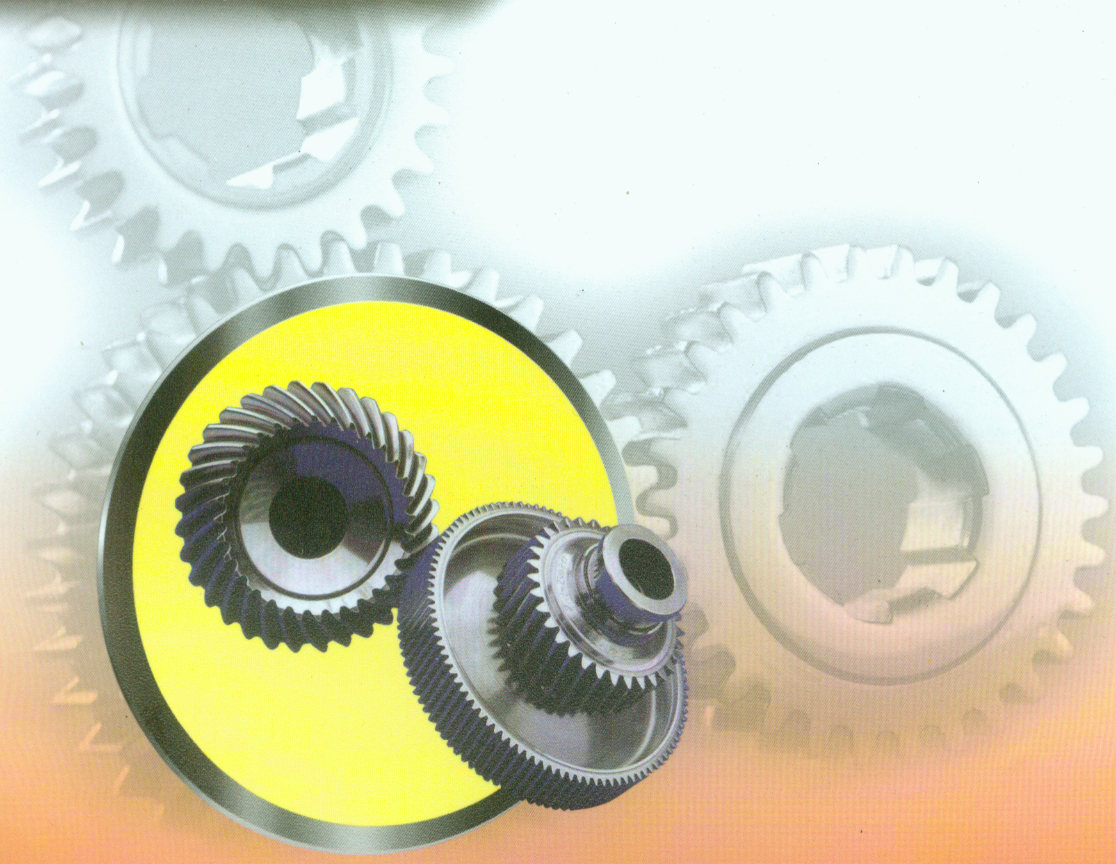
高等职业教育机械大类规划教材系列

机电英语

顾莉莉　乔清合／主　编



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内 容 简 介

本书内容包括机电一体化技术、工程制图、机械零件、机械切削加工基本原理、注塑成型技术、可编程控制器、数字控制、数控加工中心简介、数控机床操作面板、计算机辅助设计/计算机辅助制造、工业机器人、汽车构造、个人简历和求职信及求职面试等方面的英文资料。为了便于阅读对照，书后还附有参考译文及练习答案。本书强调专业性和实用性，实现了从书本知识到工作岗位专业英语实际应用的过渡。

本书可作为高等职业院校、高等专科学校、成人高校及本科院校举办的二级职业技术学院机电一体化技术、机械制造、数控应用技术，模具制造技术、电气自动化及汽车维修等专业的英语教材，也可供相关专业工程技术人员参考。

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前　　言

随着新世纪高新技术发展的进一步推动，全球经济文化交流日趋紧密和频繁。当前，英语仍然是国际间各种信息交流的主要载体之一，众多专业文献、科技成果、生产应用等信息多采用英语。经济全球化的潮流迫切需要具有熟练的专业应用技术和精良的专业英语能力的高级应用型人才，为此我们特编写了本书，着重培养学生掌握机电类专业英语的能力。

本教材是根据高职高专院校机电类专业英语教学基本要求而编写的。编者大多具有多年的教学实践经验和相关工程技术应用经历。通过精选内容，精心编排，做到使内容具有针对性和实用性，力求覆盖面广，通俗易懂，适合教学和自学，并为学生将来进一步学习和工作打下基础。

本书的编写工作得到了荆州职业技术学院和武汉交通职业技术学院的大力支持，对此我们表示诚挚的谢意。

由于编者水平有限，编写时间仓促，书中不妥和疏漏之处在所难免，敬请广大读者批评指正，以便再版时修改和补充。

编者在编写过程中参考了许多论著，有些地方引用了部分材料和观点，参阅了目前已出版的这方面的许多教材，在此特向相关作者表示衷心的感谢。

Contents

Lesson 1

Dialogue

A: Welcome to our NC training center. This is our NC training center, where the students majoring in electromechanical integration technology and CNC technology accept practice and training, and an important teaching and scientific research base for teachers of Electromechanical Engineering Department.

B: Can I have a look at the equipment?

A: Of course. This is a NC lathe made in Japanese. We can not only straight turn, thread, and cut slots, but also drilling, boring and reaming holes on it.

B: OK, quite good.

Text

Mechatronics

The success of industries in manufacturing and selling goods in a world market increasingly depends upon an ability to integrate electronics and computing technologies into a wide range of primarily mechanical products and processes. The performance of many current products—cars, washing machines, robots or machine tools and their manufacture depend on the capacity of industry to exploit developments in technology and to introduce them at the design stage into both products and manufacturing processes. The result is systems which are cheaper, simpler, more reliable and with a greater flexibility of operation than their predecessors. In this highly competitive situation, the old divisions between electronic and mechanical engineering are increasingly being replaced by the integrated and interdisciplinary approach to engineering design referred to as mechatronics.

In a highly competitive environment, only those new products and processes in which an effective combination of electronics and mechanical engineering has been achieved are likely to be successful. In general, the most likely cause of a failure to achieve this objective is an inhibition on the application of electronics. In most innovative products and processes the mechanical hardware is that which first seizes the imagination, but the best realization usually depends on a consideration of the necessary electronics, control engineering and computing from the earliest stages of the design process. The integration across traditional boundaries that this implies and requires lies at the heart of a mechanotronics approach to engineering design and is the key to understanding the developments that are taking place.

To be successful, a mechanotronics approach needs to be established from the very earliest stages of the conceptual design process, where options can be kept open. In this way the design engineer, and especially the mechanical design engineer, can avoid going too soon down familiar and perhaps less productive paths.

Where full attention has been given to market trends, the adoption of an integrated mechanotronics approach to design has led to a revival in areas such as high speed textile equipment, metrology and measurement systems, and special purpose equipment such as that required for the automatic testing of integrated circuits. In most cases the revival or new growth is brought about by the enhancement of process capability achieved by the integration of electronics, often in the form of an embedded microprocessor, with the basic mechanical system.

This demand for increased flexibility in the manufacturing process has led to the development of the concept of flexible manufacturing systems in which a number of elements such as computer numerically controlled machine tools, robots and automatically guided vehicles are linked together for the manufacture of a group of products. Communication between the individual elements of the system is achieved by means of local area networks.

Within products the diversity and opportunity offered by a mechanotronics approach to engineering design is to date largely unrealized. End user products are substantial revenue earners and it is possible here to distinguish between existing products offering enhanced capabilities and completely new product areas which would not have existed without a mechanotronics design approach having been adopted from the outset.

In the first category the following are illustrative from many examples:

Automotive engines and transmissions Engine and driveline management systems leading to reduced emissions, improved fuel economy, protection against driver misuse by, for example, prohibiting excessive fuel flow at low speeds, and selectable gear characteristics.

Power tools Modern power tools such as drills offer a range of features including speed and torque control, reversing drives and controlled acceleration.

Examples in the second category include the following:

Modular robots Conventional industrial robots are often limited in their operation by their geometry. By providing a range of structural components and actuators together with a central controller a modular robot system has been made available, allowing users to assemble robot structures directly suited to their needs.

Video and compact disc players Video and compact disc systems involve complex laser tracking systems to read the digitally encoded signal carried by the disc. This control is achieved by means of a microprocessor based system which also provides features such as multiple track selection, scanning and preview.

A common factor in consumer mechatronics as exemplified by the above is the continuous improvement in capability achieved against a constant or reducing real cost to the end user. The capability of a mechanotronics system, based as it often is on inexpensive components or modules, also provides a means to execute bespoke solutions to special problems.

In engineering design, a mechatronics approach requires the integration of a wide range of material and information aimed at providing systems which are more flexible and of higher performance than their predecessors. Thus, for full benefit and effect, mechatronics must be a feature of both the conceptual and functional stages of the design process.

In manufacturing, users are demanding a much higher degree of control of both the overall process and its components. This requires knowledge both of the capabilities of these components and of the means by which they are integrated within the complete system.

Words and Expressions

exploit	*v.* 开发,利用,使用,发挥;*n.* 功绩,成就
innovative	*a.* 革新的,创新的,富有革新精神的
seize	*v.* 抓,捉,了解,利用
lie at the heart of	是……的核心(精华)所在
embodiment	*n.* 具体化,具体表现,具体装置
revival	*n.* 复兴,恢复,再生
metrology	*n.* 计量学,测量学,计量制
bring about	引起,产生,造成,促使,导致,完成
enhancement	*n.* 增强,提高,放大
automatically guided vehicle	自动导引小车,自动制导车辆
local area network	局域网,本地网
diversity	*n.* 不同,异样性,多种多样性
to date	至今,到目前为止,截止当天
end user	终端用户,最终用户
metrology and measurement systems	计量和测量系统
laser tracking	激光跟踪
a wide range of	许多,各种各样的

revenue	*n.* 收入,收益,进款
outset	*n.* 开端,开始,最初
illustrative	*a.* 说明的,解说的,例证的
drive line	动力传动系统,传动轴装置
transmission	*n.* 传递,传动装置,变速箱
emission	*n.* 发射,放出,排出物
misuse	*v.*, *n.* 错用,误用,滥用
power tool	电动工具
modular	*a.* 制成标准组件的,预制的,组合的
track	*n.* 轨道,磁道,导向装置; *v.* 跟踪,沿轨道行驶
scan	*v.* 检查,扫描,浏览
preview	*n.*, *v.* 预览,事先查看,预演
module	*n.* 模数,模件,组件,可互换标准件
bespoke	*a.* 专做订货的; *n.* 预订的货
execute	*v.* 实行,完成,实现,实施
exemplify	*v.* 例证,举例说明,作为……的例子

Notes

1. Where full attention has been given to market trends, the adoption of an integrated mechanotronics approach to design has led to a revival in areas such as high speed textile equipment, metrology and measurement systems, and special purpose equipment such as that required for the automatic testing of integrated circuits.

人们给予了极大关注的市场趋势有,在设计中采用集成的机电一体化方法已经使得诸如高速纺织设备、计量和测量系统,以及集成电路自动测试装置这样一些专用设备等领域得到了振兴。

2. Communication between the individual elements of the system is achieved by means of local area networks.

这个系统的各个组成部分之间的通信是借助局域网来实现的。

3. Engine and driveline management systems leading to reduced emissions, improved fuel economy, protection against driver misuse by, for example, prohibiting excessive fuel flow at low speeds, and selectable gear characteristics.

发动机和动力传动的管理系统通过诸如防止在低速时流入过量燃料,以及可选择的齿轮特性来减少排放,以提高燃料的燃烧效率,防止司机的误操作。

4. Video and compact disc systems involve complex laser tracking systems to read the digitally encoded signal carried by the disc.

视频光盘(VCD)系统中包含有复杂的激光跟踪系统,用来读取光盘上载有的数字编码信号。

5. In engineering design, a mechatronics approach requires the integration of a wide range of material and information aimed at providing systems which are more flexible and of higher performance than their predecessors.

在工程设计中,机电一体化方法需要将许多材料和信息进行集成,其目的是提供比被它所取代的原有系统具有更好柔性和更好性能的系统。

Exercises

I. Fill in the blanks according to the information of the text.

1. In this highly competitive situation, the old divisions between electronic and mechanical engineering are increasingly being replaced by the integrated and interdisciplinary approach to engineering design referred to as ________________.

2. In this way the design engineer, and especially the mechanical design engineer, can avoid going too soon down ____________________.

3. In most cases the revival or new growth is brought about by the enhancement of process capability achieved by ________________, often in the form of ____________, with the basic mechanical system.

4. Thus, for full benefit and effect, mechatronics must be a feature of both ____________ of the design process.

II. Translate the following expressions into Chinese.

1. metrology and measurement systems
2. local area networks
3. laser tracking
4. a wide range of
5. automatically guided vehicle

III. Translate the following sentences into English.

1. 这个系统的各个组成部分之间的通信是借助局域网来实现的。

2. 视频光盘(VCD)系统中包含有复杂的激光跟踪系统,用来读取光盘上载有的数字编码信号。

3. 在这种竞争激烈的环境中,将电子与机械工程分开的做法正逐渐被工程设计中所采用的综合与学科交叉法所取代,这种方法叫做机电一体化。

IV. Writing.

According to your reading materials from other channels, please write a passage about mechatronics (less than 300).

Free Reading

Automation Systems in Manufacturing

Mass production of any product always involved repetitive operations. One of the primary functions of automation is to standardize repeat production operations so that they may be accomplished on a continuous unvarying basis. This permits design tolerances to be met on a large number of production parts as well as there to be higher production rates. To do this, automation techniques most often replace inconsistent manual functions with consistent machine functions. This is where automation can and does eliminate production jobs.

The process of automating a manufacturing process may take many forms ranging form a rudimentary level, perhaps involving a simple mechanical device that operates part of a machine, to complex computer driven feedback systems that have considerable decision-making capacity over the process that they are controlling.

In a true automatic system, the automation device has ability to sense in some way factors about the process that is being accomplished and then initiate control functions.

Automation requires the following factors (Fig. 1-1).

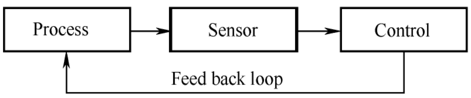

Fig. 1-1 Factors for process

1) A process to automate.

2) A sensing system for making decisions about the process.

3) A control action system that operates on the sensed information and then provides a process control function.

Almost any manufacturing process can't be automated. This can be done at any phase of manufacturing including the manufacturing process themselves or systems that inspect and/or package a finished product.

Semi Automatic and Full Automatic

Consider a simple process such as the carriage feed on a lathe (Fig. 1-2). The process must be initiated manually by the operator and disengaged manually at the end of the cut. This is not a fully automated process but once engaged, it does serve to feed the tool automatically, without the requirement for external manual input. Thus, the process is semi-automatic.

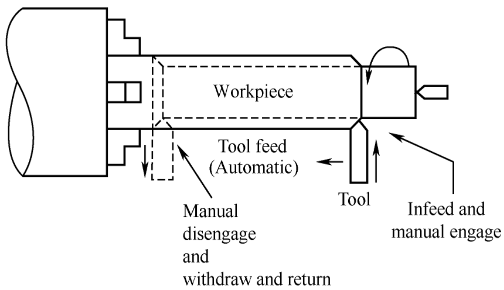

Fig. 1-2 Semi-automatic control involves manual engage and manual disengage

By setting the feed trip stop, the operator can further automate the process. Initiation is manual, but feed disengagement is automatically accomplished. Two automation factors are present here, the process (automatic carriage feed) and the sensor (trip stop). This simple system does not have any feedback for further action after feed disengage. The operator must take over manual control at that point to withdraw and return the tool to the starting point. Therefore, the function is semi-automatic requiring a manual initiation for each new cycle.

On a numerically controlled (NC) lathe or turning center, the feed might be engaged by computer control, disengaged, and the tool automatically withdrawn and returned to the beginning of the cut, or changed to a new tool. All three factors are present here for full automation, the process (tool feed), the sensor (computer control), and the action based on sensed information (tool withdrawal and return or tool change).

Although the lathe process is automatic, initial manual inputs had to be made at some point in the system. In the case of numerical control programming for machining, the manual data inputs (MDI) are in the form of the numerical control program loaded into the machine's control computer. Such is the case with all automatic processes. They must be programmed manually or otherwise set up before they can operate with full automatic capability.

Words and Expressions

mass production	大量生产、批量生产
design tolerance	设计公差
inconsistent	*a.* 不一致的,不连续的
eliminate	*vt.* 削减(人员)
rudimentary	*a.* 基本的;初步的

sensing system	传感系统
semi-automatic	半自动化
full-automatic	全自动化
carriage	*n.* 刀架
disengage	*vt.* 脱离,退刀
lathe	*n.* 车床
trip stop	行程开关
numerically control lathe	数控机床
turning center	车削中心
numerical control programming	数控程序
Computer Aided Manufacturing(CAM)	计算机辅助制造
Computer Integrated Manufacturing(CIM)	计算机集成制造
undergo	*vt.* 经受,经历,遭受
electromechanical	*a.* 机电的
hydraulic	*a.* 液压的
actuator	执行器,执行元件,执行机构
precision	*n.* 精度
open loop	开环
close loop	闭环
sophisticated	*a.* 精密复杂的
servo control	伺服控制(系统)
time sharing	分时
fabric cutting	织物剪裁
typesetting	*n.* 排字,排版
flame cutting	火焰切割
punch press	冲床
pipe bending	管道弯曲
welding	*n.* 焊接
grinding	*n.* 研磨,磨削
nontraditional machining process	特种加工
EDM	电火花加工
industrial robot	工业机器人
mainstay	*n.*, *v.* 支柱,主要依靠
foreseeable	*a.* 可预知的,能预知的
acoustic	*a.* 声学的,有关声音的
emission	*n.* 发射
dull	*a.*(刀等)钝的

Lesson 2

Dialogue

Peter: Hello, Jim. Where are you going after work?

Jim: To the cinema. What about coming with me?

Peter: No, thanks. I'm going home because there are many things waiting for me to deal with.

Jim: What a pity. I believe it's a very good film.

Peter: Do you know what's on tonight, by any chance?

Jim: No, I'm sorry I don't. I never read the papers till I get home.

Peter: Oh, I see.

Text

Engineering Graphics

Engineering graphics is a cornerstone of engineering. The essence of engineering—that is, design—requires graphics as the means of communication within the design process. Graphics serves as the common tread between design and the manufacturing and construction processes.

Study of the fundamentals of engineering graphics is one key to your success as an engineer. Being able to describe an idea with a sketch is a prerequisite of the engineering profession. The ability to put forth a three-dimensional geometry in a form that can be communicated to other engineers, scientists, technicians, and non-technical personnel is a valuable asset. Of equal importance is knowing how to read and understand the graphics prepared by others.

The ability to communicate is the key to success for a practicing engineer. Graphic communication, along with written and oral communication, constitutes an important part of a program of study in engineering. The fundamentals of the graphics language are universal in the industrialized world, an advantage not afforded by the written and spoken language. Thus graphics may be said to be "a language for engineers".

The study of graphics involves three aspects: terminology, skills and theory. Definitions of general terms encountered in graphic applications are introduced below.

Engineering graphics is the area of engineering which involves the application of graphic principles in the development and conveyance of design concepts.

Engineering design is the systematic process by which a solution to a problem is created. Engineering graphics provides visual support, a basis for engineering analysis, and documentation for the design process.

Descriptive geometry is a set of principles which enable the geometry of an object to be identified and delineated by graphic means. It is the theory by which spatial (three-dimensional) problems involving angles, shapes, sizes, clearances, and intersections are solved with two-dimensional representation.

Computer graphics utilizes the digital computer to define, manipulate, and display devices, processes, and systems for the purpose of analysis, design, and communication of engineering solutions.

Geometric modeling is the representation of a concept, process, or system operation usually in a mathematical form, and more specifically as an electronic database. Computer-based geometric modeling may conveniently be classified as wireframe, surface, or solid.

Engineering graphics is in a period of rapidly changing graphics technology. The traditional tools of graphics, such as the T-square, compass, and drafting machines, are being displaced by computer hardware and software. We are in an exciting era in which we will experience the transition from scales, triangles, and dividers to a computer keyboard and from blueprints to databases.

The engineers of today see the engineering drawing as a by-product of the CAD process. The control of the design-manufacture cycle is now the electronic database of the design. Changes are incorporated instantly in all aspects of the design. New product models can be quickly developed and oftentimes proved with computer simulations, thus bypassing the prototype. If drawings are desired for manufacture or documentation, they may be quickly obtained from the database.

The engineering student of today will study graphics from the standpoint of supporting the design process. Geometric modeling techniques, analysis techniques which are mathematically based, and practice in visualization of three-dimensional geometries will be the focus of intensive computer utilization. In order to prepare concepts for modeling and analysis, freehand techniques will be studied and practiced. The student will learn to produce and interpret multi-views and pictorials both via sketches and computer techniques. Many of the graphics standards for appropriate representation of object features (sections, dimensioning, and multi-views) will be studied.

Working in three dimensions with the computer, graphics will be produced easily in two-or three-dimensional modes depending upon the application. Creating two-