高职高专“十二五”规划教材·专业英语系列

汽车工程专业英语

宋建桐　朱春红　主　编
方　芳　张贺达　任小龙　副主编

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内 容 简 介

本书内容涵盖汽车发动机、底盘以及相关的新技术等，共分 20 个单元，每个单元包括课文、生词及专业词汇解析、长难句解析、课后练习题、课文的中文译文等内容。本书针对最新技术，甄选技术资料，力争在帮助学生提高汽车专业英语知识水平的同时，提高学生对英语文献资料的翻译和阅读能力，同时提高学生对英文的听、说、读、写能力。为了便于学生查阅、学习，书后还附有汽车专业常用的词汇和术语的中英文对照表。

本书可作为高职高专院校、成人高等院校及本科院校高职教育的汽车专业英语教材，也可供汽车生产及营销企业、汽车运输企业的从业者及相关技术人员学习、参考。

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前　言

近年来，汽车技术的发展日新月异，我国汽车行业也发展迅速，急需大批熟悉外国汽车技术特点、能够熟练阅读英文技术资料、掌握扎实的专业英语知识的应用型人才。本书旨在向读者介绍汽车的新结构与新技术，使读者了解当今汽车领域发展的前沿技术和最新动态，力争在帮助读者提高汽车专业英语知识水平的同时，提高读者对英语文献资料的翻译和阅读能力，同时提高读者对英语的听、说、读、写能力。

本书共分 20 单元，内容涵盖汽车发动机、底盘以及相关的新技术等。每个单元包括课文、生词及专业词汇解析、长难句解析、课后练习题和课文的中文翻译等内容。为了便于学生查阅、学习，书后还附有汽车专业常用的词汇和术语的中英文对照表。

本书由长期从事高职高专汽车专业教学的教师与专业英语教师共同编写，对专业知识与英语知识两手抓。本书在编写过程中参阅了大量外文原著资料和外文网站内容，力图为读者呈现出原汁原味的英语语言表达和专业术语运用，同时我们在课文中插入大量图片，力求图文并茂，帮助读者更清晰明了地学习和掌握知识。

本书由宋建桐、朱春红担任主编，方芳、张贺达、任小龙担任副主编。其中宋建桐编写了 Chapter 3、Chapter 4、Chapter 6、Chapter 11、Chapter 12、Chapter 14、Chapter 19、Chapter 20，朱春红编写了 Chapter 2、Chapter 5、Chapter 7～Chapter 10，张贺达编写了 Chapter 1、Chapter 13、Chapter 15～Chapter 18，方芳负责核对每篇英文课文的语法、时态，并编制课后注释，任小龙负责编制词汇、术语表。

本书可作为高职高专院校、成人高等院校及本科院校高职教育的汽车专业英语教材，也可供汽车生产及营销企业、汽车运输企业的从业者及相关技术人员学习、参考。

本书力求突出汽车专业知识与英语知识的结合与应用，由于编者水平有限，疏漏和不妥之处在所难免，殷切期望广大教师和读者不吝指正，以使本书不断优化、完善。

编　者

目　录

Chapter 1 Automotive Historical Background

The automobile has changed quite a bit since the first horseless carriage went down an American street. In 1896, both Henry Ford and Ransom Eli Olds test drove their first gasoline-powered vehicles. Prior to this time, other individuals were making their own auto-mobiles (Figure 1-1) . Most were powered by electricity or steam. The year 1896 marks the beginning of the automotive industry, not because of what Ford or Olds did, but because of the Duryea Brothers, who, by 1896, had made thirteen cars in the first factory that made cars for customers.

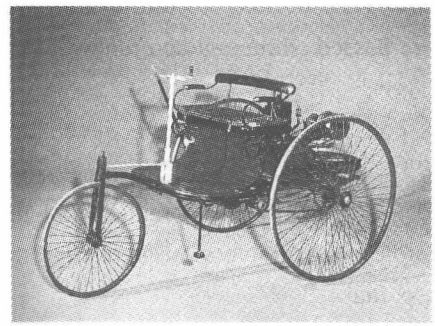


Figure 1-1 The 1886 Benz Patent Motor Wagen, one of the first automobiles made.

In the beginning, the automobile looked like the horse-drawn carriage it was designed to replace. In1919, 90% of the cars had carriage like open bodies. These early cars had rear-mounted engines and very tall tires. They were designed to move people down dirt roads.

The automobile changed when the roads became paved, more people owned cars, manufacturers tried to sell more cars, concerns for safety and the environment grew, and new technology was developed. All of these changes resulted in automobiles that are more practical, more affordable, safer, more comfortable, more dependable, and faster. Although many improvements have been made to the original design, the basics of the automobile have changed very little:

- Nearly all of today's cars still use gasoline engines to drive two or more wheels.
- A steering system is used to control the direction of the car.

- A brake system is used to slow down and stop the car.
- A suspension system is used to absorb road shocks and help the driver maintain control on bumpy roads.
- These major systems are mounted on steel frames and the frame is covered with body panels.
- The body panels give the car its shape and protect those inside from the weather and dirt. The body panels also offer some protection for the passengers if the automobile is in an accident.

Although these basics have changed little in the past 100 years, the design of the systems has greatly changed. New technologies have changed the slow, unreliable, user-hostile vehicles of the early 1900s into vehicles that can travel at very high speeds, operate trouble-free for thousands of miles, and provide comforts that even the very rich had not dreamed of in 1896.

Social and political pressures have had a great influence on automobile design for the past 40-plus years. In 1965, laws were passed that limited the amount of harmful gases emitted by an automobile. Although this had little immediate effect on the industry, the automobile manufacturers were forced to focus on the future. They needed to build cleaner-burning engines. In the following years, stricter emissions laws were passed and manufacturers were required to develop new emission control systems.

World events in the 1970s continued to shape the development of the automobile. An oil embargo by Arab nations in 1973 caused the price of gasoline to quickly increase to four times its normal price. This event caused most Americans to realize that the supply of gasoline and other nonrenewable resources was limited. Car buyers wanted cars that were not only kind to the environment but that also used less fuel.

The Corporate Average Fuel Economy (CAFE) standards were set in 1975. These required automakers to build more fuel-efficient vehicles. Under the CAFE standards, different models from each manufacturer are tested for the number of miles they can be driven on a gallon of gas. The fuel efficiencies of these vehicles are averaged together to arrive at a corporate average. The CAFE standards have increased many times since it was established. A manufacturer that does not meet CAFE standards for a given model year faces heavy fines.

While trying to produce more fuel-efficient vehicles, manufacturers replaced large eight-cylinder engines with four-cylinder and other small engines. Basic engine systems like carburetors and ignition breaker points were replaced by electronic fuel injection and electronic ignition systems.

By the mid-1980s, all automobiles were equipped with some type of electronic control system. These systems monitor the engine's operation and provide increased power outputs while min-imizing fuel consumption and emissions. Electronic sensors are used to monitor the engine and

many other systems. Computerized engine control systems control air and fuel delivery, ignition timing, emission systems operation, and a host of other related operations. The result is a clean-burning, fuel-efficient, and powerful engine (Figure 1-2).

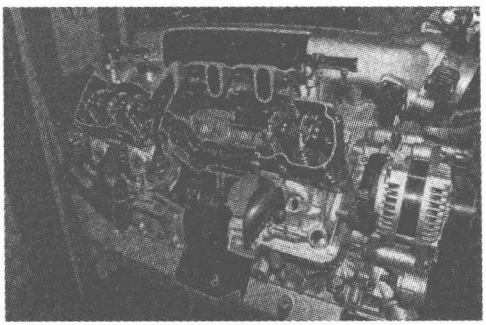


Figure 1-2 A cutaway of a late-model V-10 gasoline engine.

New Words

automotive [ɔ:tə'məutiv]	*adj.* 汽车的
automobile ['ɔ:təməubi:l]	*n.* 汽车
horseless ['hɔ:slis]	*adj.* 不用马的，自行推进的
carriage ['kæridʒ]	*n.* 马车，客车
electricity [ilek'trisiti]	*n.* 电流，电
steam [sti:m]	*n.* 蒸汽
tire ['taiə]	*n.* 轮胎
safety ['seifti]	*n.* 安全
environment [in'vaiərənmənt]	*n.* 环境
technology [tek'nɔlədʒi]	*n.* 技术
practical ['præktikəl]	*adj.* 实用的
comfortable ['kʌmfətəbl]	*adj.* 舒适的
dependable [di'pendəbl]	*adj.* 可靠的
improvement [im'pru:vmənt]	*n.* 改进，进步
original [ə'ridʒənəl]	*adj.* 最初的
gasoline ['gæsəli:n]	*n.* 汽油
steering ['stiəriŋ]	*n.* 操纵，转向
brake [breik]	*n.* 制动，刹车

suspension [səs'penʃən]	*n.* 悬架
steel [sti:l]	*n.* 钢，钢铁
body ['bɔdi]	*n.* 车身
shape [ʃeip]	*n.* 外形，形状
protect [prə'tekt]	*vt.* 保护
weather ['weðə]	*n.* 天气
dirt [də:t]	*n.* 污垢，泥土
protection [prə'tekʃən]	*n.* 保护
accident ['æksidənt]	*n.* 意外事件，事故
social ['səuʃəl]	*adj.* 社会的
political [pə'litikəl]	*adj.* 政治的
pressure ['preʃə(r)]	*n.* 压力
influence ['influəns]	*n.* 影响
law [lɔ:]	*n.* 法律，法规
limit ['limit]	*vt.* 限制
harmful ['hɑ:mful]	*adj.* 有害的
gas [gæs]	*n.* 气体
emit [i'mit]	*vt.* 发出，排放
immediate [i'mi:djət]	*adj.* 直接的，立即的
industry ['indəstri]	*n.* 工业
manufacturer [ˌmænju'fæktʃərə]	*n.* 制造业者，厂商
emission [i'miʃən]	*n.*（光、热等的）散发，排放
automaker ['ɔ:təuˌmeikə]	*n.* 汽车制造商
efficient [i'fiʃənt]	*adj.* 有效率的
vehicle ['vi:ikl]	*n.* 交通工具，车辆
cylinder ['silində]	*n.* 汽缸
carburetor [kɑ:bə'retə(r)]; (US)['kɑ:rbəreitər]	*n.* 化油器
ignition [ig'niʃən]	*n.* 点火，点燃
breaker ['breikə]	*n.* 断电器
point [pɔint]	*n.* 点，触点
injection [in'dʒekʃən]	*n.* 注射
monitor ['mɔnitə]	*vt.* 监测，监控
operation [ˌɔpə'reiʃən]	*n.* 运转
power ['pauə]	*n.* 动力

sensor ['sensə]	*n.* 传感器
delivery [di'livəri]	*n.* 分配

Phrases and Expressions

gasoline engine	汽油机
steering system	转向系统
brake system	制动系统
suspension system	悬架系统
automobile design	汽车设计
have an effect on	影响
automobile manufacturer	汽车厂商
emission control system	排放控制系统
nonrenewable resources	不可再生资源
fuel efficiency	燃油效率
breaker point	断电器触点
electronic fuel injection	电控燃油喷射
electronic ignition system	电子点火系统
electronic control system	电控系统
power output	功率输出
fuel consumption	燃油消耗率
ignition timing	点火正时

Notes

1. The automobile has changed quite a bit since the first horseless carriage went down an American street. 自从第一辆没有马拉的车出现在美国街头开始，汽车已经发生了相当大的变化。

a bit 稍微，一点。

since 自从，从…时开始。通常用于现在完成时，表示从某个时间点开始，注意与 for 的差别，后者用于现在完成时表示持续了一段时间。例如：

I have been in Beijing for six years. 我在北京已经 6 年了。

2. Prior to this time, other individuals were making their own auto-mobiles. 在此之前，其他人也在制造着他们自己的汽车。

prior to 在…之前。例如：

I saw him prior to leaving. 离开前我见到了他。

The duty to protect my sister is prior to all others. 保护我的妹妹是我最重要的责任。

3. The year 1896 marks the beginning of the automotive industry, not because of what Ford or Olds did, but because of the Duryea Brothers, who, by 1896, had made thirteen cars in the first factory that made cars for customers. 1896 年标志着汽车工业的开始，并不是因为福特和奥斯的所作所为，而是因为直到 1896 年为止，杜叶兄弟已经在他们的第一家工厂为顾客制造了 13 辆小汽车。

mark 标记。

by 1896 作插入语，插入到由 who 引导的定语从句中。

because of 由于，因为。例如：

I came back because of the rain. 因为下雨，所以我回来了。

It was because of the job that he had taken the flat. 他因为工作的原因租了那套公寓。

4. The automobile changed when the roads became paved, more people owned cars, manufacturers tried to sell more cars, concerns for safety and the environment grew, and new technology was developed. 随着公路变得平直，汽车也发生了变化，更多的人拥有了汽车，制造商也尽力地销售更多的汽车，人们对安全和环境也越来越关注，所以发展了新的技术。

concern *vt.* 关于，关系到；*n.* 忧虑，焦虑，担心。例如：

These problems concern all of us. 这些问题与我们所有的人都有关系。

It doesn't concern me at all. 此事与我毫不相干。

5. All of these changes resulted in automobiles that are more practical, more affordable, safer, more comfortable, more dependable, and faster. 所有的这些发展使汽车变得更加的实用、经济，安全、舒适、可靠，并且车速也更快。

result in 导致，结果是。例如：

The game resulted in another victory for our team. 比赛结果是我们队又获胜了。

The flood resulted in a considerable reduction in production. 这次水灾造成相当大的减产。

6. The body panels give the car its shape and protect those inside from the weather and dirt. 车身使汽车具有不同的形状，保护车内的人与货物免受天气和灰尘影响。

protect from 保护，保卫。例如：

Citrus growers were cautioned to protect the fruit from frost. 种柑橘者收到防霜保橘的劝告。

An umbrella will protect you from the rain. 雨伞可以保护你不至于淋雨。

7. New technologies have changed the slow, unreliable, user-hostile vehicles of the early 1900s into vehicles that can travel at very high speeds, operate trouble-free for thousands of miles, and provide comforts that even the very rich had not dreamed of in 1896. 新技术已经将 20 世纪初期

的低车速、不可靠、不安全改变为很高的车速、无故障行驶数千公里，即使在 1896 年非常富有的人也想象不到的舒适性。

very 很，非常，相当。放在形容词前表示程度，例如：

the very tall 相当高。

8. Social and political pressures have had a great influence on automobile design for the past 40-plus years. 在过去的 40 多年里，社会和政治的压力对汽车的设计产生了深远的影响。

have influence on …对…有影响。

plus 比所示数量多的。例如：

All the children here are 12 plus. 这里的孩子都是 12 岁以上的。

9. World events in the l970s continued to shape the development of the automobile. 20 世纪 70 年代，世界性事件继续推动了汽车的发展。

continue to do 继续做某事。

shape 对（某人或某事物）有重大影响；决定（某事物）的性质。例如：

Can they shape public opinion? 他们能左右舆论吗?

10. Under the CAFE standards, different models from each manufacturer are tested for the number of miles they can be driven on a gallon of gas. 在 CAFE 的标准下，每个制造商的不同车型都要测试每加仑汽油能够行驶的里程数，这些汽车燃油消耗的平均值就是汽车制造厂的平均油耗。

different from 与…不同，不同于，不同的。

under 根据…的条款；根据，按照（协议、法律或制度）。例如：

Under the terms of the agreement, you have to pay a weekly rent. 根据这份协议的条款，你得支付一周的房租。

the number of+可数名词复数 …的数量 注意与 a number of 的区分。

a number of +可数名词复数 许多，大量。

11. The fuel efficiencies of these vehicles are averaged together to arrive at a corporate average. 这些汽车燃油消耗的平均值就是汽车制造厂平均油耗。

average *n*. 平均；平均数。例如：

An average of 1500 persons pass here every day. 每天平均有 1500 个人经过此地。

We average eight hours' work a day. 我们每天平均工作八小时。

12. A manufacturer that does not meet CAFE standards for a given model year faces heavy fines. 不能满足当年指定车型 CAFE 标准的制造商面临着严重的罚款。

that does not meet CAFE standards for a given model year 作定语从句修饰前面的 a manufacturer。

meet 满足；使满意。例如：

How can we best meet the needs of all the different groups? 我们怎样才能最好

地满足各种人的需要呢?

Until these conditions are met we cannot proceed with the sale.除非这些条件得到满足，否则我们不可能进行这项交易。

13. Computerized engine control systems control air and fuel delivery, ignition timing, emission systems operation, and a host of other related operations. 发动机计算机控制系统控制空气和燃油分配、点火正时、排放系统的工作和大量的其他相关工作。

computerized engine control systems 发动机计算机控制系统，作主语。

air and fuel delivery 空气和燃油分配。

a host of 许多，一大群。例如：

He has a host of friends. 他有许多朋友。

Review Questions

1. The automobile has changed _____since the first horseless carriage _____ an American street.

2. In the beginning, the automobile _____ the horse-drawn carriage it was designed to _____.

3. All of these changes _____automobiles that are more practical, more affordable, safer, more _____, more dependable, and faster.

4. Although these basics have changed little _____, the design of the systems has greatly changed.

5. Social and political pressures have had _____ on automobile design for the past 40-plus years.

6. How many features does the beginning automobile have?

7. What improvements does the original design have been made?

8. Please list the basics of the automobile and introduce the functions.

9. How many social and political pressures have had a great influence on automobile design for the past 40-plus years?

10. Please generalize the electronic control system's excellences.

译文:

汽车历史

自从第一辆没有马拉的车出现在美国街头开始，汽车已经发生了相当大的变化。1896 年，亨利·福特和兰瑟·埃里·奥斯试验驾驶了他们的第一辆以汽油驱动的汽车。在此之前，其他人也在制造着他们自己的汽

车，其中大多数是由电或者蒸汽机驱动的。1896 年标志着汽车工业的开始，并不是因为福特和奥斯的所作所为，而是因为直到 1896 年为止，杜叶兄弟已经在他们的第一家工厂为顾客制造了 13 辆小汽车。

起初，汽车看起来像是设计用来代替马车的，在 1919 年，90%的汽车都有像敞开式车身的车厢，这些早期的汽车一般都是发动机后置，并有很高的轮胎，它们被设计用来拉载乘客通过泥泞的道路。

随着公路变得平直，汽车也发生了变化，更多的人拥有了汽车，制造商也尽力地销售更多的汽车，人们对安全和环境也越来越关注，所以发展了新的技术。所有的这些发展使汽车变得更加的实用、经济、安全、舒适、可靠，并且车速也更快。与最初的设计相比，尽管已经做了很多改进，但汽车的基本结构并没有多少改变。

- 如今几乎所有的汽车还是由汽油发动机来驱动两个或多个车轮。
- 利用转向系统来控制汽车的方向。
- 利用制动系统来降低车速或停车。
- 利用悬架系统来吸收路面的震动，并辅助驾驶员在颠簸的路面继续驾驶。
- 这些主要的系统被安装在车架上，并且车架上覆盖着车身。
- 车身使汽车具有不同的形状，保护车内的人与货物免受天气和灰尘影响，当汽车遇到事故时，车身也能为乘客提供保护。

尽管这些基本结构在过去的 100 年里变化不大，但是这些系统的设计已经发生了很大的变化。新技术已经将 20 世纪初期的低车速、不可靠、不安全改变为很高的车速、无故障行驶数千公里，即使在 1896 年非常富有的人也想象不到的舒适性。

在过去的 40 多年里，社会和政治的压力对汽车的设计产生了深远的影响。1965 年，限制汽车有害气体排放量的法律通过，尽管这对行业并没有立即产生影响，但是汽车制造商们被迫将注意力放在将来，他们需要制造出更加清洁燃烧的发动机。在接下来的几年里，更严格的排放法规出台，并且制造商必须要开发新的排放控制系统。

20 世纪 70 年代，世界性事件继续推动了汽车的发展。1973 年，阿拉伯国家的一次石油禁运导致汽油价格急剧攀升到正常价格的 4 倍，这个事件使大多数美国人认识到汽油的供给和其他不可再生资源是有限的，汽车的购买者希望汽车不仅要环境友好，而且也能消耗更少的燃油。

美国汽车制造厂平均油耗（CAFE）标准制定于 1975 年，这要求汽车制造商要制造更低油耗的汽车。在 CAFE 标准下，每个制造商的不同车型都要测试每加仑汽油能够行驶的里程数，这些汽车燃油消耗的平均值就是汽车制造厂的平均油耗。自从 CAFE 标准制定以来，已经将标准提高了很多倍，不能满足当年指定车型 CAFE 标准的制造商面临着巨额的罚款。

为了设法生产更低油耗的汽车，制造商将庞大的 8 缸发动机换成了 4 缸发动机和其他的小型发动机。发动机的基本系统如化油器和触点式点火系被换为电子燃油喷射系统和电子点火系统。

到 20 世纪 80 年代中期，所有的汽车都配备了若干类型的电子控制系统。这些系统监视发动机的运转，并在极低的燃油消耗和排放下，提供强劲的动力输出。传感器用来检测发动机和一些其他的系统。发动机计算机控制系统控制空气和燃油分配、点火正时、排放系统的工作和大量的其他相关工作。这结果就是产生了清洁燃烧的、低油耗的、动力充沛的发动机。

Chapter 2 Introduction to Engines

In trying to produce more efficient vehicles, American manufacturers put four-cylinder and other small engines into their cars, instead of large eight-cylinder engines. Some basic engine systems like carburetors and ignition breaker points were replaced by electronic fuel injection and electronic ignition systems.

By the mid-1980s, the American automobile had gained a measure of self-control over emissions and fuel efficiency through the use of computers and other electronics. Fuel and air were carefully monitored and consumed in proportions that maximized the performance of the smaller engines while minimizing the production or harmful pollutants.

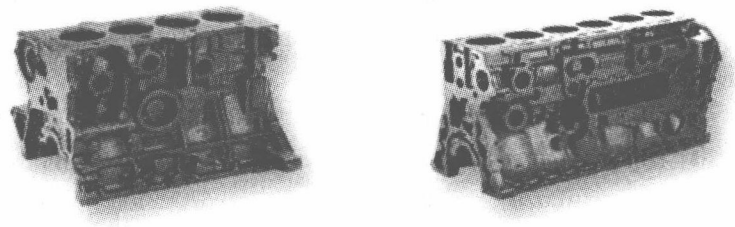
After a prolonged period of economic growth in the 1980s, the demand for good performance was once again a shaping force in automotive design. Electronic sensors are now used to monitor engine functions. Computerized engine control systems control air and fuel delivery, ignition timing, emission systems operation, and a lot of other related operations. The result is a clean-burning, fuel-efficient, and powerful engine. Examples of late-model, high-tech, high-performance engines are the Northstar engine from General Motors and the DOHC 4.6-liter engine from Ford Motor Company. These engines have approximately 260 cubic inches (4.2 liters) and put out about 300 horsepower. They provide enough power to have these cars accelerate at nearly the same rate as (or quicker than) the larger-engined cars of the 1960s. They do this while achieving at least four times the gas mileage. They also do this in cars that corner and stop very well.

In recent years, the way horsepower is measured has changed. As a result, it seems as though today's engines are weaklings compared to those of yesterday; 300 horsepower appears to be nothing compared to the 400+ horsepower that was available in the 1960s. That thinking is wrong: 400 horsepower in the 1960s is worth about 270 horsepower today. It took 400+ cubic inches (6.5 liters) to produce that much power; now we get that much power from much smaller engines. The difference is Gross (old) versus Net (new) Horsepower!

Perhaps the thing that has brought about the greatest change in the automotive industry is the computer. Not only are engine support systems controlled by computers, nearly every other major system on a car has some sort of electronic control.

Today's automotive engines can be classified in several ways depending on the following design features:

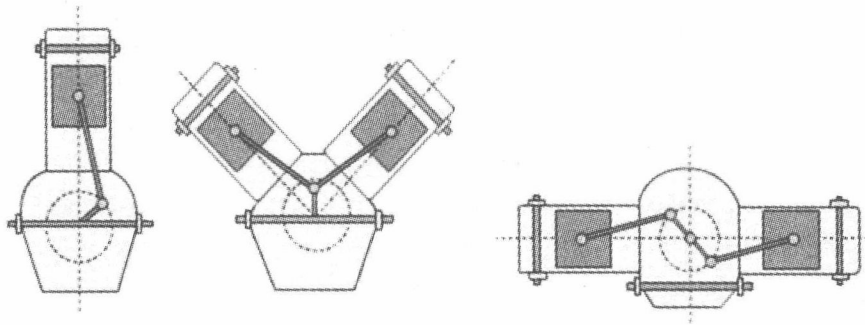
- Operational cycles. Most technicians will generally come in contact with only four-stroke engines. However, a few older cars have used and some cars in the future will use a two-stroke engine.
- Number of cylinders(Figure 2-1). Current engine designs include 3-, 4-, 5-, 6-, 8-, 10-, and 12-cylinder engines.



4-cylinder 6-cylinder

Figure.2-1 Classification by the number of cylinders

- Cylinder arrangement(Figure 2-2). An engine can be flat (opposed), inline, or V-type. Other more complicated designs have also been used.



Inline V-type Flat

Figure.2-2 Cylinder arrangement

- Valve train type. Engine valve trains can be either the overhead camshaft (OHC) type or the camshaft in-block overhead valve (OHV) type. Some engines separate camshafts for the intake and exhaust valves. These are based on the OHC design and are called double overhead camshaft (DOHC) engines. V-type DOHC engines have four camshafts——two on each side.
- Ignition type. There are two types of ignition systems: spark and compression. Gasoline engines use a spark ignition system. In a spark ignition system, the air-fuel mixture is ignited

by an electrical spark. Diesel engines, or compression ignition engines, have no spark plugs. A diesel engine relies on the heat generated as air is compressed to ignite the air-fuel mixture for the power stroke.

- Cooling systems. There are both air-cooled and liquid-cooled engines in use. Nearly all of today's engines have liquid-cooling systems.
- Fuel type. Several types of fuel currently used in automobile engines include gasoline, natural gas, methanol, diesel, and propane. The most commonly used is gasoline although new fuels are being tested.

To find the correct specifications for an engine, a technician must know how to use the vehicle identification number (VIN). The VIN is a code of seventeen numbers and letters stamped on a metal tab that is riveted to the instrument panel close to the windshield. From this number much information about the vehicle can be found.

The adoption of the seventeen-number-and-letter code became mandatory beginning with 1981 vehicles. The standard VIN of the United Sates National Highway Transportation and Safety Administration Department of Transportation is being used by all manufacturers of vehicles, both domestic and foreign.

By referring to the VIN, much information about the vehicle can be determined. An engine serial number is also stamped on blocks. Its location is different for the different manufacturers. The service manual will tell you where to look for it. The engine code is generally found beside the serial number. A typical engine code might be DZ or MO. These letters indicate the horsepower rating of the engine, whether it was built for an automatic or manual transmission, and other important details. The engine code will help you determine the correct specifications for that particular engine.

Casting numbers are often mistaken for serial numbers and engine codes. Manufacturers use a casting number to identify major engine parts on the assemble line. They seldom can be used to identify the type of engine. Normally casting numbers are raised from the metal while ID numbers are usually stamped.

New Words

produce[prə'dju:s]	*vt.* 生产，制造
efficient[i'fiʃənt]	*adj.* 有效率的
vehicle['vi:ikl]	*n.* 交通工具，车辆
manufacturer [ˌmænju'fæktʃərə]	*n.* 制造商，制造厂
cylinder['silində]	*n.* 汽缸