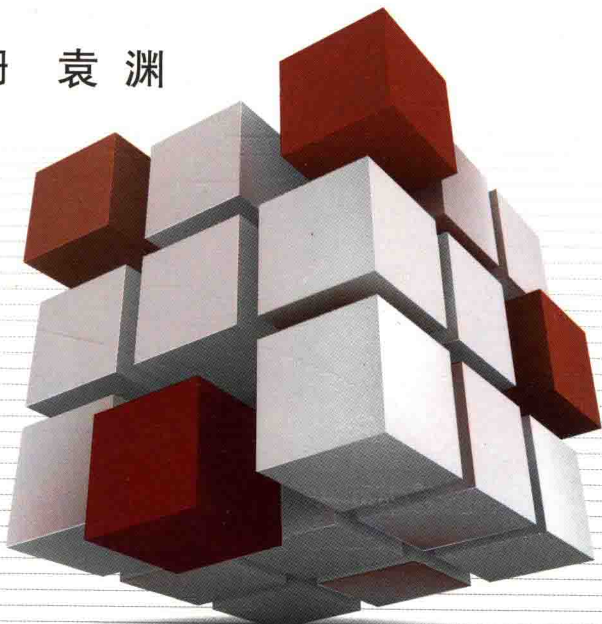
· 高等职业教育“十二五”规划教材
· 高职高专模具设计与制造专业任务驱动、项目导向系列化教材

模具专业英语

MUJU ZHUANYE YINGYU

主　编　陈显冰
副主编　韩莉芬　罗　珊　袁　渊



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内 容 简 介

本书根据高职高专的培养目标以及教学的实际情况进行编写，全书共5个单元，内容涉及冲压与塑料成型的相关知识、模具CAD/CAM技术、数控加工技术、特种加工技术、快速成型技术等。每个单元由专业阅读材料、课外阅读材料、简单问答练习等部分组成，内容较为全面，难易适中，并配有文章参考译文，便于读者阅读和学习。

本书可作为高职高专模具设计与制造类的专业教材，亦可供机械类相关专业读者自学参考。

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前言

随着模具行业的不断发展，模具设计与制造显得越来越重要。模具技术涉及面广，包括模具材料、模具结构设计、成型加工方法等。《模具专业英语》是机械类尤其是模具专业的重要课程。本教材结合实际，向读者提供必须掌握的模具专业英语知识，力求培养读者运用专业英语的能力。

本书每个单元所选取的材料都紧密结合模具的常用知识，内容涵盖注塑模具、冲压模具、快速成型等相关知识，并有模具设计和制造的相关知识介绍，既能使读者了解模具结构及应用功能，又能帮助读者把专业语言知识更好地应用于工作之中。

本书的参考教学学时为36课时，各单元的学时分配见下表。

单　元	课　程　内　容		学　时	
	课文	阅读材料	讲授	实训
第一单元	注塑成型模具	注塑成型的基本知识	6	2
第二单元	冲压模具简介	铁类金属	6	2
第三单元	精密冲模	精冲过程	4	2
第四单元	模具制造	模具寿命与模具失效	4	2
第五单元	计算机在模具设计中的应用		4	4
学时总计			24	12

本书由南京工业职业技术学院陈显冰老师担任主编，苏州工业职业技术学院韩莉芬老师、常州工程职业技术学院罗珊老师和南京工业职业

技术学院袁渊老师担任副主编。

本书在编写过程中得到了模具专业教师和相关专业技术人员的大力支持，他们提供了丰富的相关资料，并提出了很多宝贵的意见和建议。在此，一并深表谢意。

由于编者水平有限，书中难免存在缺点和错误，恳请广大读者批评指正。

编者

2013 年 3 月

目录

Unit 1 Injection Molding Overview

1.1 The injection molding

Injection molding is a method of producing plastic parts. This is done with an injection molding machine. The shape of the part to be injection molded is controlled by the geometry of the injection mold. The injection molding machine has two basic parts; the injection unit, which melts the plastic and then injects or moves it into the mold, and the clamping unit, which holds the injection mold.

Injection molding is principally used for the production of the thermoplastic parts, although some progress has been made in developing a injection method for thermosetting materials. Thermosetting plastics harden within a few minutes when injecting a melted plastic into a mold cavity from a reservoir. That problem is extremely difficult to solve. The principle of injection molding is quite similar to that of die-casting. The process consists of feeding a plastic compound in powdered or granular form from a hopper through metering and melting stages and then injecting it into a mold. After a brief cooling period, the mold is opened and the solidified part ejected. Injection-molding machines can be arranged for manual operation, automatic single-cycle operation, and full automatic operation. The advantage of injection molding are: A high molding speed adapted for mass production is possible; There is a wide choice of thermoplastic materials providing a variety of useful properties; It is possible to mold threads, undercuts, side holes, and large thin sections.

1.2 The injection-molding structure

The injection mould is an assembly of parts containing an "impression" into which plastic material is injected and cooled. It is the impression which gives the moulding its form. The impression may, therefore, be defined as that part of the mould which imparts shape to the moulding.

The impression is formed by two mould members: the cavity, which is the female portion of the mould, gives the moulding its external form. The core, which is the male portion of the mould, forms the internal shape of the moulding.

1. Cavity and core plates

The basic mould in this case consists of two plates. One plate is sunk into the cavity which shapes the outside form of the moulding and is therefore known as the cavity plate. Similarly, the core which projects from the core plate forms the inside shape of the moulding, the two plates come together forming a space between the cavity and core which is the impression.

2. Sprue bush

During the injection process, plastic material is delivered from the nozzle of the machine as a melt; it is then transferred to the impression through a passage. The material in this passage is termed as sprue, and the bush is called a sprue bush.

3. Runner and gate systems

The material may be directly injected into the impression through the sprue bush, or it may pass from the sprue bush through a runner and gate system before entering into the impression.

4. Registerring

If the material is to pass without hindrance into the mould, the nozzle and sprue must be correctly aligned. To ensure that, the mould must be central to the machine and this can be achieved by a register ring.

5. Guide pillars and bushes

To mould an even-walled article, it is necessary to ensure that the cavity and core are kept in alignmemt. This is done by incorporating guide pillars on one mould plate which then enter corresponding guide bushes in the other mould plate as the mould closes.

6. Fixed half and moving half

The various mould parts fall naturally into two sections or halves. Hence, that half attached to the stationary platen of the machine (indicated by the chain dotted line) is termed as fixed half. The other half of the mould attached to the moving platen of the machine is known simply as the moving half. Now it has to be decided in which of the two halves the cavity or core is to be situated. Generally the core is situated in the moving half and the principle is as follows:

The moulding, as it cools, will shrink on to the core and remain with it as the mould opens. This will occur irrespective of whether the core is in the fixed half or the moving half. However, this shrinkage on to the core means that some form of ejector system is almost certainly necessary.

1.3 Injection-molding machine

Several methods are used to force or inject the melted plastic into the mold. The most commonly used system in the larger machines (as shown in Figure 1.1) is the in-line reciprocating screw, as shown in Figure 1.2. The screw acts as a combination injection and plasticizing unit. As the plastic is fed to the rotating screw, it passes through three zones as shown: feed, compression, and metering. After the feed zone, the screw-flight depth is gradually reduced, forcing the plastic to compress. The work is converted to heat by shearing the plastic, making it a semifluid mass. In the metering zone, additional heat is applied by conduction from the barrel surface. As the chamber in front of the screw becomes filled, it forces the screw back, tripping a limit switch that activates a hydraulic cylinder that forces the screw forward and injects the fluid plastic into the closed mold. An antiflowback valve prevents plastic under pressure from escaping back into the screw flights.

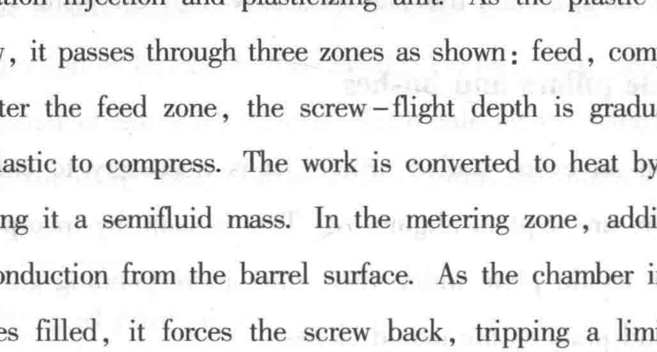

Figure 1.1 The injection-molding machine

The clamping force that a machine is capable of exerting is part of the size designation and is measured in tons. A rule-of-thumb can be used to determine the tonnage required for a particular job. It is based on two tons of clamp force per square inch of projected area. If the flow pattern is difficult and the parts are thin, this may have to go to three or four tons.

Many reciprocating - screw machines are capable of handing thermosetting plastic materials. Previously these materials were handled by compression or transfer molding. Thermosetting materials cure or polymerize in the mold and are ejected hot in the range of 375℃-410℃. Thermoplastic parts must be allowed to cool in the mold in order to remove them without distortion. Thus thermosetting cycles can be faster. Of course the mold must be heated rather than chilled, as with thermoplastics.

Injection - molding machines can be arranged for manual operation, automatic single - cycle operation, and full automatic operation. The advantage of injection molding are: (1) a high molding speed adapted for mass production is possible; (2) there is a wide choice of thermoplastic materials providing a variety of useful properties; (3) it is possible to mold threads, undercuts, side holes, and large thin sections.

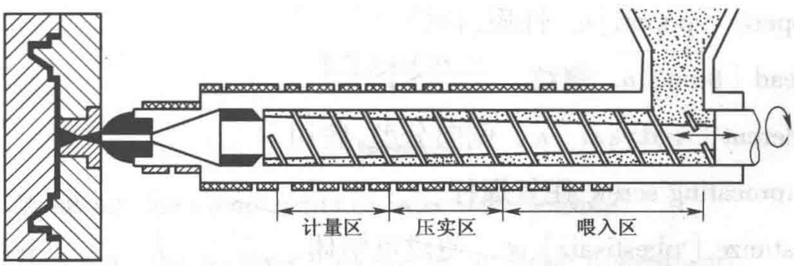

Figure 1.2 The reciprocating-screw injection system

New Words and Expressions

injection molding 注射模

principally [ˈprinsəpli] *adv.* 主要地

thermoplastic [ˌθɜːməʊˈplæstik] *n.* 热塑性,热塑性塑料

thermosetting [ˈθɜːməʊsetiŋ] *n.* 热固性

plastic [ˈplæstik] n. 塑胶,塑料

melt [melt] vt.(使)熔化,使软化

cavity [ˈkævəti] n. 型腔

reservoir [ˈrezəvwɑ:] n. 容器,储存器

extremely [ikˈstrimli] adv. 极端地,非常地

principle [ˈprinsəpl] n. 法则,原则,原理

die-casting 压力铸造

compound [ˈkɑmpaund] n. 混合物,复合的,混合

powdered [ˈpaʊdərd] vt. 弄成粉的,粉状的

granular [ˈgrænjulə] adj. 由小粒而成的,粒状的

hopper [ˈhɔɒpə] n. 加料漏斗

metering [ˈmitər] vt. 测量(法),计[配]量,测定

eject [iˈdʒekt] vt. 逐出,喷射

solidify [səˈlidifai] vt.(使)凝固,(使)团结

manual [ˈmænjuəl] adj. 手的,手动的,手工的

property [ˈpɔpəti] n. 性质,特性

thread [θred] n. 螺纹

undercut [ʌndəˈkʌt] n. 侧向分型,底切

reciprocating screw 往复螺杆

plasticize [ˈplæstisaiz] vt. 使成可塑体

compression [kəmˈpreʃ(ə)n] n. 浓缩,压缩

screw-flight [skruflait] 螺杆的螺纹

convert [kənˈvɜ:t] vt. 使转变,转换

shear [ʃiə] vt. 剪, 剪切

semifluid [ˌsemiˈflu:id] adj. 半流质,半流质的

barrel [ˈbærəl] n. 桶

chamber [tʃeimbə] n. 室,房间

trip [trip] *vt.* 松开棘爪而开动;使跳闸;切断

switch [switʃ] *n.* 开关,转换,转变

hydraulic [haiˈdrɔːlik; haiˈdrɒlik] *adj.* 水力的,水压的

cylinder valve 汽缸阀

clamping force 锁紧力

exert [igˈzɜːt] *vt.* 尽(力),施加(压力)

rule - of - thumb 单凭经验的方法

transfer molding 传递模塑法,转送成形

polymerize [ˈpɔliməraiz] *vt.* (使)聚合

distortion [diˈstɔːʃ(ə)n] *n.* 扭曲,变形

plunger [ˈplʌn(d)ʒə] *n.* 柱塞

spurt [spɜːt] *vt.* (液体等)喷射,喷出

sprue [spru] *n.* 浇口熔渣

optimum [ˈɑptəməm] *adj.* 最适宜的

foam [foʊm] *vt.* 起泡沫

EXERCISE

Questions

1. What are the components of injection-molding?
2. How does the reciprocating-screw injection system work?
3. What are the advantage of injection molding ?

Reading Material: Basics of Injection Molding

Injection molding is a manufacturing technique for making parts from both thermoplastic and thermosetting plastic materials in production. Molten plastic is injected at high pressure into a mold, which is the inverse of the product's shape. After a product is designed, usually by an industrial designer or an engineer, molds are made by a moldmaker (or toolmaker) from metal, usually either steel or aluminium, and precision-machined to form the features of the desired part. Injection molding is widely used for manufacturing a variety of parts, from the smallest component to entire body panels of cars. Injection molding is the most common method of production, with some commonly made items including bottle caps and outdoor furniture.

1. Ejector Stopper

A block that stops an ejector plate from going forward [stop pin].

2. Ejector Plate

Ejector Plate is also called a push plate. A plate supports an edge of an ejector pin or a push back pin to eject a part from a mold.

It is ejected by an ejector device of a molding machine, and returned to the original position when the edge of a push back pin collides with a cavity plate during mold clamping.

3. Stop Pin

A stopper installed to keep an ejector plate horizontal or prevent the ejector plate from retreating too far and damaging a core adaptor plate.

4. Push Rods

A shaft linked to the force (hydraulic or mechanical) of the molding machine in order to get the ejector plate to work.