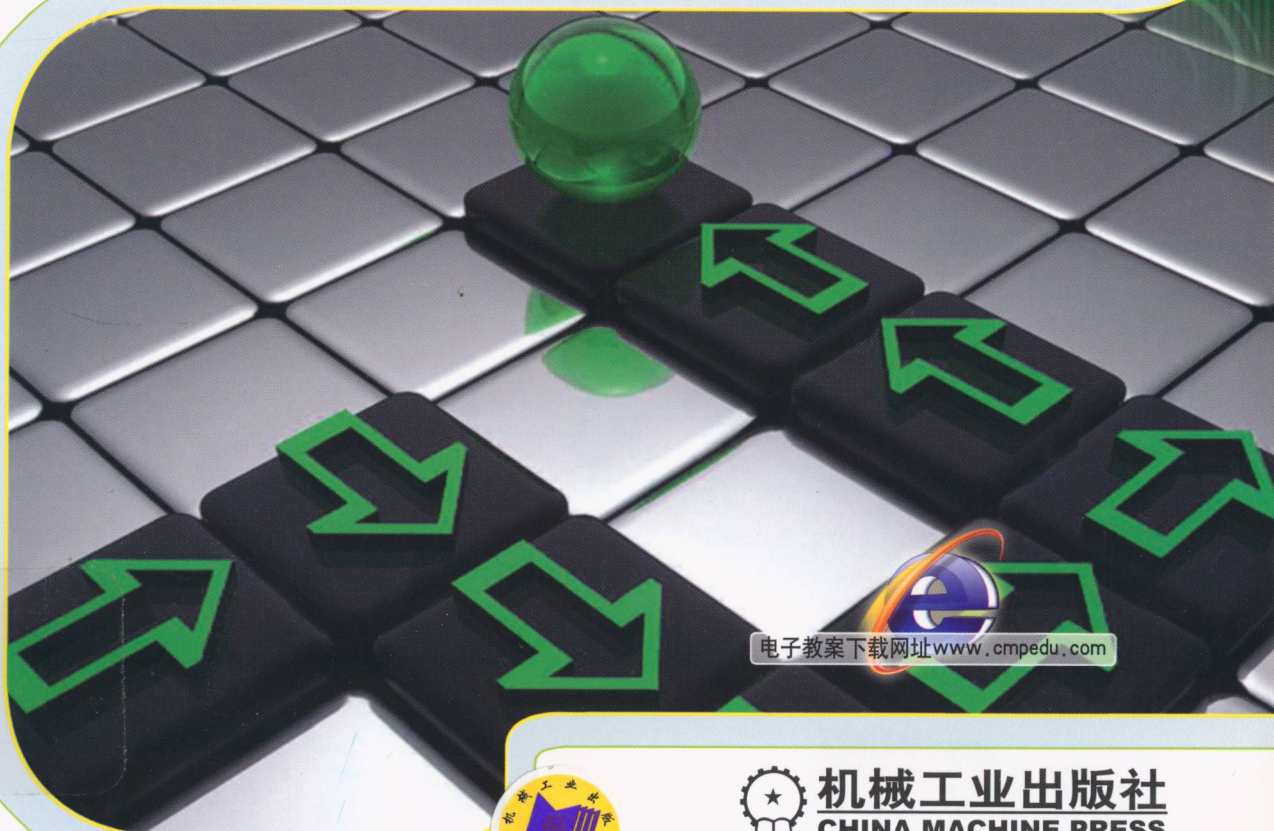




全国高等职业教育规划教材

机械电气专业英语

徐存善 主编



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全国高等职业教育规划教材

机械电气专业英语

主 编 徐存善

副主编 高晓红 黄晓东 王军红

贾晨霞 席东河

参 编 刘美珍 苏 峥 唐玉鹏

王宏松 陈军源 翟 艳



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本书由机械与模具制造、计算机数控、电力与电子技术、机电一体化与电气自动化和职业现场的交际技能会话训练 5 部分组成, 共 26 个单元。每单元包括课文、生词、专业术语、长难句解析、翻译技巧和阅读材料。为了使毕业生在外资或合资企业的就业竞争中能胜人一筹, 在后面 6 个单元的实用英语中, 分别用相当篇幅介绍了如何阅读机电产品的英文说明书、如何阅读英文招聘广告、如何写英文个人简历、如何写英文求职信等应用文体, 以及英语面试过程中的常用技巧。为了培养学生在一定场景下用英语进行专业交流的能力, 在第 5 部分汇编了 8 篇职业现场的交际对话。

本书适合高职高专(含成人教育学院)机械制造技术、模具制造与设计、数控技术、电子技术、机电维修、机电一体化与电气自动化控制等专业的学生使用, 也可供本科同类应用型专业学生学习或作为机电类专业技术人员的学习参考书。

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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“全国高等职业教育规划教材”。

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，核心基础课程的教材在保持扎实的理论基础的同时，增加了实训和习题；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。基本理论和方法的论述易于理解、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养创造良好的条件。

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。

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前 言

随着科技进步和社会的发展,我国对专业人才英语能力的要求越来越高。机械电气类专业已成为当今世界发展最迅速、技术更新最活跃的领域之一,我国在该领域注重引进世界先进技术和设备,同时要发展和创造更多的外向型经济,因此在该领域对具有专业英语能力的技术人才需求比以往任何时候都更加迫切。为了更好地培养学生的专业外语能力,促进对具有国际竞争力的人才的培养,我们在追求通俗易懂、简明扼要、便于教学和自学的指导思想下编写了这本书。

全书由 5 部分组成,即机械与模具制造、计算机数控、电力与电子技术、机电一体化与电气自动化和职业现场的交际技能会话训练,共 26 个单元。每单元包括课文、生词、专业术语、长难句解析、翻译技巧和阅读材料,在后面 6 个单元的实用英语中,分别用相当篇幅介绍了如何阅读机电产品的英文说明书、如何阅读英文招聘广告、如何写英文个人简历、如何写英文求职信等应用文体,以及英语面试过程中的常用技巧。目的是为了使毕业生在外资或合资企业的就业竞争中能胜人一筹。第 5 部分汇编了 8 篇职业现场的交际对话,目的是培养学生在一定场景下用英语进行专业交流的能力。附录提供了各单元的参考译文与部分习题答案(为了培养学生的独立阅读能力,部分阅读材料的参考译文与答案将在电子教案中给出)以及生词表等内容。

本书可作为高职高专机械制造技术、模具制造与设计、数控技术、电子技术、机电维修、机电一体化与电气自动化控制等专业的英语教材,也可供本科同类应用型专业学生学习或作为机电类专业技术人员的学习参考书。教师根据各专业的学生情况,可不受教材编排顺序的限制,进行适当的选择。部分授课学时偏少的院校,可选学其中约 15 个单元的内容,每单元参考学时为 2~3 个学时。对老师在授课中没有选入的单元,学生可根据自己的兴趣或需要自学其中的部分内容,以拓宽专业英语的知识面。

本书由河南工业职业技术学院徐存善副教授任主编。编写分工为:刘美珍编写第 1~3 单元,王军红编写第 4~6 单元,王宏松编写第 7 单元,黄晓东编写第 8~11 单元,陈军源编写第 12 单元,徐存善编写第 13~15 单元和附录 B,席东河编写第 16~18 单元,高晓红编写第 19~21 单元,贾晨霞编写第 22~23 单元,翟艳编写第 24 单元,苏峥编写第 25 单元,唐玉鹏编写第 26 单元。附录 A 中的参考译文与习题答案由各单元相应的作者编写。

本书的编审工作得到了编者所在院校领导的高度重视和大力支持,齐智英教授、唐建生教授、韩全力教授对本书的编写提出了宝贵意见,在此表示衷心的感谢。

由于编者的水平和经验有限,书中不足之处在所难免,恳请广大读者批评指正。

编 者

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Chapter I Machinery and Mold Manufacturing

Unit 1 Machine Elements

Text

However simple, any machine is a combination of individual components generally referred to as machine elements or parts. Thus, if a machine is completely dismantled, a collection of simple parts remains such as nuts, bolts, springs, gears, cams and shafts—the building block of all machinery^[1]. A machine element is, therefore, a single unit designed to perform a specific function and capable of combining with other elements. Sometimes certain elements are associated in pairs^[2], such as nuts and bolts or keys and shafts. In other instance, a group of elements is combined to form a subassembly, such as bearings, couplings, and clutches.

The most common example of a machine element is a gear, which, fundamentally, is a combination of the wheel and the lever to form a toothed wheel^[3]. The rotation of this gear on a hub or shaft drives other gears that may rotate faster or slower, depending upon the number of teeth on the basic wheels.

Other fundamental machine elements have evolved from wheel and lever. A wheel must have a shaft on which it may rotate. The wheel is fastened to the shafts with couplings. The shaft must rest in bearings, may be turned by a pulley with a belt or a chain connecting it to a pulley on a second shaft. The supporting structure may be assembled with bolts or rivets or by welding^[4]. Proper application of these machine elements depends upon knowledge of the force on the structure and the strength of the materials employed.

The individual reliability of machine elements becomes the basis for estimating the overall life expectancy of a complete machine.

Many machine elements are thoroughly standardized. Testing and practical experience have established the most suitable dimensions for common structural and mechanical parts. Through standardization, uniformity of practice and resulting economics are obtained. Not all machine parts in use are standardized, however. In the automotive industry only fasteners, bearings, bushings, chains, and belts are standardized. Crankshafts and connecting rods are not standardized.

New Words and Phrases

- combination [kɒmbi'neɪʃən] n. 组合, 结合
- individual [ɪndɪ'vɪdʒuəl] adj. 单独的, 各个的, 个别的, 特殊的
- component [kəm'pəʊnənt] n. 元件, 构件, 部件
- dismantle [dɪs'mæntl] vt. 分解 (机器), 拆开, 拆卸
- assemble [ə'sembl] v. 安装, 装配, 组合; 集合, 集中 n. 组件
- nut [nʌt] n. 螺母; 难对付的人; 难解的问题; 坚果 vi. 采坚果
- bolt [bəʊlt] n. 螺栓; (门、窗等的) 插销
- gear [gɪə] n. 仪器, 装置; 传动装置, 齿轮
- cam [kæm] n. 凸轮, 偏心轮; 样板, 靠模, 仿形板
- lever ['li:və] n. 杠杆, 控制杆, 操作杆
- shaft [ʃɑ:ft] n. 柱身; 连杆; 传动轴, 旋转轴; 轴
- machinery [mə'ʃɪ:nəri] n. 机器 (总称), 机械
- perform [pə'fɔ:m] v. 执行, 完成, 做
- associate [ə'səʊʃieɪt] v. 联合, 结合, 参加, 连带
- key [ki:] n. 键, 电键, 开关; 楔, 销; 钥匙
- subassembly [sʌbə'sembli] n. 组合件, 部件, 机组
- coupling ['kʌplɪŋ] n. 联轴节, 联轴器; 联结器, 联合器
- clutch [klʌtʃ] n. 离合器, 联轴器; 夹紧装置
- fundamentally [ˌfʌndə'mentli] adv. (从) 根本上
- hub [hʌb] n. (轮) 毂; 中心; 木片
- rotate [rəu'teɪt] n. (使某物) 旋转或转动
- evolve [ɪ'vɒlv] v. 进化, 演变; 开展, 发展, 展开
- pulley ['pʊli] n. 滑轮 (组); 滑车; 皮带轮
- rivet ['rɪvɪt] n. 铆钉 v. 铆接, 铆
- weld [weld] v. & n. 焊接, 熔焊
- reliability [rɪ'laɪə'bɪlɪti] n. 可靠性, 安全性, 准确性
- estimate ['estɪmeɪt] v. 估计, 估算, 计算, 测定, 评价
- expectancy [ɪks'pektənsɪ] n. 期望, 预期
- thoroughly ['θɒrəli] adv. 完全地, 充分地, 彻底地
- standardize ['stændədaɪz] vt. 标准化, 统一标准; 标定, 校准
- establish [ɪs'tæblɪʃ] vt. 确定, 制定; 建立, 创办, 产生; 使固定
- dimension [dɪ'menʃən] n. 尺寸, 尺度; 范围, 方面
- bushing ['bʊʃɪŋ] n. 衬套; 轴衬; 轴瓦; [电] (绝缘) 套管
- uniformity [ˌmjʊ:nɪ'fɔ:miti] n. 均匀性, 一致性
- automotive [ˌɔ:tə'məʊtɪv] adj. 自动的, 机动的
- crank [kræŋk] n. 曲轴
- refer to as 称为, 叫做; 当做; 参考作为; 所说的; 提到的

Notes

[1] Thus, if a machine is completely dismantled, a collection of simple parts remains such as nuts, bolts, springs gears, cams and shafts—the building block of all machinery.

译文：因此，如果把机床完全拆开，就可以得到像螺母、螺栓、弹簧、齿轮、凸轮及轴等简单零件——所有机器的标准元件。

说明：the building block, 砌块；积木；构件；（标准）元件 又如：

One team has made tiny transistors—the building block of computer processors. 一小组已造出小型电晶体——电脑处理器的元件。

[2] Sometimes certain elements are associated in pairs.

译文：有时某些特定的元件必须成对地工作。

说明：be associated with, 与……有关；涉及 又如：

I associated with him in business. 我与他合伙经商。

These concerns may be associated with strong feelings such as anger or shame. 这些忧虑很可能与恼火、羞愧之类的强烈情绪有关联。

[3] The most common example of a machine is a gear, which, fundamentally, is a combination of the wheel and the lever to form a toothed wheel.

译文：机器零件中最常用的是齿轮，它实际上是由轮子和杆组成的带有齿的轮子。

说明：which 引导非限定性定语从句，修饰 gear，不定式 to form a toothed wheel 作结果状语。

[4] The supporting structure may be assembled with bolts or rivets or by welding.

译文：支撑结构可由螺栓或铆钉或通过焊接固定在一起。

说明：by welding 作方式状语，be assembled with, 由……安装，又如：

The bookcase can easily be assembled with a screwdriver.

这书柜用一把螺丝刀就可以很容易地安装起来。

Exercises

I. Answer the following questions.

1. What is a machine element? Which is the most common machine element?
2. What are other fundamental machine elements?
3. Which machine elements are standardized in the automotive industry?

II. Place a "T" (true) or an "F" (false) beside the sentences according to the text.

1. Gears are used as building blocks for the construction of most devices, apparatus, and machinery.
2. A pair of gears with different numbers of teeth will rotate at different speeds.
3. Spur gears and bevel gears are different in their applications because their shapes are different.
4. The most common machine element is the gear from which other fundamental machine elements have developed.
5. A coupling is a machine element, which joins two shafts.

6. All machine parts have been developed into standardized designs.

III. Translate the following sentences into Chinese.

1. The most common machine element is the gear, which combines the feature of the wheel and the lever to form a toothed wheel.
2. The hardness of a gear determines its ability to resist wear.
3. Manufacturing engineers have centered their efforts on the development of standardized elements.
4. These parts are produced in large quantities with a high degree of perfection at reduced cost.

Translating Skills

科技英语翻译的标准与方法

翻译是一种再创造，即译者根据原作者的思想，用另一种语言表达出来。这就要求译者必须确切理解和掌握原作的内容与含意，在确切理解的基础上，很好地运用译文语言把原文内涵通顺、流畅地再现给读者。

一、翻译的标准

科技英语的翻译标准可概括为“忠实、通顺”四个字。

忠实，首先指忠实于原文内容，译者必须把原作的内容完整而准确地表达出来，不得任意发挥或增删；忠实还指保持原作风格，尽量表现其本来面目。

通顺，即指译文语言必须通俗易懂，符合规范。

忠实与通顺是相辅相成的，缺一不可。忠实而不通顺，读者会看不懂；通顺而不忠实，脱离原作的内容与风格，通顺就失去了意义。例如：

1. The electric resistance is measured in ohms.

误译：电的反抗是用欧姆测量的。

正译：电阻的测量单位是欧姆。

2. All metals do not conduct electricity equally well.

误译：全部金属不导电得相等好。

正译：并非所有的金属都同样好地导电。

3. The moment the circuit is completed, a current will start flowing the coil.

正译：电路一旦接通，电流开始流向线圈。

4. Some special alloy steels should be used for such parts because the alloying elements make them tougher, stronger, or harder than carbon steels.

正译：对这类零件应采用某些特殊的合金钢，因为合金元素能使合金钢比碳钢具有更高的韧性、强度或硬度。

从以上例句可以清楚地看到，不能任意删改，并不是逐词死译；汉语译文规范化，并非离开原文随意发挥。此外，还应注意通用术语的译法。比如，例 1 中的“电阻”已成为固定词组，不能用别的译法。

二、翻译的方法

翻译的方法一般来说有直译 (literal translation) 和意译 (free translation)。直译，即指

“既忠实于原文内容，又忠实于原文的形式”的翻译。意译，就是指忠实于原文的内容，但不拘泥于原文的形式。

翻译时，我们应灵活运用上述两种方法，能直译的就直译，需要意译的就意译。因为对同一个句子来说，有时并非只能用一种方法，所以我们可以交替使用或同时并用以上两种方法。

请看下面的句子：

1. Milky Way 银河（意译）（不可直译为：牛奶路）

2. bull's eye 靶心（意译）（不可直译为：牛眼睛）

3. New uses have been found for old metals, and new alloys have been made to satisfy new demands.

老的金属有了新用途，新的合金被冶炼出来，以满足新的需要（本句前半部分用了意译法，后半部分用了直译法）。

4. The ability to program these devices will make a student an invaluable asset to the growing electronic industry.

对这些器件编程的能力将使学生成为日益增长的电子工业领域中的无价人才（这里 asset 原意为资产，这里根据上下文意译成“人才”）。

三、翻译中的专业性特点

科学技术本身的性质要求科技英语与专业内容相互配合，相互一致，这就决定了专业英语与普通英语有很大的差异。专业英语以其独特的语体，明确表达作者在其专业方面的见解，其表达方式直截了当，用词简练。即使同一个词，在不同学科的专业英语中，其涵义也是不同的。例如：

1. The computer took over an immense range of tasks from workers muscles and brains.

误译：计算机代替了工人大量的肌肉和大脑。

正译：计算机取代了工人大量的体力和脑力劳动。

（这里 muscles and brains 引申为“体力和脑力劳动”。）

2. In any case work doesn't include time, but power does.

正译：在任何情况下，功不包括时间，但功率包括时间。

（这里 work, power 在物理专业分别译为“功”、“功率”。）

3. Like charges repel each other while opposite charges attracted.

正译：同性电荷相排斥，异性电荷相吸引。（charge 含义有“负载、充电、充气、电荷”，按专业知识理解为“电荷”。）

从以上例句可知，专业英语专业性强，逻辑性强，翻译要力求准确、精练、正式。这不仅要求我们能熟练地运用汉语表达方式，而且要求我们具有较高的专业水平。

Reading

Spur and Helical Gears

A gear having tooth elements that are straight and parallel to its axis is known as a spur gear. A spur pair can be used to connect parallel shaft only. Parallel shafts, however, can also be connected

with gears of another type, and a spur gear can be mated with a gear of a different type.

To prevent jamming as a result of thermal expansion, to aid lubrication and to compensate for unavoidable inaccuracies in manufacture, all power-transmitting gears must have backlash. This means that on the pitch circles of a mating pair, the space width on the pinion must be slightly greater than the tooth thickness on the gear, and vice versa. On instrument gears, using a gear split down its middle, one half being ratable relative to the other can eliminate backlash. A spring forces the split gear teeth to occupy the full width of the pinion space.

Helical gears have certain advantages, for example, when connecting parallel shafts, they have a higher load carrying capacity than spur gears with the same tooth numbers and cut with the same cutter. Because of the overlapping action of the teeth, they are smoother in action and can operate at higher pitch-line velocities than spur gears. The pitch-line velocity is the velocity in the pitch circle. Since the teeth are inclined to axis of rotation, helical gears create an axial thrust. If used single, this thrust must be absorbed in the shaft bearings. The thrust problem can be overcome by cutting two sets of opposed helical teeth on the same blank. Depending on the method of manufacture, the gear may be of the continuous-tooth herringbone variety or a double-helical gear with a space between the two halves to permit the cutting tool to run out. Double-helical gears are well suited for the efficient transmission of power at high speeds.

Helical gears can also be used to connect nonparallel, non-intersecting shafts at any angle to one another. Ninety degrees is the commonest angle, at which such gears are used.

New Words and Phrases

spur [spə:] n. 凸壁; 支撑物; 鼓舞; 刺激 vt. 激励; 鞭策

helical ['helikəl] adj. 螺旋形的; 螺旋线的

spur gear 正齿轮; 直齿轮

helical gear 斜齿轮

axis ['æksis] n. 轴, (几何) 轴线, 轴心线

axial ['æksisl] adj. 轴的, 成轴的, 轴向的

thrust [θrʌst] n. [机] 推力; 侧向压力; 插; 猛推

mate [meit] vt. 使配对, 使一致, 结伴 n. 配偶, 对手, 助手

thermal ['ðə:məl] adj. 热的, 热量的

expansion [iks'pænjən] n. 扩充, 开展, 膨胀, 扩张物, 浩瀚

lubrication [lɪju:'brɪ'keɪʃən] n. 润滑

compensate [kɒmpenseɪt] v. 偿还, 补偿, 付报酬

inaccuracy [ɪn'ækjʊrəsi] n. 错误, 误差

manufacture [mænju'fæktʃə] vt. 制造, 加工; n. 产品

backlash ['bæklæʃ] n. 轮齿隙; 反斜线 (\); 后座; 后冲

ratable ['reɪtəbl] adj. 可评价的; 可估价的; 按比例

velocity [vɪ'ləsɪti] n. 速度; 速率; 迅速; 周转率

incline [ɪn'klaɪn] v. 使倾斜; 赞同; 喜爱

transmission [trænz'miʃən] n. 传动, 传递; 发射; 播送
 intersect [ɪntə:'sekt] vt. 横切; 横断 vi. 交叉, 相交
 pitch [pitʃ] n. (齿轮) 节距
 eliminate [i'limineit] vt. 排除, 消除 v. 除去
 split [split] v. 劈开, (使) 裂开, 分裂, 分离 n. 裂开, 裂痕
 pinion ['piɳjən] n. 小齿轮
 overlap [ˌəʊvə'læp] v. (与某物) 交叠, 重叠, 重合
 herringbone ['herɪŋbəʊn] n. 人字形 adj. 人字形的 v. (使) 成箭尾形
 vice versa 反之亦然

Exercises

Answer the following questions.

1. What is called a spur gear?
2. How backlash on instrument gears can be eliminated? Why?
3. What is the pitch-line velocity?
4. Do you know the advantages of helical gears? Can you give an example?

Unit 2 Machine Tools

Text

Most of the mechanical operations are commonly performed on five basic machine tools:

- The drill press;
- The lathe;
- The shaper or planer;
- The milling machine;
- The grinder.

Drilling

Drilling is performed with a rotating tool called a drill. Most drilling in metal is done with a twist drill. The machine used for drilling is called a drill press. Operations, such as reaming and tapping, are also classified as drilling. Reaming consists of removing a small amount of metal from a hole already drilled. Tapping is the process of cutting a thread inside a hole so that a cap screw or bolt may be threaded into it^[1].

Turning and Boring

The lathe is commonly called the father of the entire machine tool family. For turning operations, the lathe uses a single-point cutting tool, which removes metal as it travels past the revolving workpiece^[2]. Turning operations are required to make many different cylindrical shapes, such as axes, gear blanks, pulleys, and threaded shafts. Boring operations are performed to enlarge, finish, and accurately locate holes.

Milling

Milling removes metal with a revolving, multiple cutting edge tools called milling cutter. Milling cutters are made in many styles and sizes. Some have as few as two cutting edges and others have 30 or more. Milling can produce flat or angled surfaces, grooves, slots, gear teeth, and other profiles, depending on the shape of the cutters being used^[3].

Shaping and Planing

Shaping and planing produce flat surfaces with a single-point cutting tool. In shaping, the cutting tool on a shaper reciprocates or moves back and forth while the work is fed automatically towards the tool^[4]. In planing, the workpiece is attached to a worktable that reciprocates past the cutting tool. The cutting tool is automatically fed into the workpiece a small amount on each stroke.