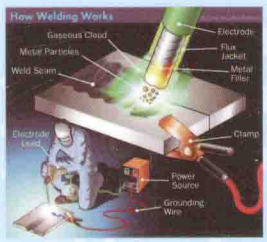
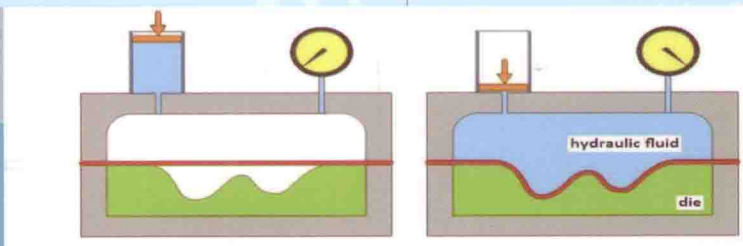
普通高等教育“十二五”规划教材

材料成型及控制工程专业英语

English for Material Forming and Control Engineering

主编 刘 瑛 阎 昱
参编 王秀凤 韩 飞





以学生为主体的教学理念

妙趣横生的课堂设计

配套英文视频精彩纷呈

听说读写全面推进

专业相关语言点全面详尽

生活工作实用内容一网打尽

机械工业出版社
CHINA MACHINE PRESS

普通高等教育“十二五”规划教材

材料成型及控制工程专业英语

主编　刘　瑛　阎　昱
参编　王秀凤　韩　飞
主审　林高用

机械工业出版社

本书以提高材料成型及控制工程专业英语应用水平为目标，具有很强的实用性、参与性与趣味性。

本书的编排体现了以学生为中心的教学理念，让学生在精心设计的活动中循序渐进地提高专业英语应用能力。内容上不但覆盖各种材料成型方式，还特别针对该专业设计了实用性很强的内容，帮助学生掌握用英文写工作邮件和求职简历，打商业电话等方法。

本书可作为高等院校材料成型及控制工程专业的专业英语教材，也可作为相关工程技术人员的自学参考用书。

图书在版编目（CIP）数据

材料成型及控制工程专业英语/刘瑛，阎昱主编．—北京：机械工业出版社，2015.1

普通高等教育“十二五”规划教材

ISBN 978-7-111-48177-5

Ⅰ.①材… Ⅱ.①刘…②阎… Ⅲ.①工程材料－成型－英语－高等学校－教材 Ⅳ.①H31

中国版本图书馆 CIP 数据核字（2014）第 229625 号

机械工业出版社（北京市百万庄大街 22 号 邮政编码 100037）

策划编辑：丁昕祯 责任编辑：丁昕祯 王晓艳

版式设计：霍永明 责任校对：张 薇

封面设计：张 静 责任印制：乔 宇

北京机工印刷厂印刷（三河市南杨庄国丰装订厂装订）

2015 年 1 月第 1 版第 1 次印刷

184mm×260mm · 15.25 印张 · 371 千字

标准书号：ISBN 978-7-111-48177-5

定价：33.80 元

凡购本书，如有缺页、倒页、脱页，由本社发行部调换

电话服务 网络服务

社 服 务 中 心：（010）88361066 教 材 网：http://www.cmpedu.com

销 售 一 部：（010）68326294 机工官网：http://www.cmpbook.com

销 售 二 部：（010）88379649 机工官博：http://weibo.com/cmp1952

读者购书热线：（010）88379203 **封面无防伪标均为盗版**

前　言

目前市场上关于《材料成型及控制工程专业英语》的书虽然也有一些，但基本都是科技文章加单词列表的陈旧模式，由于没有考虑学生的学习规律和教师的使用方便，这类书难以得到师生的认可。

编者多年来一直从事一线专业英语教学，深感急需一本体现“以学生为中心”教学理念的专业英语教材。在 English as Second Language（ESL）教学实践中被普遍证明有效的方式是：以活动为中心的课堂组织方式。本书的设计将体现该理念，让学生在精心设计的活动中循序渐进地掌握专业词汇和常见句式，并在情景练习中综合运用所学内容。采用本书，教师自然地会成为幕后的导演，而学生将成为活跃在前台的演员。

本书的另一个亮点在于几乎每个单元都配有精彩的英文视频，其中既有车间现场演示，又有教师课堂讲解，有真实的加工过程，也有生动的计算机仿真，甚至还有专门为某个知识点创作的歌曲和卡拉 OK。有了这些原汁原味的视频资料，不但能极大地提升学生的学习兴趣，还可以让他们沉浸于真实的语言环境中，对其听、说能力都会有很大的促进。此外我们还会提供视频脚本，这也会极大地方便教师的教学。

本书不但会覆盖材料成型相关的各专业领域（如各种成型方式），还特别针对该专业设计了实用性很强的内容，比如：如何写论文摘要、如何打工作电话、如何写工作邮件、如何写求职简历等。在学生未来的工作和学习中，这些内容都会很有参考价值。

下面详细介绍本书内容的总体脉络、各单元的构成以及给教师的建议。

本书内容的总体脉络

本书的内容和难度遵循由浅入深的原则。从语言的角度讲：从事物的构成、比较等简单内容逐渐发展到因果、过程描述等相对复杂的语言表述；从专业知识的角度讲，文章从什么是工程、常见的工程材料入手，逐渐发展到专业性较强的各种成型技术等内容。

书中 28 个单元大致可以分为三大部分。前 8 个单元为工科学生都应该了解的背景知识，比如工程的分类、制造工艺、工程制图、图表、工程材料、材料属性及热处理等，不论学生以后从事工程类还是非工程类职业，这些背景知识都会有用武之地；从第 9 单元到第 19 单元是专业性很强的内容，包括金属轧制、铸造、锻造、板料成形、粉末成型、注塑成型、快速成型、焊接、CAE 以及 CNC 加工等；从第 20 单元到第 28 单元为第三部分，都是实用性很强的内容，比如如何写论文摘要、实验报告以及商务邮件，如何打商务电话、做报告，如何读懂招聘广告、写简历和求职信等，实用的内容会加强学生的学习动机，而且这些内容在学生工作之后仍然会对他们大有裨益。教师可以根据学校和学生特点，在这三大部分中选择适合的单元学习。

本书单元的构成

本书单元构成体现了学习的循序渐进性原则。各单元的结构基本相同，主要由以下几部

分组成。

1. 目标（Objective）

每个单元的开始都会介绍本单元要学习的内容以及需要掌握的重点（包括专业和语言两方面的要求），帮助师生对要学习的内容有个总体把握。

2. 热身（Warming Up）

这部分是学习前的热身，通常会提出一些问题让学生分组讨论，在这个过程中分享关于这个话题的专业知识和相关语汇。同时，发现自己不明白的知识点以及表达该话题所需的语言和词汇，这样下面的学习会更有目的性。

3. 专业词汇学习（Term Study）

通过让学生看视频、读图表等方式，引出本单元的关键词汇，在填空、做表等练习中让学生初步熟悉相关词汇，为后面的学习扫除障碍。

4. 课文（Text）

课文内容与各主体密切相关，篇幅适中，而且附有大量生动明了的图表。其主要目的在于帮助学生学习专业知识，掌握专业词汇和各种阅读技巧。此外，围绕课文还设计了多个任务（Tasks），在完成任务的过程中，学生的注意力自然会放在文字的吸收和理解上，从而避免假阅读现象。许多任务都与视频有关，文字与视频紧密结合，会让学习变得更立体、更生动。

5. 语言学习（Language Study）

学习这部分内容的目的在于提高语言的精确性。重点放在语言的结构、功能等（比如如何描述事物的构成，如何对事物下定义，如何描述过程等），例子通常从前面的课文或相关主题中提炼出来，做一些必要的讲解，然后给出练习，让学生在练习中掌握该语言点。

6. 情景练习（Situation Practice）

这是每一单元中集大成的一个练习，往往会设定一个情景，设定两个身份，要求两个同学共同完成。比如，准备选定大学专业的父子、面对工程图样的师徒、招聘者与应聘者等，有时还会在两人之间设置信息障碍（让A同学读某一页的内容，B同学则读另一页），这样两人就必须通过语言沟通来解决问题。在沟通的过程中，不可避免地要用到本单元所学到的词汇、句法以及相关专业知识。这个练习是对整个单元所学内容的综合，有一定难度，学生需要一段时间的准备才能完成。教师可以根据情况，安排学生在课上或课下完成。留为课后作业的，可要求学生自己拍摄练习视频，这种作业的多样性和趣味性也会提升学生的学习热情。

7. 补充阅读（Supplement Reading）

有些单元还提供了一些补充阅读的内容，目的是保持专业知识的完整性以及扩充学生的词汇量。教师可视情况决定是否要求学生学习。

给教师的建议

本书编者推荐的学时为48，一般每单元需要2课时。本书之所以提供28个单元，主要是为了让教师根据自己的工程背景以及所在学校的特色选择最适合的单元进行教学。另外，每个单元的知识学习都是融会在各种练习中的，为了避免满堂灌的教学弊端，教师一定要在课堂上给学生留出讨论和练习的时间，2课时内不能完成的部分，可留做课后作业。

另外，为了教学方便，本书还提供了各单元的课文译文，在机械工业出版社教育服务网上（http：//www. cmpedu. com/），通过书名、作者名、ISBN 等方式还可以查询到本书配套的电子资源。

本书的编写凝聚了来自不同院校多位师生的心血，在此一并表示感谢。本书第 12、13 单元由北京航空航天大学的王秀凤教授编写，第 8、14 单元由北方工业大学的韩飞副教授编写，第 5、6、7、9、10、11、16、17、22 单元由北方工业大学的阎昱副教授编写，其余单元由北方工业大学的刘瑛副教授编写。感谢中南大学林高用教授审稿并提出改进建议，感谢北方工业大学研究生王英爽、贾方辉、靳鹏程和吴清远在课文翻译、视频脚本整理、图片文字处理、课件编写等方面所做的工作。

希望本书对相关专业师生有所帮助，不足之处欢迎指正（liuying@ ncut. edu. cn）。

编　者

Contents/目录

Unit 1 What Is Engineering?

Objective

You must be familiar with the word "engineering". But what is engineering? What're the main branches of Engineering? Is Engineering right for you? Let's figure it out!

By the completion of this unit, you'll be able to:

(1) understand what engineering is about;

(2) know the main branches of engineering;

(3) describe different engineering branches using phrases like deal with and be concerned with;

(4) figure out if Engineering is a right choice for yourself.

Warming Up

Task 1 Discuss the following questions in your group and share your answers with other groups.

(1) Do you know the name of your college and your department?

(2) Are there other colleges of Engineering in your university? What are they?

Term study

Task 2 Video 1-1 talks about "What Is Engineering" in a very interesting and creative way. I bet you'll like it. But don't just watch and laugh, you've got a task to do. What branches of engineering does the video mention and what does each branch of engineering deal with? Please complete Table 1-1 based on the video. The first one has been done for you.

Table 1-1 Branches of engineering and their concerns

Branches of Engineering	Their concerns
Mechanical	Designing the engine

Task 3 Can you make a definition of Engineering ? Write it down and share it in your group.

Engineering is _____.

Now watch Video 1-2 and see what the professors and students of University of Michigan say. Take a note of the key words about engineering.

_____

_____

_____

_____

Task 4 Read the text and

(1) list as many engineering branches as you can.

(2) list the four characteristics of engineering method.

Text

What Is Engineering?

[1] Do you want to change the world? Think engineering! It's everywhere, shaping our world for the better. Engineering is not science. Science is about discovering the natural. Engineering is creating the artificiality. Scientists discover the world that exists; engineers create the world that never was.

[2] Engineering is an incredibly diverse and exciting field. Civil engineering is concerned with making bridges, roads, airports, etc. Mechanical engineering deals with the design and manufacture of tools and machines. Electrical engineering is about the generation and distribution of electricity and its many applications. Electronic engineering is concerned with developing components and equipment for communications, computing and so on. Chemical engineering converts raw materials into usable commodities.

[3] With the rapid advancement of technology, many new fields are gaining prominence and new branches are developing such as Computer Engineering, Software Engineering, Nanotechnology, Molecular Engineering, etc. These new specialties sometimes combine with the traditional fields and form new branches such as Mechanical Engineering and Mechatronics, Electrical and Computer Engineering.

[4] Underlying all engineering fields is a common way of thinking, analyzing and solving problems. The way in which engineers think and work has been defined as the engineering method, which has four characteristics.

[5] First, the engineering method is used to analyze, model and solve complex technical problems that require an integrated interdisciplinary view of problem solving.

[6] Another characteristic of the engineering method is that engineers break down complex systems into the simpler components. And in a sense, take the problem apart, not physically but intellectually.

[7] The third characteristic is the development and using of mathematical simulation models. Such models become the engineers' tool for examining, understanding, visualizing and designing complex systems.

[8] Finally, engineering method involves synthesis and design. In this process engineers must

take into account factors such as reliability, safety, flexibility, economy and sustainability.

[9] So do you think engineering is right for you? The world today is facing enormous challenges such as global warming, burgeoning population growth, continually increasing energy demands, natural resource depletion, and the challenge of sustainable growth. We are convinced that engineers will be able to solve these problems. This country and this world need more young men and women to enter engineering.

Source: Adapted from the promo of University of Buffalo, School of Engineering and Applied Sciences, www. eng. buffalo. edu

Task 5 Now watch Video 1-3 to help you understand the text totally and check your answers to Task 4.

Task 6 Fig. 1-1 shows some of the areas in which engineers work. Can you identify them? What kinds of engineers are concerned with these areas?

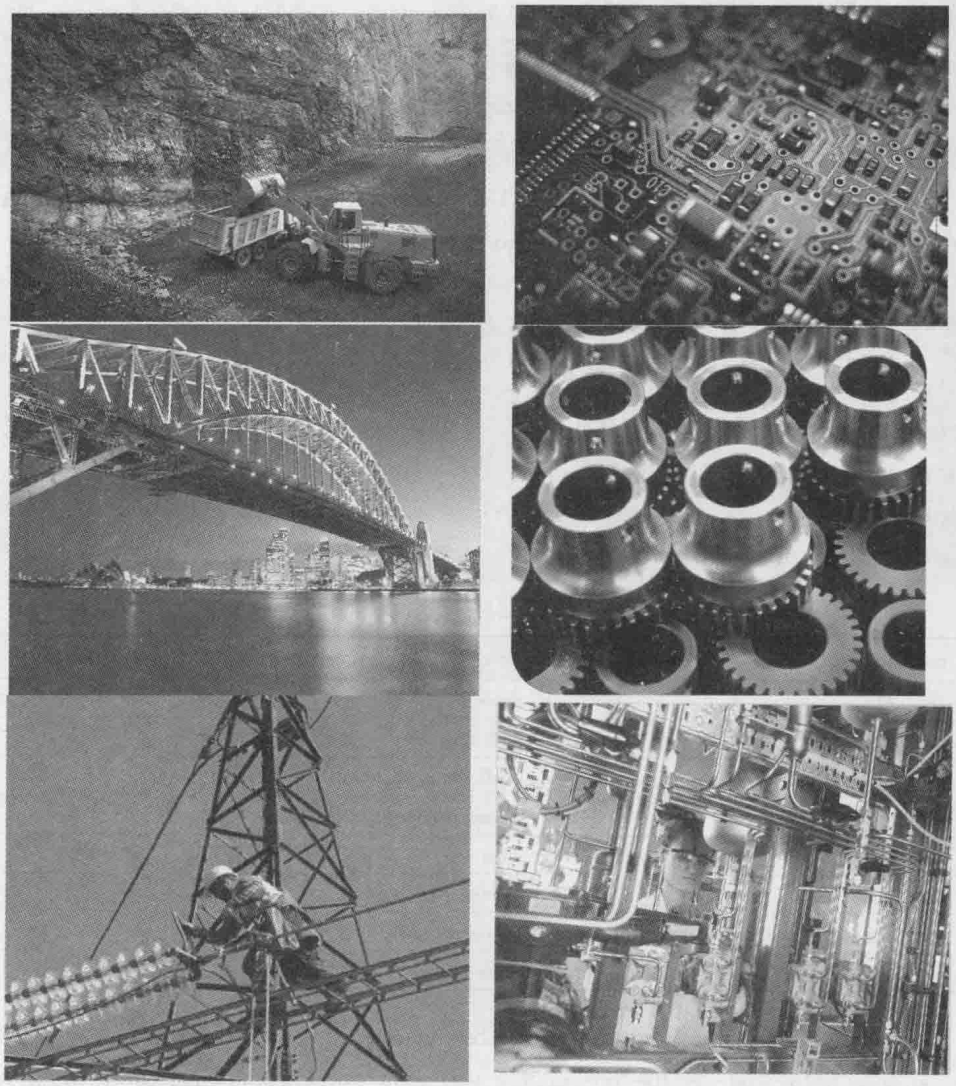


Fig. 1-1 Various branches of Engineering

Language Study

deals with/is concerned with

What is the link between Column A and Column B?

A	B
mechanical	machine
electrical	electricity

Column A lists a branch of engineering or a type of engineer. Column B lists things they are concerned with. We can show the link between them in a number of ways.

Mechanical engineering deals with machines.
Mechanical engineers deal with machines.
Mechanical engineering is concerned with machines.
Mechanical engineers are concerned with machines
Machines are the concern of mechanical engineers.

Task 7 Do the Language Study first in Table 1-2 and then match each item in column A with an appropriate item from column B and link the two in a sentence.

The first one has been done for you like this:

(1) →*f*
Marine engineering deals with ships. Or
Marine engineers deal with ships. Or
Marine engineering is concerned with ships. Or
Marine engineers are concerned with ships. Or
Ships are the concern of marine engineers.

Table 1-2 Engineering fields and the things they are concerned with

(1) marine	a. air-conditioning
(2) aeronautical	b. roads and bridges
(3) heating and ventilating	c. body scanners
(4) electricity generating	d. cables and switchgear
(5) automobile	e. communications and equipment
(6) civil	f. ships
(7) electronic	g. planes
(8) electrical installation	h. cars and trucks
(9) medical	i. power station

Task 8 As a student of engineering or as a professional engineer, you have to read a great deal. Having a purpose helps you get the information you want quickly and accurately when you read. Your purpose here is to find the most appropriate course for each of the following prospective

students. Use the course guide which follows and answer using the course code. Please work in team so that each of you only has to find right courses for 2 or 3 students.

Student Information:

(1) A student who has just left school and wants to become a technician.

(2) A student who wants to design ships.

(3) A student who wants to get an engineering degree and also improve his knowledge of languages.

(4) A student who wants a degree eventually but whose qualifications at present are enough to start an HND (Higher National Diploma) course.

(5) A student who wants to work as an engineer with the air force.

(6) A technician employed by a company which installs electrical wiring in factories.

(7) A student with a National Certificate in Electrical Engineering who is prepared to spend another two years studying to improve her qualifications.

(8) A student interested in how micro-organisms can be used in industry.

Course Guide	**Engineering**
Course Code	Course introduction
EE22	Higher National Diploma in Electronic and Electrical Engineering. Two years, full-time. For potential electronic and electrical engineers. The first year is common and the second year allows students to specialize in either electronic or electrical engineering subjects. Successful students may continue to a degree course.
EE17	National Certificate in Electrical Engineering. One year, full-time. For potential technicians or for those who wish to gain entry to an HND course.
EE3	Higher National Certificate Course in Electronic and Electrical Engineering. Two years, day-release. This course provides the technical education required for senior technicians employed in the electrical installation industry.
H300	Bachelor of Engineering (B Eng) —Mechanical Engineering for Europe. Four years, full-time, including one year study and work attachment in France or Germany.
H400	Bachelor of Engineering (B Eng) —Aeronautical Engineering. Three years, full-time, or four years including one year of professional training in the aircraft industry.
HJ36	Bachelor of Engineering (B Eng) —Naval Architecture and Ocean Engineering. Three years, full-time.
H340	Bachelor of Science (Engineering) —Mechanical.

Course Code	Course introduction
H250	Bachelor of Engineering (B Eng) —Manufacturing Management. A two-year HND course in engineering followed by two years of technology and management designed to produce managers qualified in high technology.

Situation Practice

Task 9 You're the parent of a high school student who is hesitating about which major he should choose for his university life and future career. You've got a list of points to consider when deciding whether to study engineering or not. Tick the statements which refer to him. If you have ticked most of these statements, engineering is the right course of study for him. Role-play it with your partner. One asks questions based on the following statements (for example, Are you interested in how and why things work?) The other should give more information besides yes or no.

(1) Interested in how and why things work.

(2) Constantly gather facts about their environment and store them away.

(3) Usually able to master theory and abstract thinking, but don't particularly like dealing with it unless they see a practical application.

(4) Focused on living in the present, rather than the future.

(5) Love variety and new experiences.

(6) Highly practical and realistic.

(7) Excellent "trouble-shooters".

(8) Usually laid-back and easy-going with people.

(9) Independent and determined.

(10) Usually quite self-confident.

Unit 2 Manufacturing Processes

Objective

Take a look of the objects around you: your pen, watch, computer, cell phone, chair and desk... You could not find them in nature as they appear in your room. They have been transformed from various raw materials and assembled into the shapes by various processes that we call manufacturing.

By the completion of this unit, you'll be able to:

(1) understand the two types of manufacturing: primary and secondary;

(2) be familiar with the six processes of secondary manufacturing;

(3) describe various types of connection in engineering.

Warming Up

Task 1 Discuss the following questions in your group.

(1) What's manufacture?

(2) What's the relationship between mechanical engineering and material forming engineering?

(3) How many manufacturing processes do you know and what are they?

Task 2 Watch Video 2-1 and answer the following questions:

(1) What's manufacture according to the video?

(2) In order to drill a hole, she uses three kinds of tools. What are the tools in order of increasing the level of automation?

(3) In order to cut the piece of wood, she uses three kinds of tools. What are the tools in order of increasing level of automation?

Term study

Task 3 In Video 2-2, the boy wants to make a flying car. But the problem is that he does not know how things are manufactured. Watch Video 2-2 and fill in the blanks.

(1) There are two types of manufacturing processes: _____ and _____ processing.

(2) There are six kinds of secondary processes. They are:

_____, _____,

_____, _____,

_____, _____.

(3) The first kind of secondary processing of materials is about changing size and shape, which includes _____, _____, and _____.

Task 4 Read the text, correct and supplement your answers in task 2. Then answer the questions:

(1) Which processes can directly change industrial materials into a finished part in one step?

(2) What manufacturing process do turning, milling, drilling belong to?

(3) What are the three basic methods of assembly used in manufacturing?

(4) Why do the most products require a surface finishing?

Text

Manufacturing Processes

There are two types of manufacturing processes: Primary and secondary processing. Primary processing changes raw materials like wood and metal into standard stock. The standard stock then requires further processing to be made into finished products. This processing is called secondary processing.

There are six kinds of secondary processes. Each of these processes changes the original standard stock material step by step into a new form, whether it's a usable manufactured part or a product. These are :

- casting and molding
- forming
- separating
- conditioning
- assembling
- finishing

Casting (Fig. 2-1) and molding are similar processing in which material in liquid or non-solid state is poured or forced into a prepared mold. Both processes depend on either expendable or reusable mold. First, the material is prepared by softening, dissolving or mixing with other materials. Then once the material is poured or forced into the mold, it's solidified by cooling, drying or chemical reaction. The new solid part or product is then removed by destroying the mold if it's expendable or by opening the mold if it's resuable. When this process is done with metal or ceramic, it's referred to as casting, which is illustrated in Fig. 2-1. But when it's done with plastic, it's called molding. Both casting and molding are the only processes that can directly change industrial materials into a finished part in one step. We're going to learn details about casting in Unit 9 and molding in Unit 15.

The next process, forming, changes the size and shape of the material, but not the volume of material; see Fig. 2-2. In forming, a force is applied to the material which is strong enough to change its shape, but not so strong that it destroys the material itself. Great mechanical force, high air pressure, explosives or strong vacuum are used to force the material through or against the die or mold. All of these tools must be harder and stronger than the forming material. Some materials are

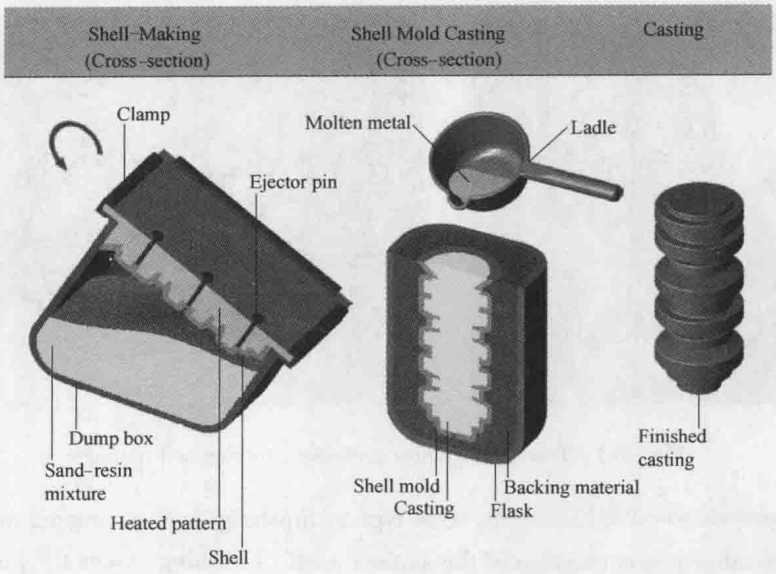


Fig. 2-1 Casting

formed at room temperature, others are heated to make the forming process easier or to produce a more accurate part. Forming may require several steps with each change in the shape of the original material, being made one step at a time. We're going to discuss these topics in detail in Unit 12, 13 and 14.

The next manufacturing process is separating. There are two traditional separating methods: machining and shearing. Machining changes the shape and size of materials by removing chips of particles a little bit at a time. The typical machining includes turning, milling (which are shown in Fig. 2-3), drilling, boring and grinding etc. Shearing changes the shape and size of materials by fracturing or breaking off pieces.

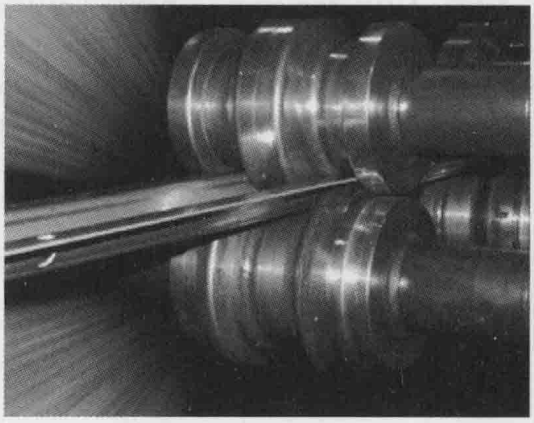


Fig. 2-2 Roll forming

So far we have talked about the first kind of secondary processing of materials that is changing size and shape.

The next kind is conditioning. Conditioning is used to change the internal or external properties of materials such as making them stronger, harder, tougher and more or less elastic. We're going to see more about this topic in Unit 8.

The third kind of manufacturing processes is assembly, where all the parts of the product are put together. Three basic methods of assembly are used in manufacturing: bonding, mechanical fastening and joining. In Unit 17, we'll learn more about welding, which is one method of bonding.

Most products require a surface finish which provides protection and makes them more attrac-

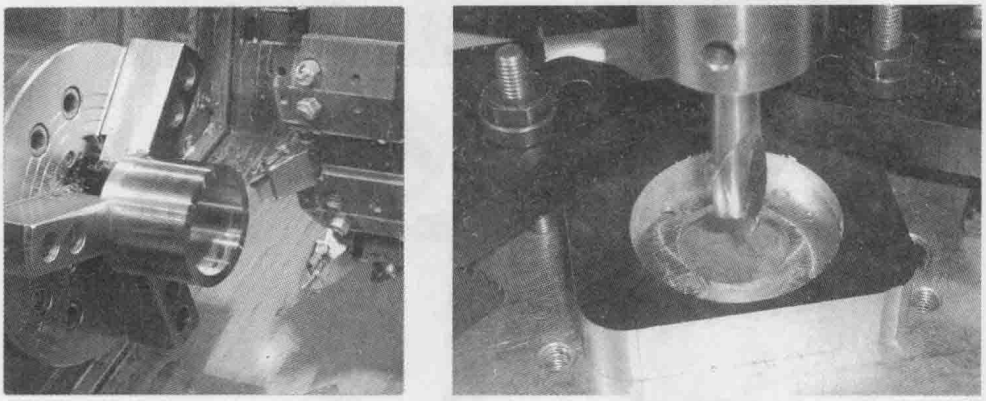


Fig. 2-3 Typical machining processes: turning and milling

tive. This final process is called finishing. One type of finishing involves coating over the surface of the material. The other is a conversion of the surface itself. Finishing makes the products both more attractive and durable.

As to how to choose manufacturing materials, we also need to know the properties of different materials. Material properties are categorized as mechanical, physical, thermal, chemical, electrical, optical and acoustical. We're going to study different materials and their properties in Unit 5, Unit 6, and Unit 7.

These topics above are all the concerns of Material Forming and Control Engineering.

Source: Adapted from the video "Manufacturing Processes", produced by Lawper Video Productions, Inc, Moline, Illinois

Task 5 Now watch Video 2-2 from beginning to 8′13″ again to help you understand the text. Then work in group and find out more information which is NOT mentioned in the Text.

(1) List more separating methods mentioned by the video.

In non-traditional machining, _____, _____, _____ and light like lasers are used to separate particles or pieces from the original material. In flaming cutting, flame and _____ can be used to cut excess material. The most recently developed separating process technology uses chemical action is _____.

(2) There are three ways of conditioning. They are heating, _____ and _____ conditioning.

Language Study

Connections

Study these expressions for describing how components are connected to each other.

A is bolted to B. = A is connected to B with bolts.

A is welded to B. = A is connected to B by welding.

A is fixed (attached, connected) to B. = no specific method given.