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高职高专系列教材

机电工程 专业英语

◎朱晓玲 主编
◎薛恩 副主编
◎李望云 主审



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21 世纪高职高专系列教材

机电工程专业英语

朱晓玲 主编

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本书以培养学生阅读和理解机电工程专业英语的能力为目标,讲解了机械制造技术、机电一体化技术、数控技术、电气控制技术、模具设计与制造、汽车工程等方面的专业英语知识。每篇课文都配有注释、阅读技巧、课后练习和参考译文,以方便读者学习。

本书适用于高职高专院校机电类专业师生。

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出版说明

根据《教育部关于以就业为导向深化高等职业教育改革的若干意见》中提出的高等职业院校必须把培养学生动手能力、实践能力和可持续发展能力放在突出的地位,促进学生技能的培养,以及教材内容要紧密结合生产实际,并注意及时跟踪先进技术的发展等指导精神,机械工业出版社组织全国近60所高等职业院校的骨干教师对在2001年出版的“面向21世纪高职高专系列教材”进行了全面的修订和增补,并更名为“21世纪高职高专系列教材”。

本系列教材是由高职高专计算机专业、电子技术专业和机电专业教材编委会分别会同各高职高专院校的一线骨干教师,针对相关专业的课程设置,融合教学中的实践经验,同时吸收高等职业教育改革的成果而编写完成的,具有“定位准确、注重能力、内容创新、结构合理和叙述通俗”的编写特色。在几年的教学实践中,本系列教材获得了较高的评价,并有多品种被评为普通高等教育“十一五”国家级规划教材。在修订和增补过程中,除了保持原有特色外,针对课程的不同性质采取了不同的优化措施。其中,核心基础课的教材在保持扎实的理论基础的同时,增加实训和习题;实践性较强的课程强调理论与实训紧密结合;涉及实用技术的课程则在教材中引入了最新的知识、技术、工艺和方法。同时,根据实际教学的需要对部分课程进行了整合。

归纳起来,本系列教材具有以下特点:

- (1) 围绕培养学生的职业技能这条主线来设计教材的结构、内容和形式。
- (2) 合理安排基础知识和实践知识的比例。基础知识以“必需、够用”为度,强调专业技术应用能力的训练,适当增加实训环节。
- (3) 符合高职学生的学习特点和认知规律。对基本理论和方法的论述要容易理解、清晰简洁,多用图表来表达信息;增加相关技术在生产中的应用实例,引导学生主动学习。
- (4) 教材内容紧随技术和经济的发展而更新,及时将新知识、新技术、新工艺和新案例等引入教材。同时注重吸收最新的教学理念,并积极支持新专业的教材建设。
- (5) 注重立体化教材建设。通过主教材、电子教案、配套素材光盘、实训指导和习题及解答等教学资源的有机结合,提高教学服务水平,为高素质技能型人才的培训创造良好的条件。

由于我国高等职业教育改革和发展的速度很快,加之我们的水平和经验有限,因此在教材的编写和出版过程中难免出现问题和错误。我们恳请使用这套教材的师生及时向我们反馈质量信息,以利于我们今后不断提高教材的出版质量,为广大师生提供更多、更适用的教材。

机械工业出版社

前 言

《机电工程专业英语》是 21 世纪高职高专机电教材编写委员会推出的机电类课程教材之一。本教材具有如下特点：

1. 立足于高等职业教育，面向高职高专教育对象，以能力培养为本位，以训练为手段，旨在切实提高读者阅读和理解机电类科技英语的能力。每个单元模块目标明确，并将科技英语中的阅读方法贯穿于专业英语的教学中，有针对性地加以训练，使学生掌握阅读技巧，提高学生科技英语的阅读能力。
2. 在具体选篇上重视取材实用新颖，以求达到学以致用目的。
3. 文中的注释适应阅读习惯，标在正文的一侧，以便读者阅读。
4. 部分章节内容与实训联系紧密，可在实验实训现场结合本教材进行现场教学，理论与实际相结合，这也是本教材异于同类教材的一大特色。

本书可作为高职高专院校数控技术应用、机械制造及自动化、机电一体化、模具设计与制造、电气自动化、汽车维修等专业的科技英语教材，也可供从事机电工程领域工作的工程技术人员参考。

本书由朱晓玲担任主编，薛恩担任副主编。第一章由陈翔编写，第二章及附录由朱晓玲编写，第三章由陈亭志编写，第四章由朱理编写，第五章由陈峰编写，第六章由薛恩编写，黄琳莉参与了第六章的部分编写。朱晓玲对本书进行统稿。

武汉职业技术学院李望云担任本书的主审。

由于编者水平有限，加上时间仓促，书中错漏难免，敬请读者批评指正。

编 者

2007 年 3 月于武汉

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Unit 1 Machinery Manufacturing Technology

Lesson 1 Metal Cutting Technology

Section I Words and Phrases

- raw material 原材料
- processing [prəu'sesiŋ] n. 加工方法, 加工, 制造
- assembly [ə'sembli] n. 装配
- operation [ɔpə'reiʃən] n. 工序, 运转, 操作
- machinery [mə'ʃi:nəri] n. [总称] 机器, 机械
- manufacturing [ˌmænju'fæktʃəriŋ] n. 制造, 生产
- metal casting 金属铸造, 金属铸件
- plastic molding 塑料成型
- machining [mə'ʃi:niŋ] v. 机械加工, 加工
- pressworking ['pres,wɜ:kɪŋ] n. 压力加工
- enhance [in'hɑ:ns] vt. 提高, 增强
- heat-treating 热处理
- polishing ['pɒlɪʃɪŋ] n. 抛光
- workpart ['wɜ:kəpɑ:t] n. 工件
- geometry [dʒi'ɒmitri] n. 几何形状
- turning ['tɜ:niŋ] n. 车削
- milling ['miliŋ] n. 铣削
- drilling ['driliŋ] n. 钻削
- boring ['bɔ:riŋ] n. 镗削
- grinding ['graɪndiŋ] n. 磨削
- EDM (Electron Discharge Machining) 电火花加工
- LBM (Laser Beam Machining) 激光加工
- USM (Ultrasonic Machining) 超声波加工
- machine tool 机床
- lathe [leið] n. 车床
- milling machine 铣床
- drill press 钻床
- grinding machine 磨床
- machining center 加工中心

tool [tu:l] n. 刀具, 工具

turning tool 车刀

milling cutter 铣刀

twist drill 钻头, 麻花钻

grinding wheel 砂轮

hardness ['hɑ:dnis] n. 硬度

strength [streŋθ] n. 强度

tenacity [ti'næsiti] n. 韧性

chemical stability 化学稳定性

main movement 主运动

feed movement 进给运动

spindle ['spɪndl] n. 主轴, 杆, 心轴

generatrix ['dʒenəreɪtrɪks] n. 母线

schematic diagram 示意图

cutting speed 切削速度

feed [fi:d] n. 进给量

depth of cut 背吃刀量, 吃刀量

chip [tʃɪp] n. 切屑

continuous chip 连续切屑, 带状切屑

segmented nonhomogeneous chip 分段不均匀切屑, 节状切屑

discontinuous chip 不连续切屑, 崩碎切屑

variable ['vɛəriəbl] n. 变量

Section II Text

As we know, Production is a process which transforms raw materials into finished products by a sequence of processing and assembly operations, illustrated in Figure 1-1.

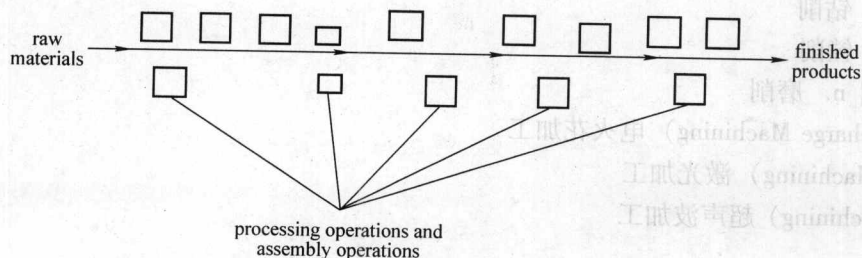


Figure 1-1 Schematic Diagram of Production

Machinery manufacturing technology is the most important technology applied in processing operation. Processing operation can commonly be classified into four types: 1. Basic process operations (such as metal casting and plastic

molding), 2. Secondary process operations (including machining and press-working operations), 3. Operations to enhance physical properties (such as heat-treating operations), 4. Finishing operations (such as painting, polishing)¹. Metal cutting technology is the technology applied in machining process which is the secondary processing operations.

Metal cutting technology is the technology which is concerned with utilizing various processes to remove materials from the workpart and achieve final desired geometry. Various processes include general processes, such as turning, milling, drilling, boring, grinding, etc. and special process, such as EDM (Electron Discharge Machining), LBM (Laser Beam Machining), USM (Ultrasonic Machining) etc.². Certainly, there must be some corresponding machine tools, for example, lathe, milling machine, drill press, grinding machine, machining center and so on. General processes make use of cutting tools (such as turning tool, milling cutter, twist drill, grinding wheel, etc.) to remove materials. The cutting tool must possess some fundamental capabilities, such as hardness, strength, tenacity, chemical stability and so on. Various types of materials which will be discussed in subsequent sections have been used in manufacturing tools and workparts.

In metal cutting, tools and workparts must have certain relative movements during processing in order to achieve geometry needed. The movements include main movement and feed movement. For example, in turning process, the rotation of spindle is the main movement which generates generatrix, and the turning tool's move is the feed movement which generates lead line³. The two movements combine together to generate the cylinder. The schematic diagram of turning process is pictured in Figure 1-2.

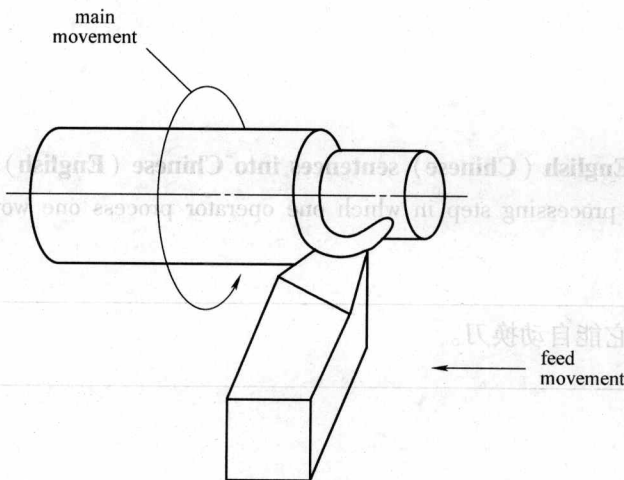


Figure 1-2 Schematic Diagram of Turning Process

1 加工工序常被分为4类: ①基本加工工序(如金属铸造和塑料成型) ②二次加工工序(包括机加工和压力加工工序) ③提高物理特性的工序(如热处理工序) ④终加工或光整加工(如喷漆、抛光)。

2 不同的加工方法包括常用加工, 比如车削、铣削、钻削、镗削、磨削等, 和特种加工, 比如电子束加工、激光加工、超声波加工等。

3 例如, 在车削加工中, 主轴的旋转是主运动, 用来产生母线, 而车刀的运动是进给运动, 用来产生导线。

The three factors of cutting include cutting speed, feed and depth of cut⁴. Cutting speed refers to the instantaneous velocity between the cutting tool and the workpiece at a given point. Feed is concerned with the distance of the cutting tool's movement relative to the workpiece at feeding direction. And depth of cut is the vertical distance that the cutting tool cuts into the workpiece. They are all variables used in expressing the main movement and feed movement.

The materials removed from the workpiece are called chips. Chips will have different shape such as continuous chips, segmented nonhomogeneous chips and discontinuous chips according to different part materials, processes, and other variables⁵.

4 切削用量三要素包括切削速度、进给量和切削深度。

5 根据零件材料、加工方法及其他变量的不同,切屑会形成不同形状,如带状切屑、节状切屑和崩碎切屑。

Section III Exercise

I. Brief answer to the questions according to the text.

1. What is the metal cutting technology?

2. What are the three elements of cutting used in processing?

II. Glossary of specialty

1. Draw a connected line between the processing and corresponding machine tool and cutting tool, which are listed in the following three columns.

turning	grinding machine	milling cutter
milling	drill press	twist drill
drilling	milling machine	turning tool
grinding	lathe	grinding wheel

2. Acronym reverting

EDM—

LBM—

USM—

III. Translate the following English (Chinese) sentences into Chinese (English).

1. Production operation is the processing step in which one operator process one workpart at one workstation.

2. 加工中心不同的特点在于它能自动换刀。

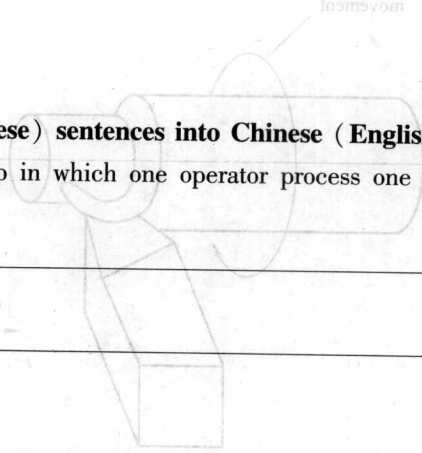


Figure 4-2 Schematic Diagram of Turning Process

Lesson 2 Engineering Materials

Section I Words and Phrases

- classification [ˌklæsɪfɪˈkeɪʃən] n. 分类, 分级
scheme [ski:m] n. 方案, 安排, 配置, 计划, 阴谋
density [ˈdensɪti] n. 密度
thermal conductivity 导热性
cast iron 铸铁
iron carbon 铁碳合金
carbon [ˈkɑ:bən] n. 碳
silicon [ˈsɪlɪkɒn] n. 硅
sulfur [ˈsʌlfə] n. 硫磺
manganese [ˌmæŋɡəˈni:z, ˈmæŋɡəni:z] n. 锰
phosphorus [ˈfɒsfərəs] n. 磷
brittle [ˈbrɪtl] adj. 脆性的, 脆弱的
cast [kɑ:st] n. 铸件 v. 铸造, 浇铸
constituent [kənˈstɪtjuənt] n. 成分, 要素
chromium [ˈkrəʊmjəm] n. 铬
nickel [ˈnɪkl] n. 镍
molybdenum [məˈlɪbdiːnəm] n. 钼
copper [ˈkɒpə] n. 铜
tungsten [əˈtʌŋstən] n. 钨
cobalt [kəˈbɔ:lt, ˈkəʊbɔ:lt] n. 钴
malleable [ˈmæliəbl] adj. 可锻的, 有延展性的
aluminum [əˈlju:mɪnəm] n. 铝
titanium [ˈtaɪteɪnjəm] n. 钛
organic [ɔ:ˈɡænik] adj. 有机的
compound [ˈkɒmpaʊnd] n. 化合物
polymerization [ˌpɒlɪməraɪˈzeɪʃən] n. 聚合, 聚合作用
thermoplastic [ˌθɜ:məˈplæstɪk] adj. 热塑性的 n. 热塑性塑料
thermosetting [ˌθɜ:məʊˈsetɪŋ] adj. 热固性的
PE (polyethylene) 聚乙烯
PVC (Polyvinyl Chloride) 聚氯乙烯
PP (polypropylene) 聚丙烯
PS (polystyrene) 聚苯乙烯
ABS 丙烯腈-丁二烯-苯乙烯, ABS 塑料

nylon 尼龙, 聚酰胺纤维
 EP (epoxy) 环氧树脂
 bakelite ['beikələit] n. 酚醛塑料, 胶木, 电木
 plasticity [plæs'tisiti] n. 可塑性, 塑性
 fluidity [flu (:)'iditi] n. 流动性
 injection molding 注塑成型
 extrude [eks'tru:d] v. 挤压
 synthetic [sin'θetic] adj. 合成的, 人造的
 elasticity [ilæs'tisiti] n. 弹力, 弹性
 electronic insulation 电绝缘性
 composite ['kɒmpəzɪt] n. 复合材料, 合成物
 fiber-reinforced 纤维增强的
 particulate [pə'tɪkjulɪt] adj. 微粒的 n. 微粒
 laminated ['læmineɪtɪd] adj. 薄板 [薄片] 状的
 high-speed steel 高速钢
 carbide n. 硬质合金
 ceramic [si'ræmɪk] n. 陶瓷 adj. 陶瓷的
 diamond ['daɪəmənd] n. 金刚石, 钻石
 CBN (Cubic Boron Nitride) n. 立方氮化硼
 automobile ['ɔ:təməubi:l] n. 汽车
 lamp-chimney 灯罩
 panel ['pænl] n. 面板, 仪表板
 headstock ['hedstɒk] n. 主轴箱
 bed [bed] n. 床身
 gear [gɪə] n. 齿轮, 传动装置
 normalizing ['nɔ:məlaɪzɪŋ] n. 正火
 anneal [ə'ni:l] n. 退火
 temper ['tempə] n. 回火
 quencher [kwentʃə] n. 淬火

Section II Text

The world is made up of matters. There are so many different types of materials in the world. We refer to the materials applied in engineering field as engineering materials. There are a lot of classification schemes about engineering materials. According to the chemical element, engineering materials can be divided into metals and nonmetals¹. According to their use in manufacturing, engineering materials can be classified into two major categories: tool materials and workpart materials.

1 根据化学元素的不同, 工程材料可分为金属和非金属。

Metal materials have some fundamental capabilities, such as hardness, strength, density, thermal conductivity and so on. The most important metal materials in manufacturing are cast iron and steel. Cast iron and steel are both iron carbon². Cast iron usually contains 2 to 4.5 percent carbon, 0.5 to 3 percent silicon, and lesser amounts of sulfur, manganese, and phosphorus. It is hard, brittle and nonmalleable, so it is commonly used in casting into various shapes. Steel contains 0.2 and 1.5 percent carbon, often contains other constituents such as manganese, chromium, nickel, molybdenum, copper, tungsten, cobalt etc. to achieve certain properties needed. Steel is not only hard and strong, but malleable on account of lower carbon content, so it has been used more widely. There are also other metal materials used in manufacturing such as aluminum & aluminum alloy, copper & copper alloy, titanium alloy and so forth.

2 铸铁和钢都是铁碳合金。

The most widely used nonmetal materials may be engineering plastics. Plastics are organic compounds produced by polymerization³. The common engineering plastics can be grouped into two types that are thermoplastic and thermosetting plastics⁴. Thermoplastics include PE (polyethylene), PVC (Polyvinyl Chloride), PP (polypropylene), PS (polystyrene), ABS, nylon, and so on. Thermosetting plastics include EP (epoxy), bakelite, and so on. Due to its good plasticity and fluidity, the plastic can not only be used in injection molding, but also be extruded or cast into shapes. The rubber is another major category in nonmetal materials. It can be divided into natural rubber and synthetic rubber according to the source of raw materials. Because of its high elasticity and electronic insulation, rubber can be used in making tires, shock absorbers, airproof loops and electronic insulation. Now more and more composites are used in engineering, especially in aerospace, biomedicine. Composites are combined with two or more distinct materials. It can be divided into three types: fiber-reinforced, particulate, and laminated composites⁵, which is illustrated in Figure 1-3.

3 塑料是一种通过聚合作用生成的有机化合物。

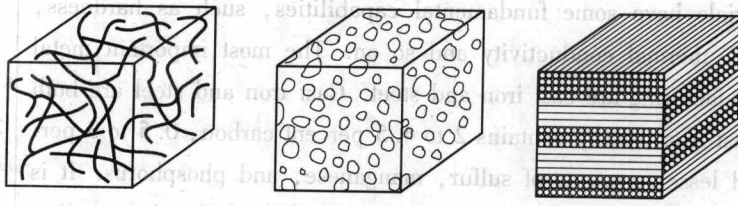
4 常用的工程塑料能分为热塑性塑料和热固性塑料两类。

Tool materials may either metal or nonmetal. High-speed steel and carbide are the most widely used metal tool materials⁶. Nonmetal tool materials include ceramic, diamond and CBN (Cubic Boron Nitride).

5 复合材料有两种或两种以上不同的材料组合而成。它一般被分为纤维增强、颗粒和层状复合材料 3 种类型。

Workpart materials also involve metal and nonmetal. Plastics can be used in making automobile lamp-chimney, panels, toys and so on. Metal can be used in manufacturing variety of parts. Take lathe as an example, Cast iron can be used in manufacturing headstock and bed. However, spindle and gears are made of steel. Metal workparts are ordinarily needed heat-treating operations (such as normalizing, anneal, temper and quencher) to enhance physical properties of materials.

6 高速钢和硬质合金是最广泛应用的金属刀具材料。



a) fiber-reinforced composite b) particulate composite c) laminated composite

Figure 1-3 Types of Composites

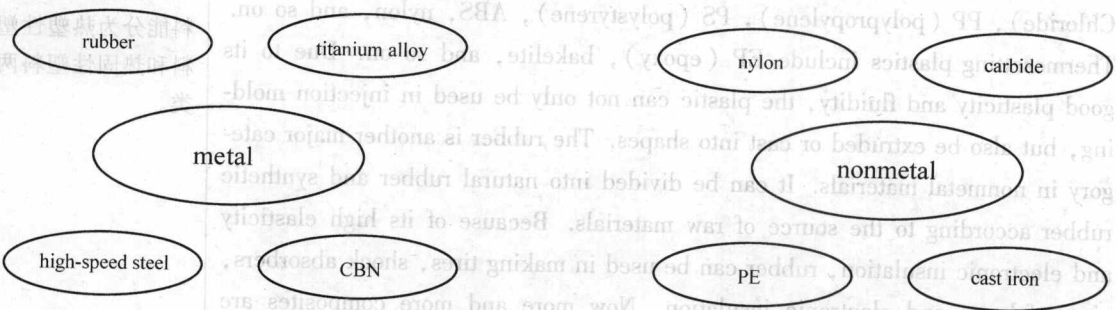
Section III Exercise

I. Brief answer to the questions according to the text.

1. Which one is malleable, the cast iron or the steel?
2. What types can composites be classified into?

II. Glossary of specialty

1. Match the engineering materials with corresponding categories by connected lines.



2. Acronym reverting

CBN——

III. Translate the following English (Chinese) sentences into Chinese (English).

1. The demand of light-weight, high-strength and heat-resistance engineering materials promotes the rapid development of composites.
2. 热处理是一种提高金属材料物理特性的方式。

Lesson 3 CAD and CAM

Section I Words and Phrases

CAD 计算机辅助设计

CAM 计算机辅助制造

acronym [ˈækrənɪm] n. 首字母缩写词

term [tɜ:m] n. 术语

hardware [ˈhɑ:dweə] n. 硬件, 五金件

computer mainframe 计算机主机

peripheral equipment 外设, 外部设备

high-resolution 高分辨率的

display [diˈspleɪ] n. 显示器

man-machine 人机的

interface [ˈɪntə(:), feɪs] n. 界面

mouse [maʊs] n. 鼠标

keyboard [ˈki:bɔ:d] n. 键盘

light pen 光笔

digitalizing tablet 数字化书写板

printer [ˈprɪntə] n. 打印机

plotter [ˈplɒtə] n. 绘图仪

drawing [ˈdrɔ:ɪŋ] n. 图, 图纸, 制图

software [ˈsɔ:ftweə] n. 软件

drafting [ˈdra:ftɪŋ] n. 草图, 制图

2D (Two Dimensional) 二维

3D (Three Dimensional) 三维

modeling [ˈmɒdlɪŋ] n. 造型, 建模

post-process 后处理的

module [ˈmɒdjʊ:l] n. 模块, 模数

NC (Numerical Control) 数控

programming [ˈprɒgræmɪŋ] n. 编程

G-code G 代码, 加工程序指令

CNC (Computer Numerical Control) 计算机数控

DNC (Direct Numerical Control) 直接数控, 计算机群控

real-time 实时的

machine tool table 机床工作台

workpiece [ˈwɜ:kpi:ɪs] n. 工件

positioning [pəˈzɪʃənɪŋ] n. 定位