. arrow /'ærəʊ/ *n.* 箭, 指针, 箭号
14. description /dis'kripʃən/ *n.* 叙述, 图说, 绘制
15. distinctive /dis'tɪŋktɪv/ *a.* 有区别的, 特殊的
16. be generally regarded as 一般被看作……, 被认为……
17. left-side view 左视图
18. right-side view 右视图
19. hidden line (dotted line, dashed line) 隐藏线, 虚线

Notes

① 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。

句中 To draw a view out of place 为不定式短语，在句中作主语，其中的 out of place 可译为“不合适，在不适当的位置”。句中 is generally regarded as 可译为“常常被认为……”

② In technical drawing, these fixed terms are used for dimensions taken in these directions, regardless of the shape of the object.

在专业绘图中，不论物体的形状如何，这些固定术语都被用来表示这些方向上的尺寸。

In technical drawing 在句中作状语，可译为“在专业制图中”；taken in these directions 是过去分词短语作后置定语，可译为“沿着这些方向上测得的”；regardless of 作“不管”、“不顾”、“不论……如何”解；in 可译为“表示”。

Glossary of Terms

1. third-angle projection 第三角投影
2. first-angle projection 第一角投影
3. mechanical drawing 机械制图
4. standard drawing 标准图
5. drawing sheet, drawing paper 图纸
6. drawer, draftsman 绘图员
7. working drawing 工作图，生产图
8. detail drawing, part drawing 零件图
9. sketch (layout, outline) 草图
10. assembly drawing 装配图
11. design drawing 设计图
12. blueprint 蓝图
13. engineering drawing 工程图
14. structure drawing 结构图
15. title blocks 标题栏
16. sectional view 剖视图
17. orthographic projection 正投影
18. the top view 俯视投影，俯视图
19. the front view 主视投影，主视图
20. the side view 侧投影
21. the bottom view 仰视图
22. rear (back) view 后视图
23. side (end) view 侧（端）视图
24. three-view drawing 三视图

25. pictorial drawing 立体图
26. technical requirements 技术要求
27. a detail list of components 零件明细表
28. scale, proportional scale 比例
29. dimensional line 尺寸线
30. descriptive geometry 画法几何
31. dimensioning, size marking 标注尺寸
32. straight line (arc, curve) 直线 (圆弧, 曲线)
33. continuous thick line (full line, visible line) 粗实线
34. continuous thin line 细实线
35. profile, section (full ~, half ~, offset ~, broken-out ~, rotating ~, inclined ~, compound ~) 剖面 (全剖、半剖、阶梯剖、局部剖、旋转剖、斜剖、复合剖)

Exercises

I. Answer the following questions according to the text.

1. What is the third-angle projection?
2. What are the differences between third-angle projection and first-angle projection?
3. List the six principal views of an object.
4. In a drawing that shows the top, front, and right-side view, which two views show depth? Which view shows depth vertically? Which view shows depth horizontally?
5. What are the three principal dimensions of an object?

II. Translate the following key terms into Chinese.

1. view 2. draw 3. projection 4. top 5. front 6. rear 7. arrowhead 8. perpendicular 9. arrange 10. height 11. width 12. depth 13. blueprint 14. left-side view 15. right-side view 16. hidden line 17. proportional scale 18. dimensional line 19. full line 20. three-view drawing

Reading Materials

First-angle Projection

If the vertical and horizontal planes of projection are considered indefinite in extent and intersecting at 90° with each other, the four dihedral angles produced are the first, second, third, and fourth angles (Figure 1-1-2a).

If the object is placed above the horizontal plane and in front of the vertical plane, the object is in the first angle. In this case, the observer always looks through the object and to the planes of projection. Thus, the right-side view is still obtained by looking toward the right side of the object, the front by looking toward the front, and the top by looking down toward the top; but the views are projected from the object onto a plane in each case. When the planes are unfolded (Figure 1-1-2b), the right-side view falls at the left of the front view, and the top view falls below the front view, as shown. A comparison between first-angle orthographic projection and third-angle

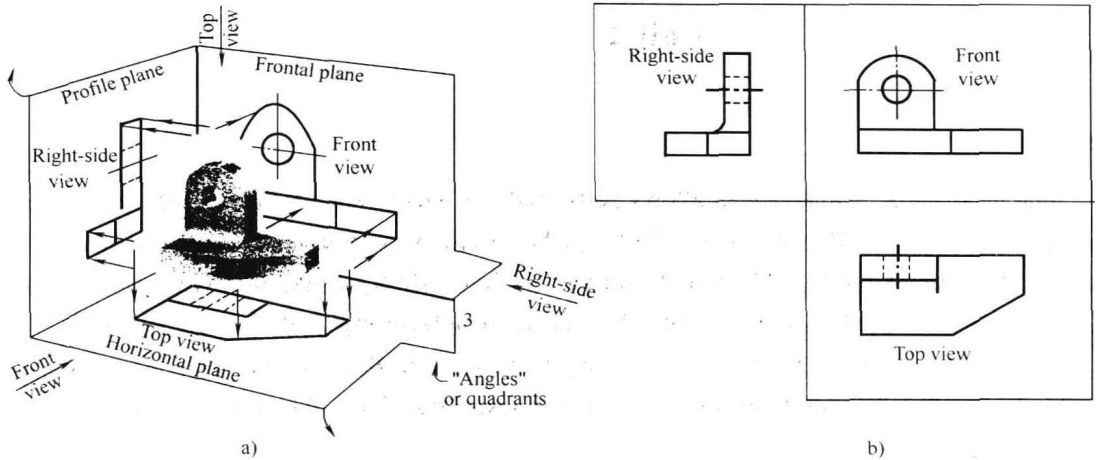


Figure 1-1-2 First-angle projection

orthographic projection is shown in Figure 1-1-3. The front, top, and right-side views shown in Figure 1-1-2b for first-angle projection are repeated in Figure 1-1-3a. Ultimately, the only difference between third-angle and first-angle projection is the arrangement of the views. Still, confusion and possibly manufacturing errors may result when the user reading a first-angle drawing thinks it is a third-angle drawing, or vice versa. To avoid misunderstanding, international projection symbols, shown in Figure 1-1-3b, have been developed to distinguish between first-angle and third-angle projections on drawings. On drawings where the possibility of confusion is anticipated, these symbols may appear in or near the title box.

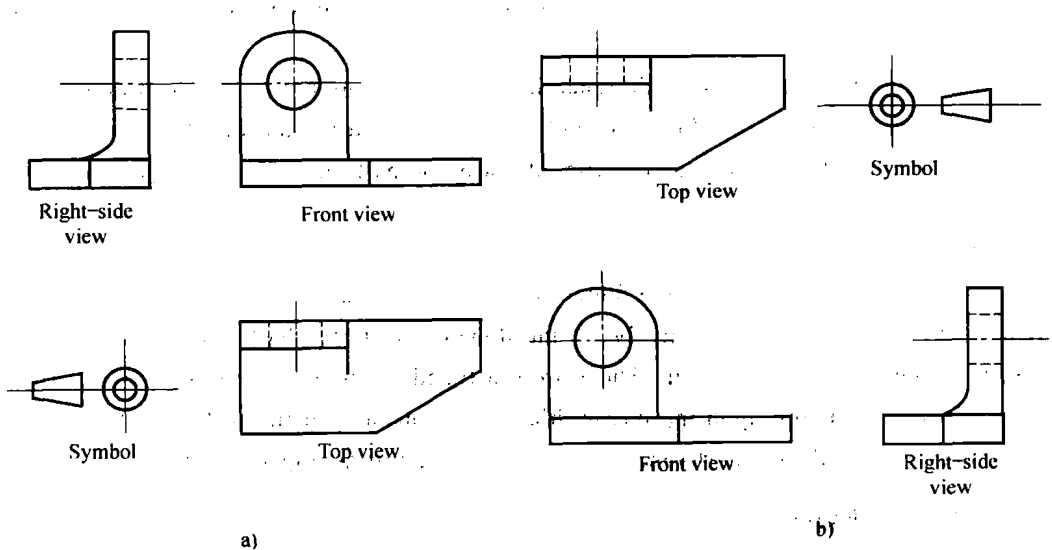


Figure 1-1-3 First-angle projection compared to third-angle projection

Unit 2 Tolerances

Text

Interchangeable manufacturing allows parts made in widely separated localities to be brought together for 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. ^①

However, it is impossible to make anything to 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 the price. ^② 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.

Tolerance is the total amount that a specific dimension is permitted to vary; it is the difference between the maximum and the minimum limits for the dimension. It can be specified in any of the two forms: unilateral or bilateral. In unilateral tolerance, the variation of the size will be wholly on the side. For example, $30 \begin{smallmatrix} 0 \\ -0.02 \end{smallmatrix}$ is a unilateral tolerance. Here the nominal dimension 30 is allowed to vary between 30mm and 29.98mm. In bilateral tolerance, the variation will be to both the sides. For example, 30.00 ± 0.01 or $30 \begin{smallmatrix} +0.01 \\ -0.01 \end{smallmatrix}$. In bilateral tolerance, the variation of the limits can be uniform as shown in the former case. The dimension varies from 30.01mm to 29.99mm.

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.

Take for example a shaft and hole, which will have to fit together. In the simplest case if the dimension of the shaft is lower than the dimension of the hole, then there will be clearance. Such a fit is termed clearance fit. Alternatively, if the dimension of the shaft is more than that of the hole, then it is termed interference fit. These are illustrated in Figure 1-2-1a and 1-2-1b. However in Figure 1-2-1c, depending upon the possibilities of dimensions, at times there will be clearance and other times there will be interference. Such a fit is termed as transition fit.

New Words and Expressions

1. interchangeable /intə'tʃeindʒəbl/ a. 可交换的, 可互换的
2. interchangeability /intə:tʃeindʒə'biliti/ n. 互换性

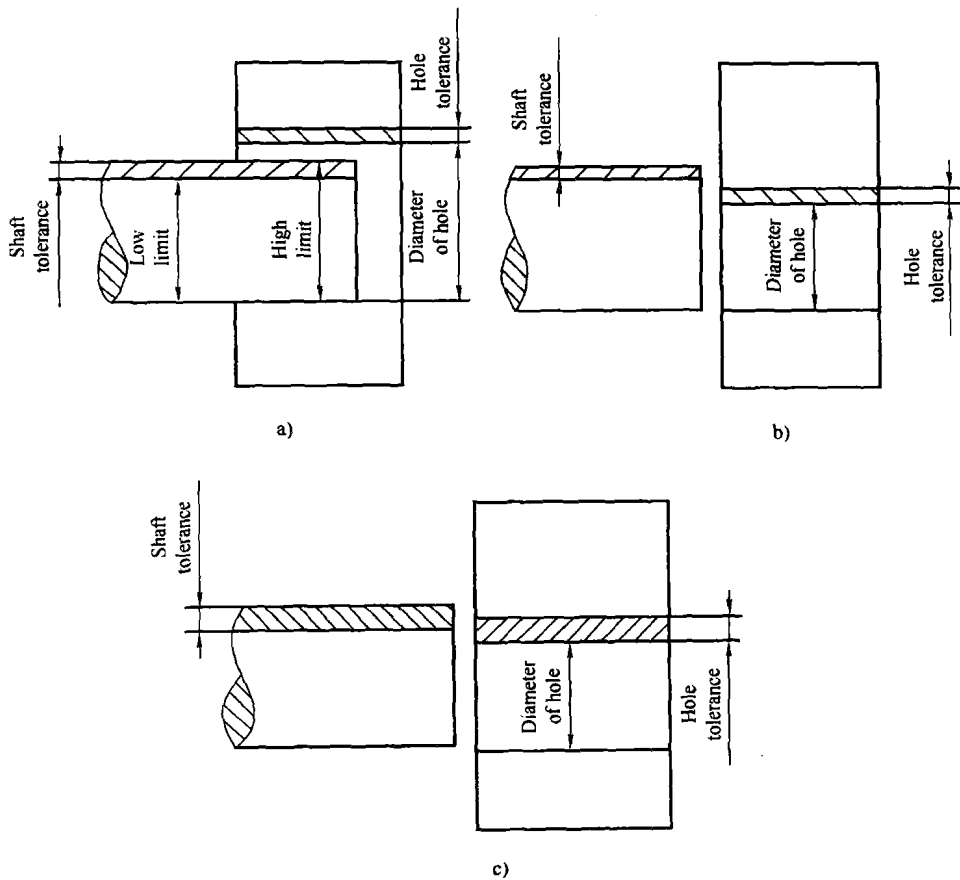


Figure 1-2-1 Typical fits possible in engineering assemblies

3. assembly /ə'sembli/ *n.* 集合; 装配, 组件; 装配图
4. millimeter /'mili,mɪ:tə/ *n.* 毫米
5. accuracy /'ækjʊrəsi/ *n.* 准确 (度), 精确 (度)
6. fortunate /'fɔ:tʃənɪt/ *a.* 幸运的, 侥幸的
7. tricycle /'traɪsɪkl/ *n.* 三轮车
8. tolerance /'tɒlərəns/ *n.* 公差
9. limit /'lɪmɪt/ *n.* 界限, 范围; 极限; *vt.* 限制
10. unilateral /'ju:ni'lætərəl/ *a.* 单边的, 单向的
11. bilateral /baɪ'lætərəl/ *a.* 双边的, 两边的
12. wholly /'həuli/ *ad.* 完全地, 实足
13. clearance /'kliərəns/ *n.* 间隙, 空隙
14. alternative /'ɔ:l'tə:nətɪv/ *a.* 两者挑一的, 交替的; 选择的
15. interference /ɪntə'fɪərəns/ *n.* 过盈, 干涉, 抵触
16. transition /træn'sɪʒən/ *n.* 过渡; 转变, 转移
17. as a means of 作为……的工具 (或方法, 手段)

18. be termed as 被叫做, 被称作
19. in the former case 在前一情形下

Notes

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

没有可互换性制造, 现代工业就不可能存在; 没有工程师对零件尺寸的有效控制, 可互换性制造就不可能实现。

该句中由介词 without 引出两个假设条件句, 分别在句中作状语, without 作“没有”解。

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 the price.

如果童车制造商将童车制造成与喷气式发动机一样的精度, 那么他将无法经营下去, 因为没有人愿意支付昂贵的价格购买(他的产品)。

本句为由 if 引导的与现实事实相反的虚拟语气。

Glossary of Terms

1. unilateral tolerance 单边间隙
2. bilateral tolerance 双边间隙
3. clearance fit 间隙配合
4. interference fit 过盈配合
5. transition fit 过渡配合
6. hole-basis (basic-hole) system 基孔制
7. shaft-basis (basic-shaft) system 基轴制
8. basic size 公称尺寸
9. actual size 实际尺寸
10. limit of size 极限尺寸
11. error 误差
12. tolerance on fit 配合公差
13. tolerance zone 公差带
14. standard tolerance 标准公差
15. tolerance grade 公差等级
16. nominal error 名义误差
17. geometric tolerance 几何公差
18. positional tolerance 位置公差
19. upper (lower) deviation 上(下)偏差
20. working (finishing) allowance 加工余量
21. mass production 成批生产, 大批生产
22. straightness 直线度

23. flatness 平面度
24. circularity 圆度
25. cylindricity 圆柱度
26. parallelism 平行度
27. perpendicularity 垂直度
28. angularity 倾斜度
29. concentricity 同轴度
30. symmetry 对称度
31. roughness 粗糙度
32. finishing 光洁度
33. total runout (runout) 全跳动 (圆跳动)
34. datum (~ line, ~ plane) 基准 (基准线, 基准面)
35. setting up error 安装误差

Exercises

I . Answer the following questions according to the text.

1. Why is it impossible to make anything to exact size?
2. What is the meaning of tolerance?
3. What is the difference between unilateral tolerance and bilateral tolerance?
4. Explain the concepts of clearance, interference and transition fits.

II . Translate the following key terms into Chinese.

1. interchangeability 2. assembly 3. millimeter 4. accuracy 5. tolerance 6. deviation 7. clearance 8. limit 9. interference 10. transition 11. circularity 12. symmetry 13. error 14. clearance fit 15. interference fit 16. transition fit 17. hole-basis system 18. shaft-basis system 19. basic size 20. tolerance zone

Reading Materials

Hole-basis and Shaft-basis System

For obtaining the required fit, the organization can choose any one of the following two possible systems.

Hole-basis system. In this system, the nominal size and the limits on the hole are maintained constantly and the shaft limits are varied to obtain the requisite fit. For example,

Let the hole size be $20.00 \begin{smallmatrix} +0.03 \\ 0 \end{smallmatrix}$

Shaft of $20.00 \begin{smallmatrix} +0.08 \\ +0.04 \end{smallmatrix}$ gives the interference fit.

Shaft of $20.00 \begin{smallmatrix} +0.04 \\ 0 \end{smallmatrix}$ gives the transition fit.

Shaft of $20.00 \begin{smallmatrix} +0.02 \\ -0.04 \end{smallmatrix}$ gives the clearance fit.

Shaft-basis system. This is the reverse of hole basis system. In this system the shaft size and limits are maintained constantly while the limits of hole vary to obtain any fit.

Though there is not much to choose between the two systems, the hole-basis system is mostly

used because standard tools such as reamers, drills, broaches and other standard tools are often used to produce holes, and standard plug gages are used to check the actual sizes. On the other hand, shafting can easily be machined to any size desired.

Unit 3 Properties of Engineering Materials

Text

Design of structures and systems requires determination of component dimensions and is based on the appropriate mechanical properties of materials.

Tension Testing. The tension testing is the test most commonly used to evaluate the mechanical properties of materials. A typical load-elongation curve for a pure metal is shown in Figure 1-3-1. The stress-strain curve for an aluminum alloy is shown in Figure 1-3-2. A number of important quantities can be calculated from the load-elongation or stress-strain curve of a material, namely:

Modulus of Elasticity. The modulus of elasticity, or Young's modulus (E), is defined as the tensile stress divided by the tensile strain for elastic deformation and so is the slope of the linear part of the stress-strain curve. This relationship is Hooke's Law: $E = \sigma / \epsilon$.

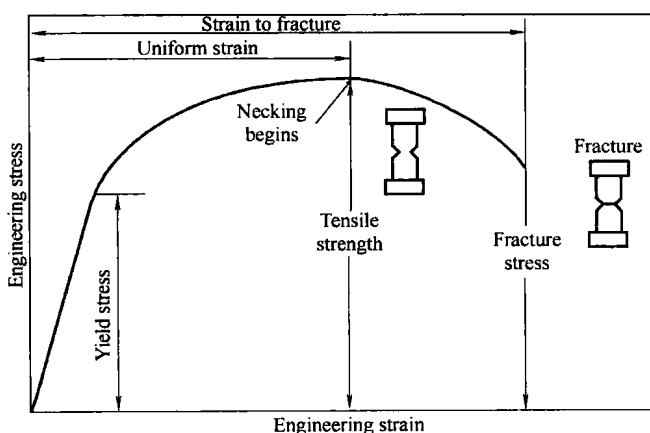


Figure 1-3-1 A typical load-elongation curve for a pure metal

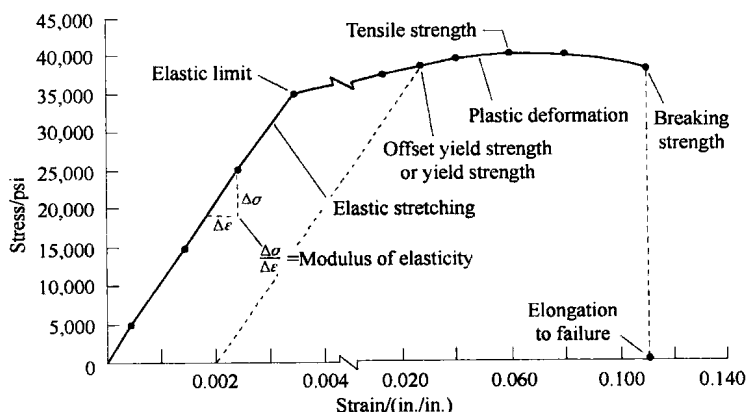


Figure 1-3-2 The stress-strain curve for an aluminum alloy

Yield Strength. When a material under tension reaches the limit of its elastic strain and begins to flow plastically, it is said to have yielded.^① The yield strength is then the stress at which

plastic flow starts.

Tensile Strength. This is defined as the maximum load sustained by the specimen during the tensile test, divided by its original cross-sectional area. It is sometimes called the ultimate strength of the material.

Tensile Elongation. This is frequently taken as an indicator of the ductility of the material under tensile test. To determine the elongation, the increase in distance between two reference marks, scribed on the specimen before test, is measured with the two halves of the broken specimen held together.^② The percentage elongation is 100 times the quotient of the increase in length and the initial distance between the scribe marks.

Reduction of Area. This is the quotient of the decrease in cross-sectional area at the plane of fracture and the original area at that plane (times 100, to express as a percentage). Similarly to percentage elongation, this number is related to ductility.

The shape and magnitude of the stress-strain curve of a metal will depend on its composition, heat treatment, prior history of plastic deformation, and the strain rate, temperature, and state of stress imposed during the testing. The parameters, which are used to describe the stress-strain curve of a metal, are the tensile strength, yield strength or yield point, percent elongation, and reduction of area. The first two are strength parameters; the last two indicate ductility.

New Words and Expressions

1. tension /'tenʃən/ *n. & v.* 拉伸, 拉紧
2. elongation /i:lɒŋ'geɪʃən/ *n.* 伸长, 伸长率
3. modulus /'mɒdjʊləs/ *n.* 模量, 系数, 率
4. slope /sləʊp/ *n.* 倾斜面, 斜度, 坡(梯)度
5. sustain /sə'steɪn/ *vt.* 持续, 支撑
6. ultimate /'ʌltɪmɪt/ *n.* 极限, 终极, 极点
7. ductility /dʌk'tɪlɪti/ *n.* 韧性, 塑性
8. scribe /skraɪb/ *n.* 划线器; *vt.* 用划线器划线
9. quotient /'kwɒʃənt/ *n.* 商数, 系数
10. load-elongation curve 力-伸长曲线
11. define... as... 把……定义为, 把……规定为
12. be used + 带 to 的不定式 表示“用于做……”之意

Notes

① When a material under tension reaches the limit of its elastic strain and begins to flow plastically, it is said to have yielded.

当材料在拉力的作用下达到其弹性应变极限, 并且开始产生塑性流变时, 称为屈服。

在由 when 引导的状语从句中, reaches 与 begins 作为两个并列的谓语, 可译为“当……达到……并且开始……”。

② To determine the elongation, the increase in distance between two reference marks,

scribed on the specimen before test, is measured with the two halves of the broken specimen held together.

为了确定伸长量, 即试样上两个参考标记间距的增加量, 拉伸前先在试样上划线作为标记, 拉断后再将两部分试样放在一起进行测量。

在本句中, the increase in distance between two reference marks 作 the elongation 的同位语; 而 scribed on the specimen before test 则作 marks 的定语。

Glossary of Terms

1. mechanical properties 力学性能 (旧称机械性能)
2. physical properties 物理性能
3. chemical properties 化学性能
4. technique properties 工艺性能
5. cross-sectional area 横断面
6. impact-loading 冲击载荷
7. engineering stress 工程应力
8. engineering strain 工程应变
9. elastic deformation 弹性变形
10. elastic limit 弹性极限
11. proportional limit 比例极限
12. modulus of elasticity 弹性模量
13. stiffness 刚度
14. yield strength 屈服强度
15. tensile strength 抗拉强度
16. fatigue strength (σ_{-1}) 疲劳强度
17. impact toughness 冲击韧度
18. percentage elongation 伸长率
19. area reduction 断面收缩率
20. ductility and brittleness 塑性和脆性
21. Rockwell hardness (HR) test 洛氏硬度试验
22. Brinell hardness (HB) test 布氏硬度试验
23. Vickers hardness (HV) test 维氏硬度试验
24. fatigue and endurance limit 疲劳极限, 持久极限
25. stress-strain curve 应力-应变曲线
26. psi = pound per square inch 磅/每平方英寸
27. brittle material 脆性材料
28. fracture surface 断裂面
29. toughness 坚韧性, 刚性
30. melting point 熔点
31. thermal expansion 热膨胀