机电、数控类实用专业英语

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清华大学出版社

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内 容 简 介

本书是由具有深厚的教学功底的职业教育一线教师根据当前机电、数控类专业人才培养目标和需求编写而成的一本专业英语教材。

本书内容涉及传统制造技术、现代制造技术、电工电子基础和实用应用文。每课配有课文及阅读材料，以满足读者的阅读需求；课后练习形式多样，以帮助学生巩固知识。书后附录中配有参考译文，以方便读者自学。

本书可作为中高级职业院校机电、数控类专业教材，也可作为企业培训用书。

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前 言

随着我国经济改革和对外开放不断地深入，英语在对外交流中起着越来越重要的作用。当前，在我国职业教育中，对于专业英语的教学，其涉及面较窄，远远跟不上社会发展的需求。为此，我们从实际出发，组织有关人员编写了这本《机电、数控类实用专业英语》教材。

本教材构思实用性和针对性强，选材新颖独特，贴近企业，以突出专业英语为目的，以介绍机械制图、电气制图、机械零件、电气器件、部分工种简介以及人们在求职、面试、签合同等方面所需掌握的知识为重点，专业词汇量丰富，所选题材、词汇尽可能与机电、数控专业相结合，由浅入深，删繁就简，并附有翔实的图文。读者可根据专业趋向差异，有方向性地选择学习内容。本教材可作为中高级职业院校机电、数控类专业教材，也可作为企业培训的用书。

本教材由烟台工程职业技术学院张英姿、王礼梅担任主编。其中，Units 3、4、5、6、10和 12 以及“参考译文”部分对应章节由张英姿、巩华荣、苏慧祎、李晓芳编写，Units 2、9、13 和 14 以及“参考译文”部分对应章节由王礼梅、李波、朱学忠、韩延臣编写，Units 1、7、8和 11 以及“参考译文”部分对应章节由邱丽波、王宗贵、周国首、王东勇编写。美国专家 Charles L. George 和 Catherine M. George 对本教材进行了审校，并提出了宝贵的意见，在此表示衷心地感谢。

由于编者水平有限，书中疏漏在所难免，恳请广大读者批评指正。

编 者

2008 年 2 月

Contents

Unit 1

Understanding of Mechanical Drawings and Electrical Diagrams

Part 1 Mechanical Drawings

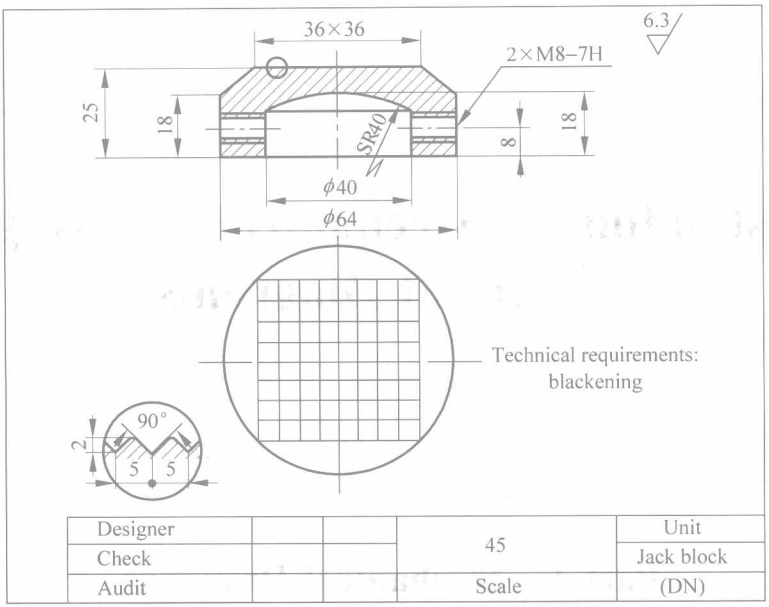
Mechanical Drawings

A drawing must be a true and complete statement of the figure, dimension and technical requirements, expressing the way that the part is to be manufactured. Mechanical drawing is a process which relies heavily upon research in the principles of representation, interpretation and related technical standards. Typical drawings in machine manufacturing are classified as part drawings and assembly drawings. Please see Figures 1-1 and 1-2.

1. Part Drawings

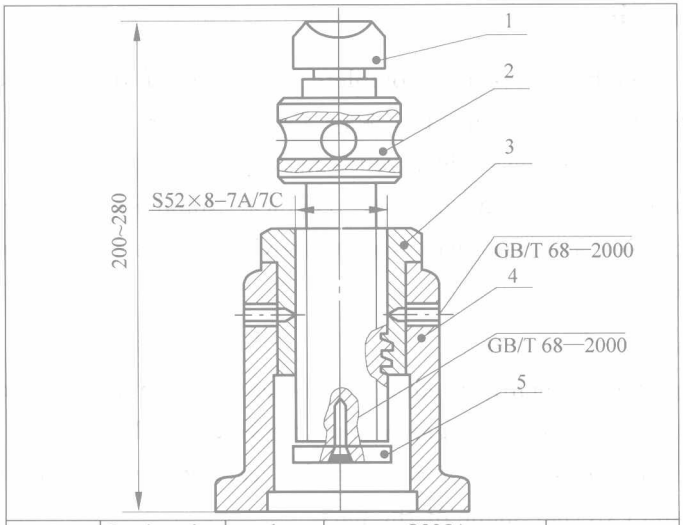
Part drawings are frequently used as instruction for manufacture and inspection of the parts. Figure 1-3 shows an integrated part drawing as follows:

- A set of drawings: Some representation can be given to properly show the internal and external shape of the part.
- Overall dimensions: Specifying the requirements for manufacture and inspection of the part integrity.
- Necessary technical requirements: Codes, symbols and notes are used to describe the essential technical requirements in the process of manufacture, inspection and assembly, such as surface roughness, tolerance, heat treatment, case treatment,



Designer			45	Unit
Check				Jack block
Audit			Scale	(DN)

Figure 1-1 Part drawing of a jack block



5	Retainer ring	1	Q235A		
4	Base	1	HT200		
3	Nut	1	ZQSn6-6-5		
2	Bolt	1	45		
1	Block	1	45		
Serial No.	Description	Qty	Material		Remarks
Designer					Unit
Check					Jack
Audit			Scale		Drawing No.

Figure 1-2 Assembly drawing of a lifting jack

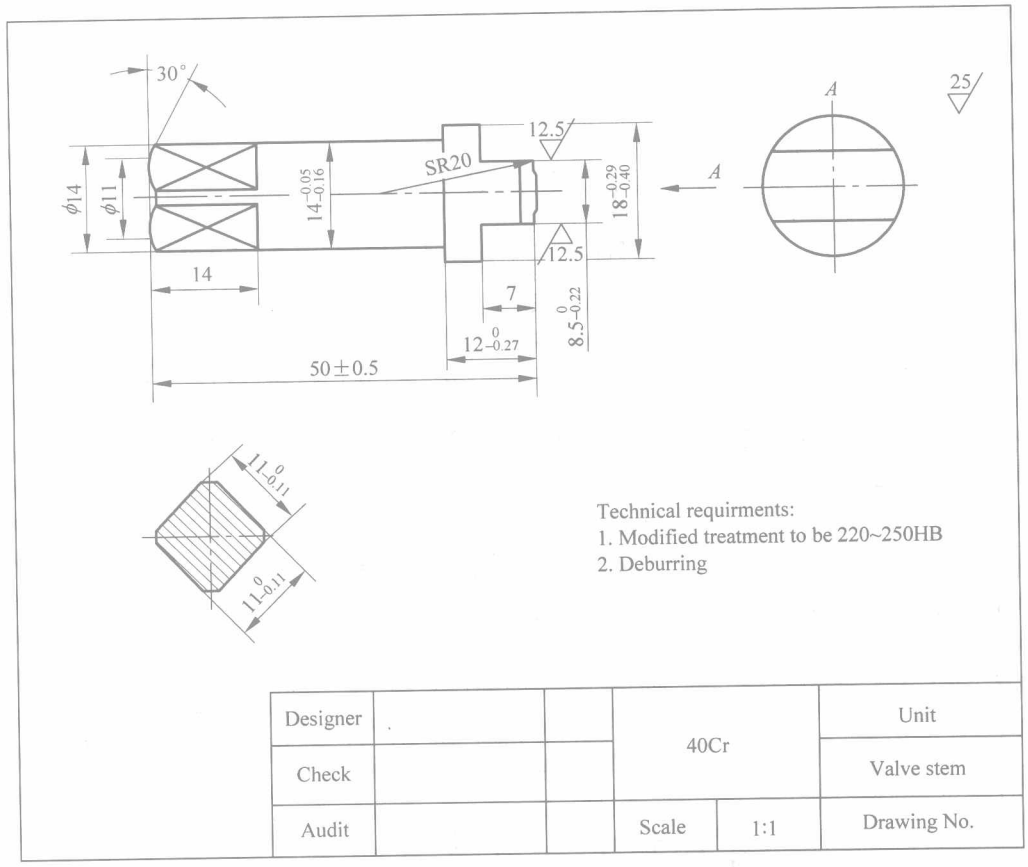


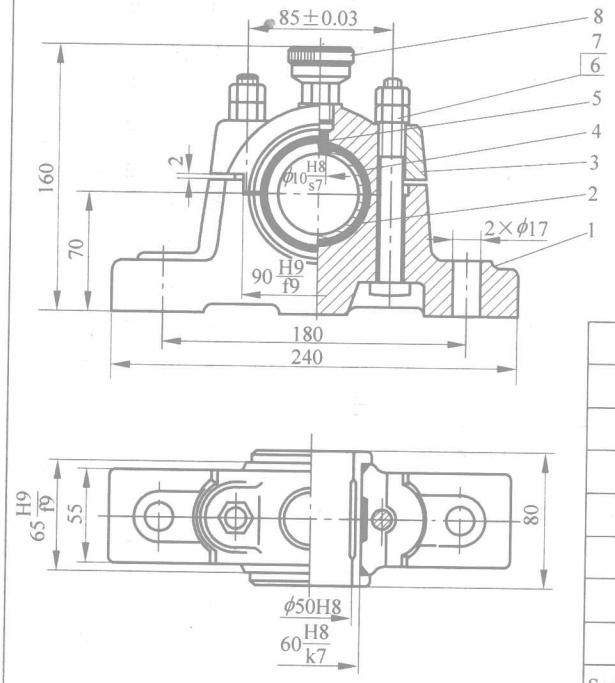
Figure 1-3 Part drawing of a valve stem

and the like.

- Full contents of title block: Including the part name, material, drawing number, scale and signature of responsible individual.

2. Assembly Drawings

Assembly drawings are used in explaining machines or components, as shown in Figure 1-4. In mechanical design, part drawings are usually related to the assembly drawing which indicates the working principle and structure of a machine or component. In the process of machine manufacturing, the drawings are to allow machining of the metal based on the part drawing and assembling to create a unit or a machine in due course as well as in operation and maintenance.



Technical requirements:

1. Upper and lower bushing, bearing block and cover should contact properly.
2. Max. bushing pressure ⩽ 29.4MPa.
3. Max.linear speed of bearing journal and bushing $v = 8\text{m/s}$.
4. Temperature of bearing < 120℃.

8	Oil cup12	1		GB/T 1152—1989
7	Nut M12	4		GB/T 6171—2000
6	Bolt M12×130	2		GB/T 8—1988
5	Bearing fixed sleeve	1		GB/T 700—1988
4	Upper bushing	1	ZQAL9-4	
3	Bearing cover	1	HT150	
2	Lower bushing	1	ZQAL9-4	
1	Bearing block	1	HT150	
Serial No.	Description	Qty	Material	Remarks
Designer				Unit
Check				Sliding Bearing
Audit			Scale 1:2	Drawing No.

Figure 1-4 Assembly drawing of a slide bearing

Representation of Machine Elements

"Mechanical Drawings" in national standards are restricted to those which specify the view, sectional view and broken sectional view to represent the structures and shapes.

Views are projection drawings of the object. Typical views include basic views, directional views, partial views and oblique views, as shown in Figures 1-5, 1-6, 1-7 and 1-8.

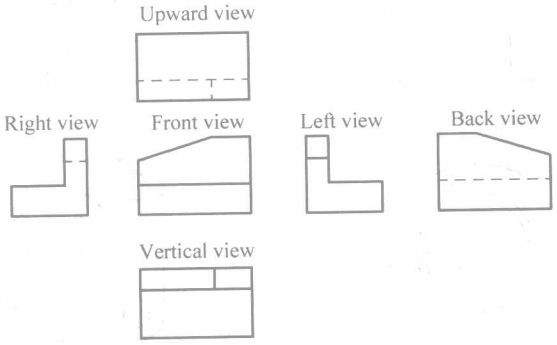


Figure 1-5 Basic views

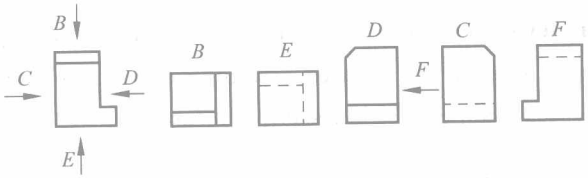
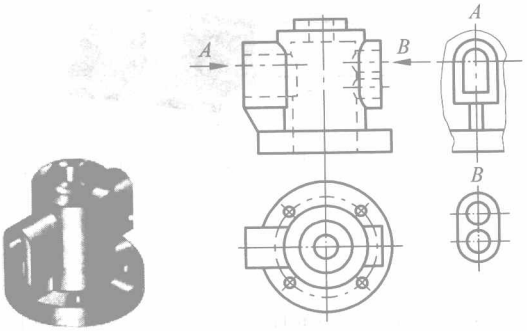
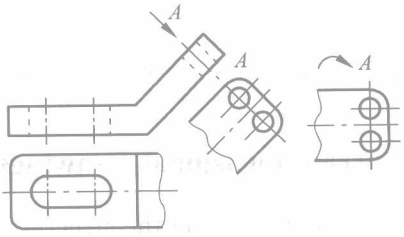


Figure 1-6 Directional views



(a) (b)

Figure 1-7 Partial views



(a) (b)

Figure 1-8 Oblique views

Sectional views are generally used to show the internal structure of the object with a dashed line. We also divide them into full sectional (Figure 1-9), half sectional (Figure 1-10) and partial sectional views (Figure 1-10).

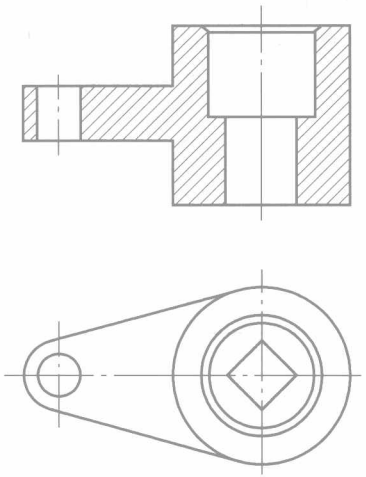


Figure 1-9 Full sections

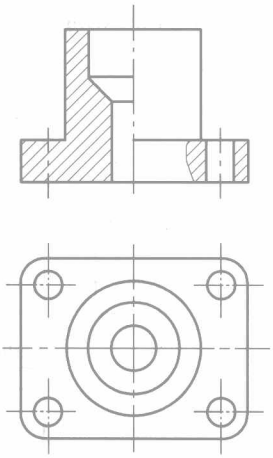


Figure 1-10 Half and partial sections

Broken sectional views are supposed to be sectional plane at a point somewhere on the machine element. Figure 1-11 pictures a sample of removed broken sectional view and Figure 1-12 indicates a superposition sectional view.

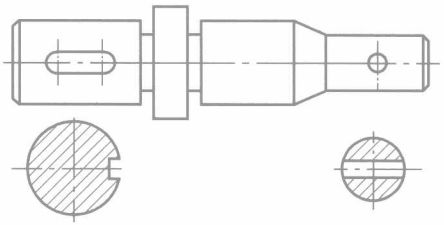


Figure 1-11 Removed sectional views

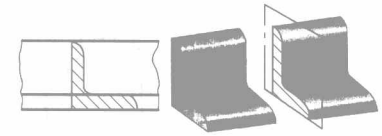


Figure 1-12 Superposition sectional views

Three-dimensional Drawings

For expressing the structure and size of a component distinctly, we put a component into a three-plane projection system, and acquire the three-dimensional drawings in the three projection planes. The basic principle is indicated as equal length in the front view and top view, equal height in the front view and left view, equal width in the top view

and left view.

Figures 1-13 and 1-14 show the principle of three-dimensional drawings. The axonometric drawing is used for complementing the outline of the body. The common axonometric drawing combines isometric projection (see Figure 1-15) with oblique bimetric projection (see Figure 1-16).

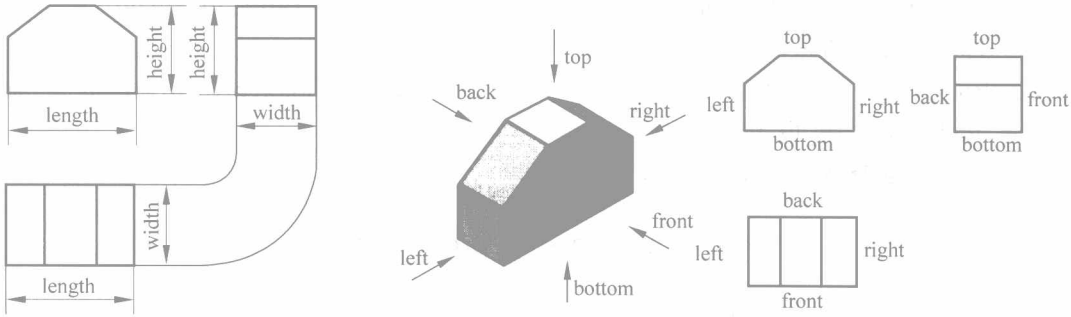


Figure 1-13 Principle of three-dimensional drawings

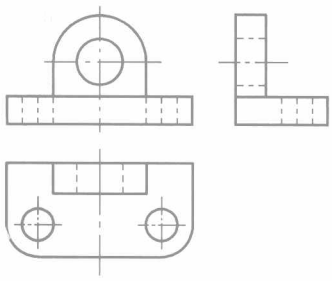


Figure 1-14 Three-dimensional drawing

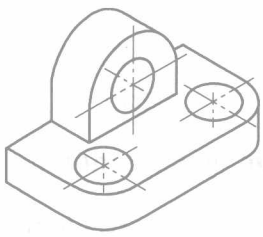


Figure 1-15 Isometric axonometric drawing

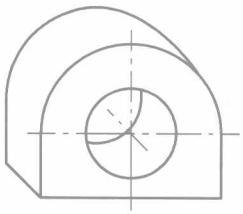


Figure 1-16 Oblique bimetric axonometric drawing

New Words

blacken /'blækən/ *v.* 使变黑，诽谤，变黑
tolerance /'tɔlərəns/ *n.* 公差
view /vju:/ *n.* 景色，视图
ensure /in'ʃuə/ *v.* 确保，保证
jack /dʒæk/ *n.* 插孔，千斤顶
code /kəud/ *n.* 代码，编码
valve /vælv/ *n.* 阀，电子管，真空管
projection /prə'dʒekʃən/ *n.* 投影
bushing /'buʃiŋ/ *n.* 轴套
maximum /'mæksiməm/ *n.* 最大值
represent /ˌri:pri'zent/ *vt.* 表现，描绘
representation /ˌreprizen'teiʃən/ *n.* 表示，表现
interpretation /inˌtə:pri'teiʃən/ *n.* 解释，阐明

Phrases and Expressions

dimension tolerance 尺寸公差
working principle 工作原理
case treatment 表面处理
slide bearing 滑动轴承
surface roughness 表面粗糙度
sectional view 剖视图
full sectional view 全剖视图
directional view 向视图
half sectional view 半剖视图
partial view 局部视图
partial sectional view 局部剖视图
oblique view 斜视图
removed sectional view 移出断面图
basic view 基本视图
superposition sectional view 重合断面图

Check your understanding

Ⅰ. Give brief answers to the following questions:

1. What is a drawing?
2. List two typical drawings in machine manufacturing.
3. Discuss the view, sectional view and broken sectional view.
4. Discuss the principle of three-dimensional drawing.
5. How are the common axonometric drawings classified?

Ⅱ. Match the items listed in the following two columns:

1. blacken
2. mechanical drawing
3. view
4. maximum

a. 最小值
b. 机械制图
c. 虚线
d. 滑动轴承

5. projection
6. dashed line
7. minimum
8. jack
9. sliding bearing
10. sectional view

e. 视图
f. 剖视图
g. 投影
h. 最大值
i. 千斤顶
j. 发黑处理

Part 2 Understanding of Electrical Diagrams

As a manufacturing engineer, it is essential that the mechanical drawings and electrical diagrams be understood. Electrical diagrams are intended to provide relevant electric and electronics information. They indicate the functions, locations, manufacturing processes as well as connections of the equipment.

For electrical purposes, block diagrams, circuit diagrams, disposal diagrams, wiring diagrams and printed circuit board diagrams are commonly used.

Block Diagrams

Symbols or blocks with remarks are used in block diagrams to express main structure and interrelation. A block diagram of electric driving system is shown in Figure 1-17.

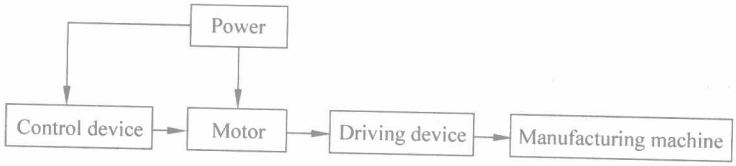
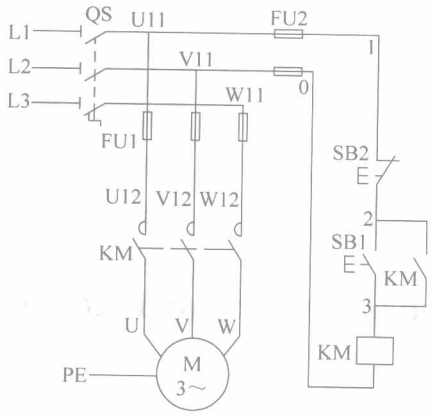


Figure 1-17 Block diagram of electrical driving system

Circuit Diagrams

Circuit diagrams are fully integrated drawings using national unified graphic symbols to express the relative connections in circuit. Figure 1-18 shows the control circuit of self-locking positive rotation of contactor.

The commonly used electric graphic symbols and codes are shown in Table 1-1.



Y112M-4 4kW
△wiring, 380V, 8.8A, 1440r/min

Figure 1-18 Control circuit of self-locking positive rotation of contactor

Table 1-1 Graphic Symbols and Codes

Graphic symbol	Description	Code		Graphic symbol	Description	Code	
		single	double			single	double
—	DC		DC	~	AC		AC
~	low frequency		LF	≈	intermediate frequency		MF
≋	high frequency		HF	≂	A. C. & D. C.		
→	direction of movement or force			→	direction of energy or signal		
----	mechanic, pneumatic or hydraulic connection			⏢	braking arrester		
Ⓜ⏢	braked			Ⓜ⏢	not braked		
↙	automation(built-in)			⊢----	manual control		
⊏-----	push-on operation			⏚	earthing	E	
⊜	protective earthing		PE	⫽⊥	earthing of case or grounding pad		
⊖	ideal current supply			⊕	ideal voltage supply		
↯	fault			↯	flashover breakdown		

续表

Graphic symbol	Description	Code		Graphic symbol	Description	Code	
		single	double			single	double
	wire	W			three wires	W	
	shielded wire	W			twisted wires	W	
	cable connection				terminal	X	
11 12 13 14 15	terminal board	X	XT		removable terminal	X	
	wire joining				multi-wire joining		
	branching or combining of wire or cable				plug	X	XS
	plug	X	XP		plug and jack	X	
	resistor	R			adjustable resistor	R	RP
	capacitor	C			polar capacitor	C	
	inductor, coil winding	L			tapped transformer	L	
	two electrodes piezocrystal	B			semiconductor diode	V	
	LED	VH			bilateral diode	V	
	unilateral breakdown diode	V			PNP triode	V	
	thyratron transistor	V			photodiode	BV	
	photodiode coupler	KU		G	DC generator	G	
M	DC motor	M		G	AC generator	G	
M	AC motor	M			commutation winding	L	
	series winding	L			shunt or separate winding	L	
	two-winding transformer	T			autotransformer	T	