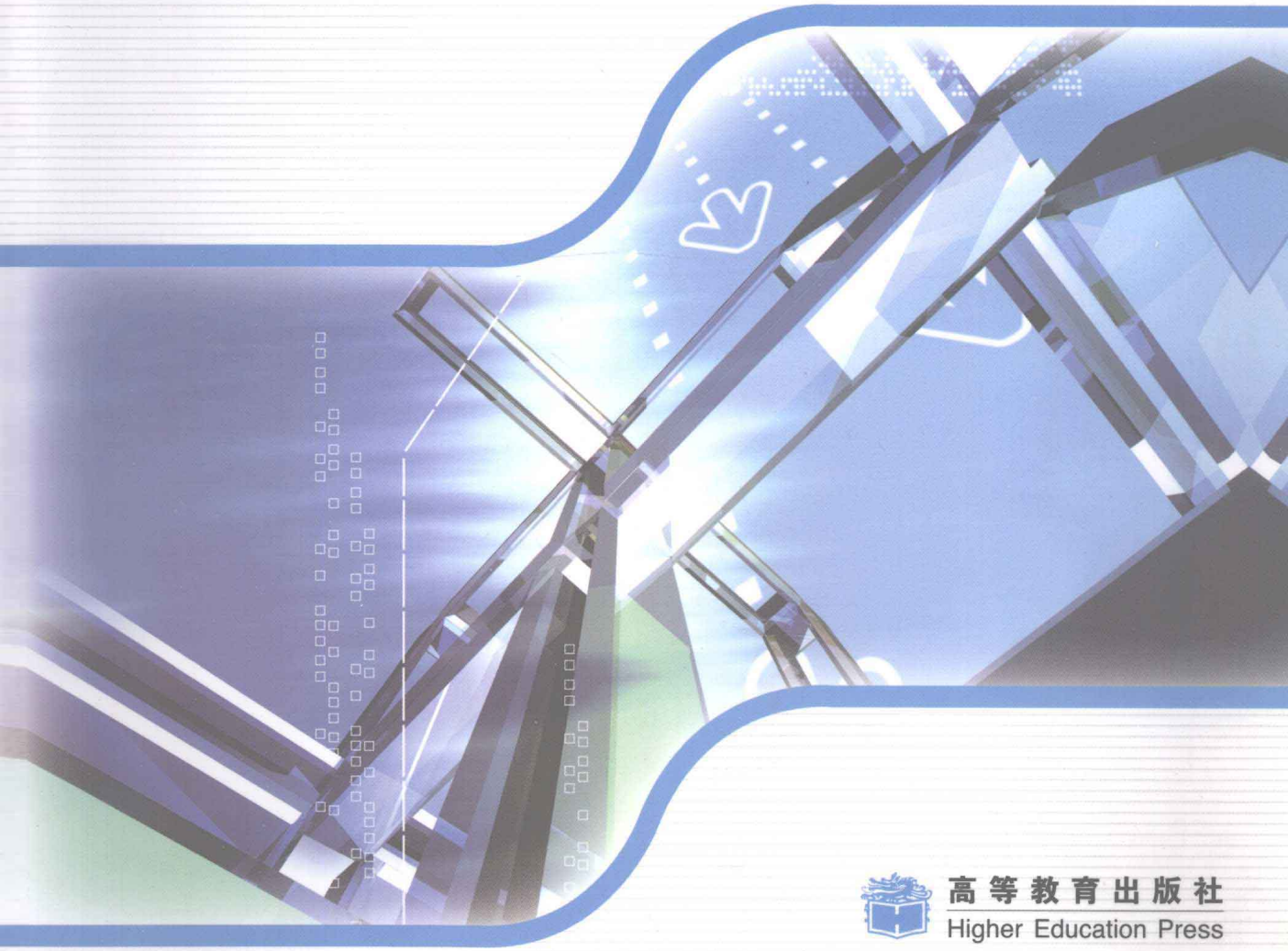
高等职业院校教材
“以就业为导向、以能力为本位”课程改革成果系列

机电专业英语

葛金印　组编
杨成美　主编



高等教育出版社
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内容简介

本书是高等职业院校“以就业为导向、以能力为本位”课程改革成果系列教材之一。

本书既注意机电基础知识的选材，又强调现代制造行业数控技术和模具技术专业知识的学习。全书分为三个模块，第一模块为基础机电技术篇，包含电气常用元器件、刀具、机器人等知识共8个单元；第二模块为数控技术篇，包含数控机床、操作系统、编程和控制等知识共6个单元；第三模块为模具技术篇，包含模具材料、模具加工、注塑模、冲压模等知识共5个单元。模块内科技文献间的内容安排由浅入深、循序渐进。每一单元又由车间对话、科技英语精读、泛读三部分组成。

本书的内容与专业紧密结合，选材注重实践性、实用性，力求基础性与专业性知识兼顾，注意降低相关专业知识难度，收录专业最新、最实用的词汇和用语，反映专业特色及专业发展的最新知识。

本书可作为高等职业院校机电技术专业和数控技术专业教材，也可作为相关行业岗位培训教材及有关人员自学用书。

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前　言

随着现代科学技术的发展，人类已经进入信息时代，特别是中国加入 WTO 后，各种经济、文化、科技交往日趋频繁。英语是目前世界上最通用的语种，越来越多的企业对技术人员的专业英语水平提出了较高的要求，因此专业英语已成为学生们参与就业竞争以及今后工作中必需的工具之一。与机械和电子相关的制造技术发展迅猛，机电专业英语教材的编写工作提到了重要地位。本书既涉及一些基础性、通用性的英语知识，又有机电热门行业知识专题介绍，注重专业英语的听、说、读、写多方面实用能力的训练。

本书分为三个模块，第一模块为基础机电技术篇，包含电气常用元器件、刀具、机器人等知识共 8 个单元；第二模块为数控技术篇，包含数控机床、操作系统、编程和控制等知识共 6 个单元；第三模块为模具技术篇，包含模具材料、模具加工、注塑模、冲压模等知识共 5 个单元。每一单元又由车间对话、科技英语精读、泛读三部分组成。

本书具有如下特点：

1. 面向广大高职教育对象，以能力培养为本位，以实用、简洁、够用为度，旨在提高读者的科技英语听、说、读、写方面能力，扩充学生的专业英语词汇量。每篇精读文献都有参考译文，帮助读者全面理解课文。

2. 内容与专业紧密结合，选材注重实践性、实用性。内容包括机电技术基础以及两个机电类的主干专业数控专业、模具专业的相关技术知识。

3. 在选取科技文献时，力求基础性与专业性知识兼顾，注意降低相关专业知识难度，收录专业最新、最实用的词汇和用语，反映专业特色及专业发展的最新知识。

4. 文中生词的注释不像以往放在文章结束的地方，而是标在正文的一侧，便于读者阅读。文中生词、短语以粗体形式出现，便于读者记忆新词。

5. 内容上注重选材新颖实用，力求采用地道的英语表达；形式上注重生动活泼、图文并茂。

本书由南京铁道职业技术学院苏州校区杨成美主编，沈爱军副主编。编写分工为：常州刘国钧高等职业技术学校王海编写第一模块的一部分，沈爱军编写第一模块的一部分及第二模块，杨成美编写第一模块的一部分及第三单元，杨成美负责全书统稿。

无锡机电高等职业技术学校马佐贤老师审阅了全书，提出了很多宝贵意见，在此表示感谢。

由于编者水平有限，书中误漏欠妥之处，恳请读者指正。

编者

2008 年 4 月

Contents

Unit 1

Mechanical and Electrical Technology

Passage 1

Dialogue

Tom: Hi, Jack. Who's the man outside?

Jack: He's my new **colleague**, Mike.

Tom: What's his job?

Jack: He is an engineer, and he is in charge of **After-sales services**. Come here, Mike. This is Tom.

Tom: How do you do, Mike?

Mike: How do you do, Tom? Nice to meet you.

Tom: Glad to meet you, too. May I ask you a question?

Mike: Go ahead.

Tom: Could you introduce something about your work to us?

Mike: After-sales services is also key work for our company. We supply customer services, including dealing with **feedback information** and **complaint** and **claims** according to the **contract**.

Tom: Thank you, Mike. I wish we can visit your department sometime.

Mike: Welcome! I have to go to call center now. See you!

Tom and Jack: Bye!

Mechatronics

Mechatronics is the **combination** of **mechanical engineering**, electronic engineering and **software engineering**. The purpose of this **interdisciplinary** engineering field is the study of **automata** from an engineering **perspective** and serves the purposes of controlling advanced **hybrid systems**. The word itself is a **portmanteau** of "Mechanics" and "Electronics".

Mechatronics **is centred on** mechanics, electronics, control engineering, computing, **molecular engineering**. The portmanteau "Mechatronics" **was** first **coined by** Mr. Tetsuro Mori, a senior engineer of the Japanese company Yaskawa, in 1969. Mechatronics may **alternatively** be referred to as "**electromechanical systems**" or less often as "**control and automation engineering**", as shown in Fig. 1.1.

combination 结合
mechanical engineering 机械工程
software engineering 软件工程
interdisciplinary 跨学科的
automata 自动控制
perspective 前景
hybrid system 混合系统
portmanteau 混合词
be centred on 集中于
molecular engineering 分子工程
be coined by 被提出
alternatively 可选地
electromechanical system 机电系统
control and automation engineering 控制与自动化工程

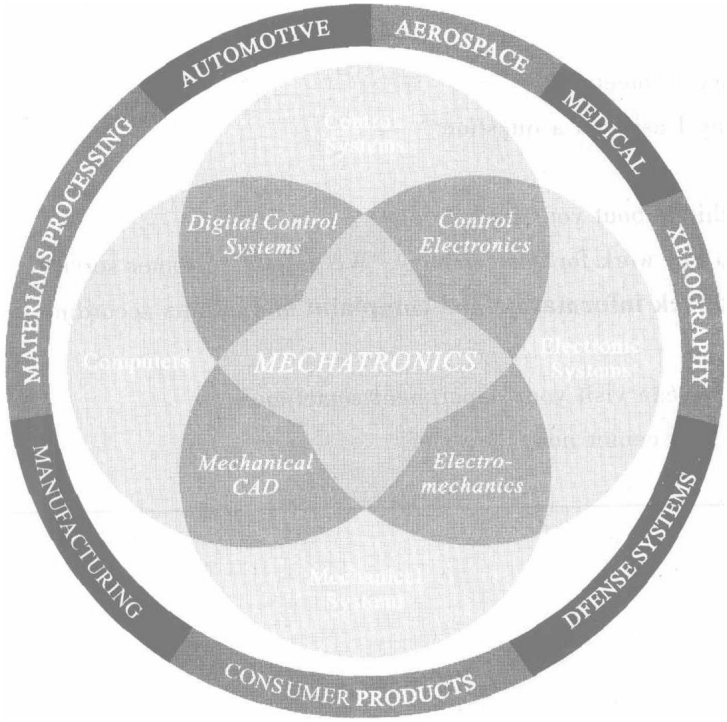


Fig. 1.1 The Various fields that make up Mechatronics[1]

Engineering cybernetics deals with the question of control engineering of mechatronic systems. It is used to control or **regulate** such a system. Through **collaboration** the mechatronic **modules** perform the production goals and **inherit** flexible and **agile** manufacturing **properties** in the production scheme. Modern production equipment **consists of** mechatronic modules that are **integrated** according to a control **architecture**. The most known architectures involve **hierarchy**, **polyarchy**, **heterarchy** and hybrid. The methods for achieving a technical effect are described by control **algorithms**, which may or may not **utilize** formal methods in their design. Hybrid-systems important to Mechatronics include production systems, **synergy drives**, **planetary exploration rovers**, automotive subsystems such as **anti-lock braking systems**, spin-assist and every day equipment such as **autofocus** cameras, video, hard disks, CD-players, washing machines.

engineering cybernetics 工程控制论
regulate 调整
collaboration 合成
module 模块
inherit 传承
agile 敏捷的
property 特性
consists of 包括
integrated 集成的
architecture 结构
hierarchy 层次结构
polyarchy 多元化结构
heterarchy 变态分层结构
algorithm 算法
utilize 利用
synergy drive 协同驱动系统
planetary exploration rover 行星探测器系统
anti-lock braking system 防抱死刹车系统
autofocus 自动对焦

Notes

1. 构成机电一体化学科的不同领域：

Control Systems	控制系统
Electronic Systems	电子系统
Mechanical Systems	机械系统
Computers	计算机系统
Digital Control Systems	数控系统
Mechanical CAD	机械计算机辅助设计
Control Electronics	控制电子
Electro-mechanics	机电
Automotive	汽车业
Aerospace	航空业
Medical	医药业
Xerography	静电印刷

Defense Systems	防卫系统
Consumer Products	消费品
Manufacturing	制造业
Material Processing	材料加工

New Words and Expressions

colleague['kɔli:g] *n.* 同事
complaint[kəm'pleint] *n.* 抱怨，投诉
claim[kleim] *n.* 索赔
contract['kɔntrækt] *n.* 合同
combination[ˌkɔmbi'neiʃən] *n.* 结合
interdisciplinary[ˌintə(:)'disiplinəri] *adj.* 跨学科的
automata['ɔ:təmətə] *n.* 自动控制
perspective[pə'spektiv] *n.* 前景
portmanteau[pɔ:t'mæntəu] *n.* 混合词
alternatively[ɔ:l'tɜ:nətivli] *adv.* 可选地
regulate['regjuleit] *v.* 调整
collaboration[kəˌlæbə'reiʃən] *n.* 合成
inherit[in'herit] *v.* 传承
agile['ædʒail] *adj.* 敏捷的
property['prɔpəti] *n.* 特性
module['mɔdju:l] *n.* 模块
integrated['intigreitid] *adj.* 集成的
architecture['ɑ:kitektʃə] *n.* 工艺
hierarchy['haiərɑ:ki] *n.* 层次结构
polyarchy['pɔliɑ:ki] *n.* 多元化结构
heterarchy['hetərɑ:ki] *n.* 变态分层结构
algorithm['ælgəriðəm] *n.* 算法
utilize[ju:'tilaiz] *v.* 利用

after-sales service 售后服务
feedback information 反馈信息
mechanical engineering 机械工程
software engineering 软件工程
hybrid system 混合系统
be centred on 集中于
molecular engineering 分子工程
be coined by 被提出
electromechanical system 机电系统
control and automation engineering 控制与自动化工程
engineering cybernetics 工程控制论
consists of 包括
synergy drive 协同驱动系统
planetary exploration rover 行星探测器系统
anti-lock braking system 防抱死刹车系统
autofocus 自动对焦

Exercises

【Ex1】 Answer the following questions according to the text above.

1. Why do we say the word "mechatronics" is a portmanteau?
2. Describe the advantages of using the mechatronic modules.
3. Describe the architectures mentioned in this passage.
4. What are every-day equipment utilizing hybridsystems?
5. Why do we say "Mechatronics is interdisciplinary engineering field"?

【Ex2】Match Column A with Column B according to the meaning.

A	B
1. mechatronic	a. to fix or adjust the time, amount, degree, or rate of
2. portmanteau	b. something(as a power plant, vehicle, or electronic circuit) that has two different types of components performing essentially the same function
3. hybrid	c. a usually packaged functional assembly of electronic components for use with other such assemblies
4. architecture	d. a mechanism that is relatively self-operating
5. module	e. an interdisciplinary engineering field
6. integrated	f. a method or style of working
7. automata	g. marked by the unified control of all aspects of industrial production from raw materials
8. regulate	h. a word or whose form and meaning are derived from a blending of two or more distinct forms

【Ex3】Translate the passage below into Chinese.

Engineering cybernetics deals with the question of control engineering of mechatronic systems. It is used to control or regulate such a system. Through collaboration the mechatronic modules perform the production goals and inherit flexible and agile manufacturing properties in the production scheme. Modern production equipment consists of mechatronic modules that are integrated according to a control architecture. The methods for achieving a technical effect are described by control algorithms, which may or may not utilize formal methods in their design.

参考译文

机电一体化

机电一体化是机械工程、电子工程和软件工程三者的结合。这种跨学科的工程领域旨在研究某个工程方面的自动控制和对各种先进的混合系统的控制。机电一体化这个词的本身就是“机械”和“电子”两个词构成的混合词。

机电一体化的核心是机械、电子、控制工程、计算机、分子工程。机电一体化一词最早是由 Yaskawa 公司的高级工程师 Tetsuro Mori 先生于 1969 年首先提出的。机电一体化有时也被用来表示“电机系统”，极少数的时候表示“控制与自动化工程”，如图 1.1 所示。

工程控制论应用于机电一体化控制工程。它被用来控制或调整特定的某个系统，通过集成的机电一体化模块来完成生产要求，获得在生产过程中灵活、轻快的生产特性。现代生产设备包括了根据控制结构所需要的集成的机电一体化模块。我们所熟悉的结构包括数据层次结构、多元化结构、变态分层结构、混合结构。获取某种技术效果的方法被称之为控制算法，在设计中使用这种算法时可能运用或不运用规范的方法。对机电一

体化重要的混合系统包括生产系统、同步驱动系统、行星探测器系统、自动控制子系统（例如防抱死刹车系统、旋转辅助、日常设备如自动对焦照相机、影像设备、硬盘、CD 机、洗衣机等）。

Reading Material

Intelligent Manufacturing Systems

Production engineering and manufacturing industries face difficulties in developing a new **paradigm** to **cope with** the post mass-production **era**. Consumers' **preferences** change very quickly and vary over a wide range of taste. A product's life cycle becomes shorter than shorter. Thus, **rapid prototyping techniques** have been requested, and some new concepts on manufacturing have been presented including **Flexible Manufacturing System**, **Factory (or Flexible) Automation**, **Computer Integrated Manufacturing System**, and **Concurrent Engineering**.

After the termination of the cold war, many regional economies combined through international trade and **dynamically evolved** into global economies. Such change had significant effects on manufacturing industries and **consequently** on production engineering.

As a new paradigm in the post mass-production era, the creation of manufacturing culture has been advocated by Prof. Hiroyuki Yoshikawa, President of University of Tokyo. It contains not only the movement towards **standardization** of **conventional** manufacturing knowledge but also the development of a global manufacturing system with use of **computerization**. At his **advocation**, the international research project of **Intelligent Manufacturing Systems (IMS)** was initiated.

This bimonthly journal is a special issue on the IMS project and similar topics widely covering intelligent manufacturing systems.

The former part of the contents is the description of the IMS project. It consists of the **commentary** articles quoted from the IMS news and the latest reports of IMS international test cases. The Japan IMS center publishes the IMS news and strongly supports the IMS project itself with collaboration of **Ministry of International Trade and Industry of Japan (MITI)**. The authors of these reports are primarily enrolled in the actual responsibility to promote their projects and newly write the articles for this journal. I would like to thank the IMS center and each author for their contributions to this special issue on the IMS project.

The latter part of the contents consists of the articles on the **Standard for the Exchange of Product model data (STEP)** and some technical papers on manufacturing. A conference report on the 2nd Japan-France Congress on Mechatronics is also provided in this issue. I would like to thank all **contributors** for their cooperation in creating this special issue.

As can be easily seen, this issue focused on the forthcoming advancement on production engineering and manufacturing through the movement of Intelligent Manufacturing Systems.

As the editor of this special issue on Intelligent Manufacturing Systems, I hope that the readers pay attention to this new movement and become involved in the near future.

New Words and Expressions

paradigm['pærədaim,-dim] *n.* 范例
era['iərə] *n.* 时代
preference['prefərəns] *n.* 偏好
dynamically[dai'næmikəl] *adv.* 动态地
evolve[i'vɔlv] *n.* 发展
consequently['kɔnsikwəntli] *adv.* 从而
standardization[,stændədai'zeiʃən] *n.* 标准化
conventional[kən'venʃənl] *adj.* 传统的
computerization[kəm,pju:tərai'zeiʃən;-ri'z-] *n.* 计算机化
advocation[,ædvə'keiʃən] *n.* 提倡
commentary['kɔməntəri] *n.* 评述
contributor[kən'tribju(:)tə] *n.* 贡献者

cope with 处理
rapid prototyping techniques 快速成形技术
Flexible Manufacturing System 柔性制造系统
Factory (or Flexible) Automation 工厂自动化
Computer Integrated Manufacturing System
计算机集成制造系统
Concurrent Engineering 并行工程
Intelligent Manufacturing Systems (IMS)
智能制造系统
Ministry of International Trade and Industry of Japan (MITI)
日本国际贸易和产业部
Standard for the Exchange of Product model data (STEP)
产品模型数据交换标准

Passage 2

Dialogue

Tom: You look great today! Mr. Li.

Mr. Li: Thank you! Anything I can do for you?

Tom: May I borrow your **multimeter**?

Mr. Li: Of course. What kind of multimeter do you want, **handy type** or **digital type**?

Tom: Handy type. I want to repair my TV set.

Mr. Li: Do you know how to use it?

Tom: Yes. You've taught us about it. Thank you, Mr. Li.

Mr. Li: Don't mention it. If you have any problem, you're always welcome.

Tom: I will. May I return it tomorrow?

Mr. Li: Anytime. I needn't use it in a few days.

Tom: I will return it as soon as I complete the repair. Thanks again!

Mr. Li: My pleasure.

Text

Electronic Components

Transducer

A **transducer** is a device, usually electrical, electronic, electro-mechanical, **electromagnetic**, **photonic**, or **photovoltaic** that **converts** one type of energy to another for various purposes including measurement or information transfer (for example, **pressure sensors**)[①]. In a broader sense (for example in the **Viable System Model**) a transducer is sometimes defined as any device that converts a signal from one form to another. A very common device is an audio speaker, which converts **electrical voltage variations** representing music or speech to mechanical **cone vibration**. The speaker cone in turn vibrates **air molecules** creating **acoustical** energy. A particular type of transducer is the sensor, used to detect a signal in one form and report it in another.

transducer 传感器
electromagnetic 电磁
photonic 成像
photovoltaic 光电
convert 变换，转变
pressure sensor 压力感应器
Viable System Model 活动系统模式
electrical voltage variations 电压变化
cone vibration 圆锥振动
air molecule 空气分子
acoustical 声音的

Resistor

A **resistor** is a **two-terminal** electrical or electronic **component** that **opposes** an **electric current** by producing a **voltage drop** between its terminals **in accordance with Ohm's Law**: $R = \frac{V}{I}$.[②] The electrical resistance is equal to the voltage drop across the resistor **divided by** the current through the resistor. Resistors are used as part of electrical networks and electronic circuits (Fig. 1.2、Fig. 1.3).

resistor 电阻器
two-terminal 两端的
component 元件
oppose 抵抗，反对
electric current 电流
voltage drop 电压降
in accordance with 与……一致，依照
Ohm's Law 欧姆定律
divided by 除以……

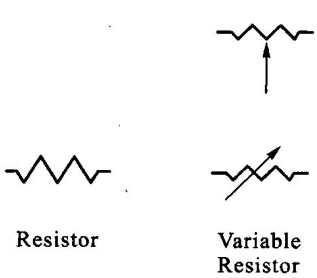
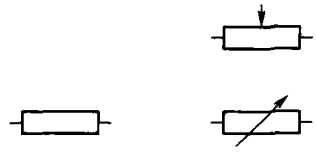


Fig. 1.2 Resistor symbols (American)

Resistor symbol (American)
美式电阻器标志



Resistor symbol(Europe, IEC)

英式及国际电工委员会电阻器标志

Fig. 1.3 Resistor symbols(Europe, IEC)

Resistors in a **parallel configuration** (Fig. 1.4) each have the same **potential difference** (voltage). To find their total **equivalent resistance** (R_{eq}):

parallel 平行，并联

configuration 结构

potential difference 电位差

equivalent resistance 等效电阻

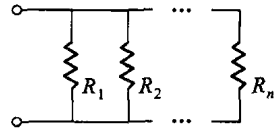


Fig. 1.4 Parallel configuration

$$\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} + \cdots + \frac{1}{R_n}$$

The current through **resistors in series** (Fig. 1.5) stays the same, but the voltage across each resistor can be different. The sum of the potential differences(voltage) is equal to the total voltage. To find their total resistance:

resistors in series 串联电阻器

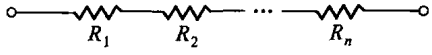


Fig. 1.5 Resistors in series

$$R_{eq} = R_1 + R_2 + \cdots + R_n$$

A resistor network(Fig. 1.6) that is a combination of parallel and series can sometimes be broken up into smaller parts that are either one or the other. For instance:

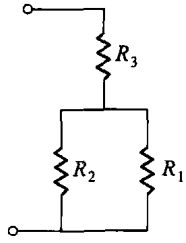


Fig. 1.6 A resistor network

$$R_{eq} = (R_1 \parallel R_2) + R_3 = \frac{R_1 R_2}{R_1 + R_2} + R_3$$

However, many resistor networks cannot be **split up** in this way. Consider a cube, each **edge** of which has been replaced by a resistor. For example, determining the resistance between two opposite **vertices** requires **matrix methods** for the general case. However, if all twelve resistors are equal, the corner-to-corner resistance is $\frac{5}{6}$ of any one of them.

split up 分开，分裂
edge 边，边缘
vertices （vertex 的复数）顶点
matrix method 矩阵方法

Capacitor

A **capacitor** is an electrical/electronic device that can store energy in the electric field between a pair of **conductors**（called "**plates**"）. The process of storing energy in the capacitor is known as "**charging**", and involves electric charges of equal **magnitude**, but opposite **polarity**, building up on each plate.

Capacitors are often used in **electrical circuit** and electronic circuits as energy-storage devices. They can also be used to **differentiate** between **high-frequency** and low-frequency signals. This property makes them useful in **electronic filters**(Fig. 1.7 ~ Fig. 1.9).

capacitor 电容器
conductor 导体
plate 极板
charge 充电
magnitude 数量，大小
polarity 极性
electrical circuit 电路
differentiate 区分
high-frequency 高频率的
electronic filters 电子过滤器

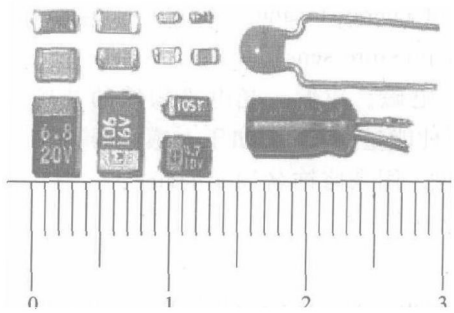


Fig. 1.7 Capacitors

SMD ceramic at top left; SMD **tantalum** at bottom left; **through-hole** tantalum at top right; through-hole **electrolytic** at bottom right. Major **scale divisions** are cm.

SMD = Surface Mounted Device 表面安装器件
ceramic 陶瓷
tantalum 钽
through-hole 透孔
electrolytic 电解
scale division 标尺的刻度

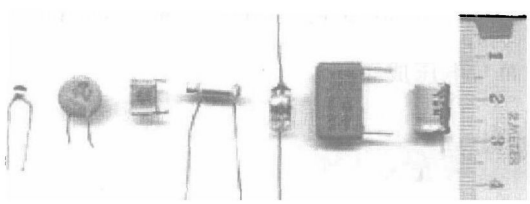


Fig. 1.8 Various types of capacitors

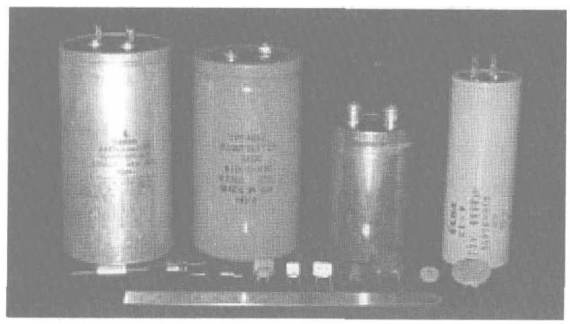


Fig. 1.9 Various capacitors

From left: **multilayer ceramic**, **ceramic disc**, **multilayer polyester film**, **tubular ceramic**, **polystyrene**, **metallized polyester film**, **aluminium electrolytic**. Major scale divisions are cm.

The large **cylinders** are high value electrolytic types

multilayer ceramic 多层陶瓷
ceramic disc 陶瓷盘
multilayer polyester film 多层聚酯膜
tubular ceramic 管式陶瓷
polystyrene 聚苯乙烯
metallized polyester film 金属化聚酯膜
aluminium electrolytic 电解铝

cylinder 圆柱体

Notes

1. A transducer is a device, usually electrical, electronic, electro-mechanical, electromagnetic, photonic, or photovoltaic that converts one type of energy to another for various purposes including measurement or information transfer(for example, pressure sensors).

传感器是广泛应用于电子、电路、电机、电磁、成像、光电等领域的装置。它是以测量或信号转换等为目的，将一种能量转换成另一种能量的装置(如压力感应器)。

that converts... 到句子结束是一个定语从句，用来修饰名词 a device;

convert... to... 短语解释为“从……变成……”;

for... 为介词短语，表示目的。

2. A resistor is a two-terminal electrical or electronic component that opposes an electric current by producing a voltage drop between its terminals in accordance with Ohm's Law: $R = \frac{V}{I}$.

电阻器是对电流具有一定阻碍作用的两极电路器件，电阻器两端所加的电压降符合欧姆定律：$R = \frac{V}{I}$。

欧姆定律 $R = \frac{V}{I}$ 中的 I(current)代表电流，V(voltage)代表电压，R(resistance)代表电阻。欧姆定律显示电阻的大小与电流成反比，而与电压成正比。

New Words and Expressions

multimeter[ˌmʌlti'mitə] *n.* 万用表
transducer[trænz'dju:sə] *n.* 传感器
electro-mechanical[iˌlektrəumi'kænikəl] *adj.* 电机的