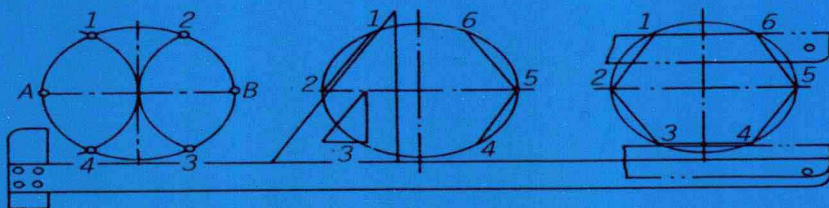
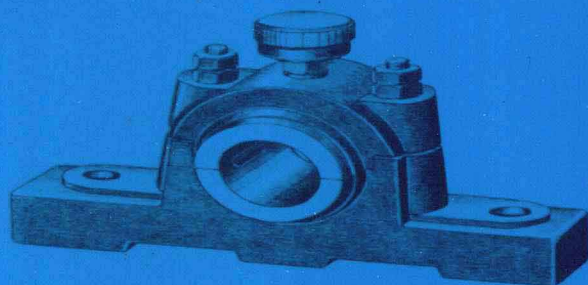




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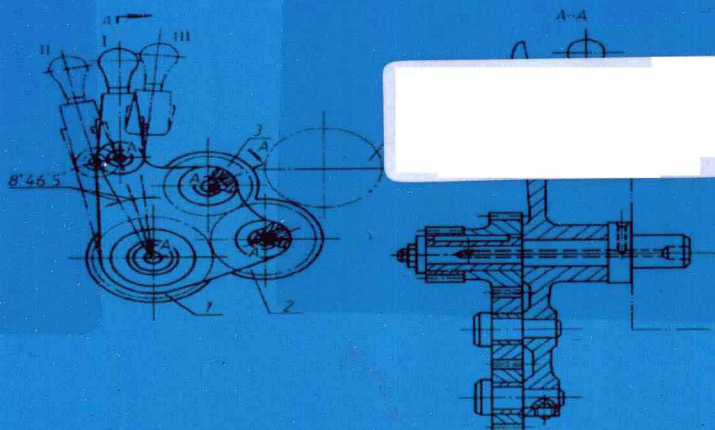
机电专业英语

主编 马利平 李绍鹏



第一法

第二法



 复旦大学出版社

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机电专业英语

主 编 马利平 李绍鹏

副主编 钱袁萍 王宪伟 赵艳平
张超英 王晓兰

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内容简介

《机电专业英语》是以高职教育倡导的能力目标为主线而编就。本教材以高等职业教育的实际要求为依据,以切实培养和提高职业院校机电类学生的专业技能为目的,突出实用性和针对性。编者不拘泥于理论研究,注重对机电专业英语的理解及实际应用。

全书共 10 个单元,主要内容有机械和电子元件的认识及工作原理的简单介绍,金属材料的分类及介绍,机床、机器人、手机、汽车和计算机在生活中的应用以及工作原理,还有微机电系统和新技术在当今取得的进展情况等。

本教材适合高职高专院校机电一体化、电气自动化、机械制造及自动化等相关专业的教学,也可作为相关专业工程技术人员的学习参考用书。





Preface

前 言

《机电专业英语》是新世纪高职高专教材编审委员会组编的机电类课程规划教材之一。本教材是针对高职高专院校学生的知识结构、能力水平、职业需要以及课程的学时数而编写的,在难度和深度上适应学生的专业英语水平需要,创新构建教材的结构、精心编排教材的内容,以有利于实施集教、学一体的知识传授和能力培养的教学活动。

《机电专业英语》由多位资深高职高专机电专业英语教师编写,具有如下特点:

1. 以高职高专学生为对象,以能力培养为本位,以训练为手段。训练内容针对性强,强化教材的工具性和手段性。

2. 课文选材重视针对性和新颖性。精选学生在职业活动中经常接触到的专业英语文献,反映专业发展的新知识,以满足学生当前就业需要和未来职业发展的需要。

3. 部分单元设有构词法介绍,便于增加学生的词汇量。

4. 重点句子解读时,在做出翻译的同时介绍翻译技巧,提高学生的理解能力。

5. 文章内容与训练内容组合合理,训练内容的设置突出强化其作为知识掌握和能力增长的手段性,有利于教师组织教、学于一体的教学活动。

6. 每个单元后面还加了一个让学生开拓知识的文章和幽默故事,拓宽学生的知识面和增加本教材的趣味性。

本教材共分 10 个单元,分别是金属材料、机械元件、电子元件、机床、机



器人、手机、汽车、计算机、微机电系统和先进技术。

本教材适用于高职高专院校的机械制造及自动化、机电一体化技术、机电设备管理与维护、数控设备应用与维护、数控加工技术等专业。

本书由马利平和李绍鹏担任主编,钱袁萍、王宪伟、赵艳平、张超英、王晓兰担任副主编。

由于编者水平有限,加上时间仓促,书中的错误以及疏漏在所难免,欢迎广大读者批评指正。

编者

2012年11月



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Unit 1

Metal Materials

Almost 75% of all elements are metals. Metals are used in electronics for wires and in cookware for pots and pans because they conduct electricity and heat well.¹ Most metals are malleable and ductile and are, in general, heavier than the other elemental substances. Two or more metals can be alloyed to create materials with properties that do not exist in a pure metal.²

All metals can be classified as either ferrous or non-ferrous. Ferrous metals contain iron and non-ferrous metals do not. All ferrous metals are magnetic and have poor corrosion resistance while non-ferrous metals are typically non-magnetic and have more corrosion resistance.³ An overview of the most common ferrous and non-ferrous metals is shown below.

Ferrous Metals

(1)

Material name: Low Carbon Steels (Figure 1 - 1)

Composition: up to 0.3% carbon

Properties: good formability,
good weldability, low cost

Applications:

0.1% ~ 0.2% carbon: chains,
stampings, rivets, nails, wire, pipe,
and so on

0.2% ~ 0.3% carbon: machine

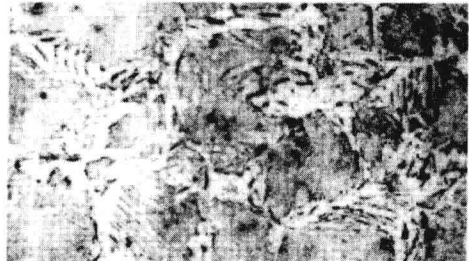


Figure 1 - 1 Low Carbon Steels



and structural parts

(2)

Material name: Medium Carbon Steels (Figure 1 - 2)

Composition: 0.3% to 0.8% carbon

Properties: a good balance of properties, fair formability

Applications:

0.3% ~ 0.4% carbon: lead screws, gears, worms, spindles, shafts, and machine parts

0.4% ~ 0.5% carbon: crankshafts, gears, axles, mandrels, tool shanks, and heat-treated machine parts

0.6% ~ 0.8% carbon: drop hammer dies, set screws, screwdrivers, and arbors

0.7% ~ 0.8% carbon: tough and hard steel, anvil faces, band saws, hammers, wrenches, and cable wire

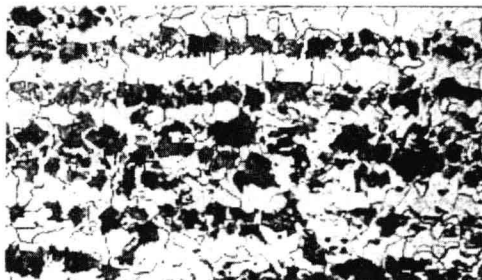


Figure 1 - 2 Medium Carbon Steels

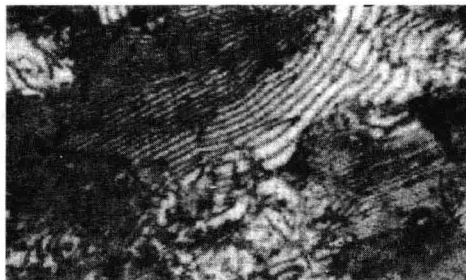


Figure 1 - 3 High Carbon Steels

(3)

Material name: High Carbon Steels (Figure 1 - 3)

Composition: 0.8% to 2% carbon

Properties: low toughness, formability, and weld ability, high hardness and wear resistance, fair formability

Applications:

0.8% ~ 0.9% carbon: punches for metal, rock drills, shear blades, cold chisels, rivet sets, and many hand tools

0.9% ~ 1.0% carbon: used for hardness and high tensile strength, like



springs and cutting tools

1.0%~1.2% carbon: drills, taps, milling cutters, knives, cold cutting dies, wood working tools

1.2%~1.3% carbon: files, reamers, knives, tools for cutting wood and brass

1.3% ~ 1.4% carbon: used where a keen cutting edge is necessary (razors, saws, etc.) and where wear resistance is important

(4)

Material name: Stainless Steels
(Figure 1-4)

Composition: Stainless Steels is a family of corrosion resistant steels. They contain at least 10.5% chromium. The Chromium in the alloy forms a self-healing protective clear oxide layer. This oxide layer gives stainless steels their corrosion resistance.

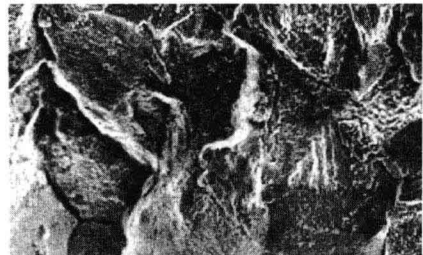


Figure 1-4 Stainless Steels

Properties: good corrosion resistance, appearance, and mechanical properties

Applications:

11.5% of chromium: widely used in cookware, cutlery, and kitchen utensils these are along with hardware supplies, industrial equipments, structural buildings, automotive, and aerospace industries.

Non-Ferrous Metals

(5)

Material name: Aluminum/Aluminum Alloys (Figure 1-5)

Composition: pure metal; easily alloyed with small amounts of copper, manganese, silicon, magnesium, and other elements

Properties: low density, good electrical conductivity (approx. 60% of copper), nonmagnetic, noncombustible, ductile, malleable, corrosion resistance; easily formed, machined, or cast

Applications: window frames, aircraft parts, automotive parts, kitchenware



Figure 1-5 Aluminum Alloys



Figure 1-6 Brass

(6)

Material name: Brass (Figure 1-6)

Composition: alloy of copper and zinc; 65% to 35% is the common ratio

Properties: reasonable hardness, casts, forms, and machines well; good electrical conductivity and acoustic properties

Applications: parts for electrical fittings, valves, forgings, ornaments, musical instruments

(7)

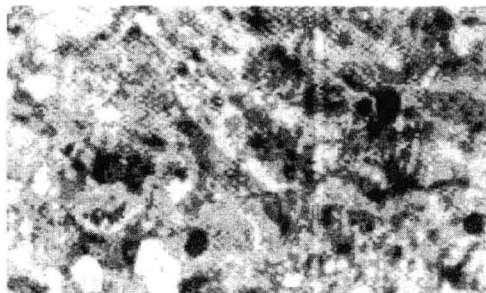


Figure 1-7 Copper

Material name: Copper (Figure 1-7)

Composition: pure metal

Properties: excellent ductility, thermal and electrical conductivity

Applications: electrical wiring, tubing, kettles, bowls, pipes, printed circuit boards

(8)

Material name: Magnesium/Magnesium Alloys (Figure 1-8)

Composition: pure metal; used as an alloy element for aluminum, lead, zinc, and other nonferrous alloys; alloyed with aluminum to improve the mechanical, fabrication, and welding characteristics

Properties: lightest metallic material (density of about 2/3 of that of aluminum), strong and tough, most machinable metal, good corrosion



resistance, easily cast

Applications: automobile, portable electronics, appliances, power tools, sporting goods parts, and aerospace equipments

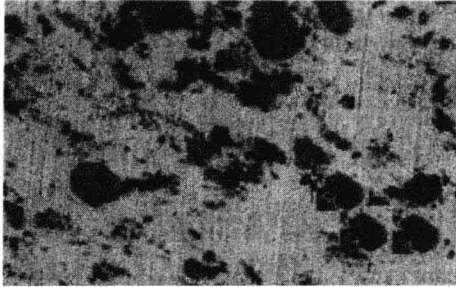


Figure 1 - 8 Magnesium Alloys

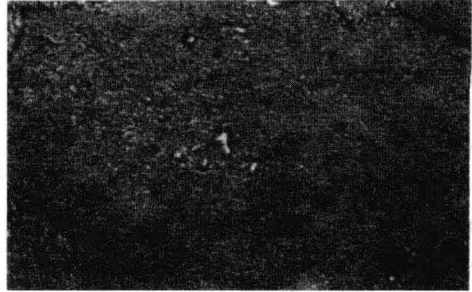


Figure 1 - 9 Nickel Alloys

(9)

Material name: Nickel/Nickel Alloys (Figure 1 - 9)

Composition: pure metal; alloys very well with large amounts of other elements, chiefly chromium, molybdenum, and tungsten

Properties: very good corrosion resistance (can be alloyed to extend beyond stainless steels), good high temperature and mechanical performance, fairly good conductor of heat and electricity

Applications: used as an undercoat in decorative chromium plating and to improve corrosion resistance; applications include electronic lead wires, battery components, heat exchangers in corrosive environments

(10)

Material name: Zinc/Zinc Alloys (Figure 1 - 10)

Composition: pure metal; employed to form numerous alloys with other metals. Alloys of primarily zinc with small amounts of copper, aluminum, and magnesium are useful in die-casting

Properties: excellent corrosion resistance, light weight, reasonable

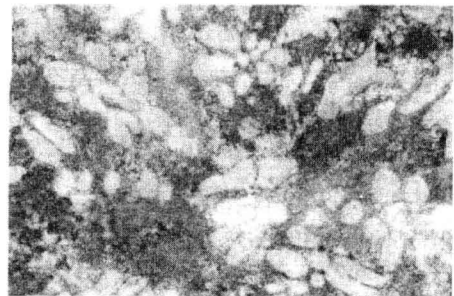


Figure 1 - 10 Zinc Alloys



conductor of electricity

Applications: used principally for galvanizing iron (more than 50% of metallic zinc goes into galvanizing steel), numerous automotive applications because of its light weight

New Words

cookware ['kʊkweə] <i>n.</i> 炊具	chisel ['tʃɪzl] <i>n.</i> 凿子
conduct ['kɒndʌkt] <i>v.</i> 传导	tensile ['tensəl] <i>a.</i> 可拉伸的
malleable ['mæliəbl] <i>a.</i> 可塑的	tap [tæp] <i>n.</i> 螺丝攻
ductile ['dʌktaɪl] <i>a.</i> 易延展的、有韧性的	file [faɪl] <i>n.</i> 锉刀
property ['prɒpəti] <i>n.</i> 属性	reamer ['ri:mə] <i>n.</i> 铰刀
ferrous ['ferəs] <i>a.</i> 含铁的	keen [ki:n] <i>a.</i> 锋利的
magnetic [mæg'netɪk] <i>a.</i> 有磁性的	razor ['reɪzə] <i>n.</i> 剃刀
corrosion [kə'reʊʒən] <i>n.</i> 腐蚀	chromium ['krəʊmjəm] <i>n.</i> 铬
composition [ˌkɒmpə'zɪʃən] <i>n.</i> 成分	heal [hi:l] <i>v.</i> 愈合
formability [fɔ:mə'bɪlɪti] <i>n.</i> 成形性	oxide ['ɒksaɪd] <i>n.</i> 氧化物
weld [weld] <i>n.</i> 焊接 <i>v.</i> 焊接	layer ['leɪə] <i>n.</i> 层
chain [tʃeɪn] <i>n.</i> 链条	cutlery ['kʌtləri] <i>n.</i> 餐具
stamping ['stæmpɪŋ] <i>n.</i> 冲压件	utensil [ju:(ə)'tensl] <i>n.</i> 厨具
rivet ['rɪvɪt] <i>n.</i> 铆钉	hardware ['hɑ:dweə] <i>n.</i> 五金
nail [neɪl] <i>n.</i> 钉子	aerospace ['eərəʊspeɪs] <i>n.</i> 航空航天
worm [wɜ:m] <i>n.</i> 蜗杆	manganese ['mæŋɡəni:z] <i>n.</i> 锰
crankshaft ['kræŋkfæft] <i>n.</i> 曲轴	silicon ['sɪlɪkən] <i>n.</i> 硅
mandrel ['mændrɪl] <i>n.</i> 心轴	magnesium [mæg'ni:zi:əm] <i>n.</i> 镁
shank [ʃæŋk] <i>n.</i> 柄	conductivity [ˌkɒndʌk'tɪvɪti] <i>n.</i> 传导性
heat-treated ['hi:tri:tɪd] <i>a.</i> 热处理的	noncombustible [ˌnɒnkəm'bʌstəbl] <i>a.</i> 不燃的
screwdriver ['skru:draɪvə] <i>n.</i> 螺丝刀	form [fɔ:m] <i>v.</i> 成形
anvil ['ænvɪl] <i>n.</i> 铁砧	frame [freɪm] <i>n.</i> 框
toughness ['tʌfnɪs] <i>n.</i> 韧性	kitchenware ['kɪtʃɪnweə] <i>n.</i> 厨具
hardness ['hɑ:dnis] <i>n.</i> 硬度	zinc [zɪŋk] <i>n.</i> 锌
wear [weə] <i>n.</i> 磨损	acoustic [ə'ku:stɪk] <i>a.</i> 声的
shear [ʃiə] <i>n.</i> 剪切	fitting ['fɪtɪŋ] <i>n.</i> 配件
blade [bleɪd] <i>n.</i> 刀片	valve [vælv] <i>n.</i> 阀门



forging [ˈfɔːdʒɪŋ] *n.* 锻件
 ornament [ˈɔːnəmənt] *n.* 饰品
 thermal [ˈθɜːmə] *a.* 热的
 tubing [ˈtuːbɪŋ] *n.* 管材
 lead [liːd] *n.* 铅
 fabrication [ˌfæbrɪˈkeɪʃən] *n.* 制造
 characteristic [ˌkærəktəˈrɪstɪk] *n.* 特性
 machinable [məˈʃɪnəbl] *a.* 可加工的
 appliance [əˈplaɪəns] *n.* 家用电器

nickel [ˈnɪkəl] *n.* 镍
 molybdenum [məˈlɪbdənəm] *n.* 钼
 tungsten [ˈtʌŋstən] *n.* 钨
 undercoat [ˈʌndəkəʊt] *n.* 内层油漆
 plating [ˈpleɪtɪŋ] *n.* 镀饰
 exchanger [ˌɪksˈtʃeɪndʒə] *n.* 交换器
 corrosive [kəˈrəʊsɪv] *a.* 腐蚀的
 die-casting [daɪˈkɑːstɪŋ] *n.* 压铸件
 galvanize [ˈɡælvənaɪz] *v.* 镀锌

Phrases and Expressions

be classified as	分类为	set screw	紧定螺钉
ferrous metal	黑色金属	rock drill	凿岩机
non-ferrous metal	有色金属	tensile strength	拉伸强度
up to	多达	stainless steel	不锈钢
lead screw	丝杆	lead wire	引线
drop hammer die	落锤模		

Notes

1. Metals are used in electronics for wires and in cookware for pots and pans because they conduct electricity and heat well. 在这句中, be used in 意为“被用于……”。Because 引导原因状语从句。在这个从句中, conduct 后连接两个并列宾语 electricity 和 heat。整句可译为: 金属在电子设备中用作导线, 在炊具中用作锅碗瓢盆, 因为它们能够导电且传热好。
2. Two or more metals can be alloyed to create materials with properties that do not exist in a pure metal. 主语为 Two or more metals。with 意为“具有”。That 引导定语从句, 先行词为 properties。整句可译为: 两种或更多种的金属可以形成合金材料, 这些合金材料具有纯金属没有的属性。
3. All ferrous metals are magnetic and have poor corrosion resistance while non-ferrous metals are typically non-magnetic and have more corrosion resistance. 此句中, while 用作连词, 连接两个并列的句子, 表示对比关系。其中, 两个并列句的谓语动词又都是由 and 连接的并列谓语。该句可译为:



所有的黑色金属都具有磁性和较差的耐蚀性,而有色金属通常不具有磁性和有较强的耐蚀性。

EXERCISE 1

Mark the following statements with T (True) or F (False) according to the passage

1. All metals can be ferrous, non-magnetic and have poor corrosion resistance. ()
2. Low carbon steels can show good properties, like good formability, good weldability and low cost. ()
3. High carbon steels are composed of 0.3% to 0.8% carbon. ()
4. Aluminum can be used as window frames, aircraft parts, valves, forgings and kitchenware. ()
5. Nickel is pure metal, which can alloy very well with large amounts of chromium, molybdenum and tungsten. ()

EXERCISE 2

Translate the following phrases into Chinese or English.

- | | |
|----------------------------|-------|
| 1. corrosion resistance | _____ |
| 2. lead screw | _____ |
| 3. electrical conductivity | _____ |
| 4. die-casting | _____ |
| 5. _____ | 中碳钢 |
| 6. _____ | 耐磨性 |
| 7. _____ | 铝合金 |
| 8. _____ | 印制电路板 |



Broaden Your Horizon — Practical Activity

Hardness and Hardness Testing

The hardness of a metal is its resistance to surface indentation under standard test conditions. Two main test methods are used: Brinell and