

普通高等教育“十一五”规划教材
21世纪汽车专业课改新教材

汽车专业英语

主编 李 崑



中国地质大学出版社
ZHONGGUO DIZHI DAXUE CHUBANSHE

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主 编 李 崑
副 主 编 卢彩林 胡堂飞
编委会成员 (排名不分先后)
 郝 伟 李百华 徐艳民 林 凤
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前 言

汽车的诞生和发展对人类社会的进步作出了巨大的贡献。近年来我国汽车工业迅猛发展,已经成为国家的支柱产业,并带动着相关产业,为我国的经济的发展作出了突出的贡献。汽车行业的高速发展对汽车专业人才的培养工作提出了更高的要求。

编写人员根据多年教学和培训工作经验,结合汽车类专业的实际需求编写本书。目的是帮助大专院校的学生较系统地学习汽车专业英语知识,熟练掌握汽车领域的专业词汇,能够顺利阅读汽车方面的英文说明书、技术资料和各种文献,并具有一定的专业英语交流能力。

本书比较全面地介绍汽车结构、工作原理以及汽车新技术。全书共 25 个单元,涵盖了汽车发动机和底盘部分的大部分系统或总成,详细介绍了各系统或总成的构成、零部件结构、基本工作过程和相关新技术等方面的内容。

本书既可作为大专院校汽车类专业的专业英语教材,又可作为汽车构造双语教学的辅助教材,也可提供给希望通过英语了解现代汽车的读者。

本书由李崑任主编,参加编写的老师有郝伟、李百华、胡堂飞、徐艳民、林凤、邵建华、李慕清、唐馨、张庆良、卢彩林、袁晶、龙照明。

本书在出版过程中得到了广东机电职业技术学院、烟台工程职业技术学院、广西理工职业技术学院、邯郸职业技术学院、宣城职业技术学院等各院校领导以及老师的支持和帮助,谨在此表示衷心感谢。

本书相关课件请登入:中国职业教育教材网下载(www.zgzyjjcw.com)。为了维护读者利益,打击盗版盗印现象,本书封底配有激光防伪标识,请读者购买时注意查看真伪,支持正版教材。全国维权电话:010-58448886 转维权办。

由于编者水平有限,书中如有不妥之处,敬请批评指正。

编 者
2009. 12.

CONTENTS

CHAPTER 1 AUTOMOTIVE BASICS	(1)
1.1 BODY AND FRAME	(1)
1.2 BASIC ENGINE	(2)
1.3 DRIVE LINES AND RUNNING GEAR	(4)
1.4 SUSPENSION SYSTEM	(4)
New Words	(5)
CHAPTER 2 ENGINE CLASSIFICATIONS	(7)
2.1 CLASSIFIED BY THE LOCATION OF THE COMBUSTION	(7)
2.2 CLASSIFIED BY THE TYPE OF COMBUSTION	(8)
2.3 CLASSIFIED BY THE TYPE OF INTERNAL MOTION	(8)
2.4 OTHER CLASSIFICATION METHODS	(9)
2.5 CLASSIFICATION OF ENGINES USED IN AUTOMOBILES	(10)
New Words	(10)
CHAPTER 3 BASIC ENGINE TERMINOLOGY	(11)
3.1 CYLINDER BLOCK	(11)
3.2 CYLINDERS	(11)
3.3 PISTONS	(11)
3.4 CONNECTING ROD AND CRANKSHAFT	(12)
3.5 CYLINDER HEAD	(12)
3.6 COMBUSTION CHAMBER	(12)
3.7 VALVES	(13)
3.8 VALVE AND CYLINDER HEAD ARRANGEMENTS	(14)
3.9 CAMSHAFT	(14)
3.10 FLYWHEEL	(15)
3.11 INTAKE AND EXHAUST MANIFOLDS	(15)
3.12 CARBURETOR	(16)
3.13 FUEL INJECTORS	(16)
New Words	(16)
CHAPTER 4 ENGINE DESIGN AND SYSTEMS	(18)
4.1 FUEL SYSTEM	(18)
4.2 IGNITION SYSTEM	(19)



4.3 STARTING AND CHARGING SYSTEM	(19)
4.4 LUBRICATION SYSTEM	(20)
4.5 COOLING SYSTEM	(21)
4.6 AIR INTAKE AND EXHAUST SYSTEMS	(21)
4.7 POLLUTION CONTROL SYSTEM	(22)
New Words	(23)
CHAPTER 5 GASOLINE ENGINE PRINCIPLES	(25)
5.1 COMBUSTION REQUIREMENTS	(25)
5.2 FOUR-STROKE ENGINE DESIGN	(28)
New Words	(32)
CHAPTER 6 OTHER POWER SOURCES	(33)
6.1 DIESEL ENGINE PRINCIPLES	(33)
6.2 TWO-STROKE ENGINE DESIGN	(36)
6.3 ROTARY DESIGN (WANKEL)	(38)
6.4 HYBRID POWER SOURCE	(38)
6.5 FUEL CELLS	(41)
New Words	(43)
CHAPTER 7 BASIC ENGINE CONSTRUCTION	(45)
7.1 CYLINDER BLOCK	(45)
7.2 CRANKSHAFT ASSEMBLY	(46)
7.3 PISTON AND ROD ASSEMBLY	(51)
New Words	(58)
CHAPTER 8 CYLINDER HEADS AND VALVES	(60)
8.1 CYLINDER HEAD	(60)
8.2 VALVE ASSEMBLY	(62)
8.3 CAMSHAFT ASSEMBLY	(64)
8.4 VALVE DRIVE MECHANISM	(65)
New Words	(68)
CHAPTER 9 LUBRICATION SYSTEM	(70)
9.1 OIL FLOW	(70)
9.2 OIL PAN	(71)
9.3 OIL PUMPS	(71)
9.4 OIL PRESSURE REGULATING VALVE	(72)
9.5 OIL FILTERS	(73)
9.6 OIL COOLERS	(74)
9.7 OIL SENSORS AND GAUGES	(74)
New Words	(75)
CHAPTER 10 COOLING SYSTEM	(76)



10.1 TYPES OF COOLING SYSTEMS	(76)
10.2 COOLING SYSTEM PARTS	(77)
New Words	(83)
CHAPTER 11 FUEL DELIVERY SYSTEMS	(84)
11.1 TOTAL FUEL FLOW	(84)
11.2 FUEL TANK	(86)
11.3 FUEL PUMPS	(87)
11.4 FUEL FILTERS	(90)
11.5 ELECTRONIC FEEDBACK CARBURETORS	(90)
11.6 GASOLINE FUEL INJECTION SYSTEMS	(91)
New Words	(93)
CHAPTER 12 AIR INTAKE AND EXHAUST SYSTEMS	(94)
12.1 AIR INTAKE SYSTEMS	(94)
12.2 EXHAUST SYSTEMS	(95)
12.3 TURBOCHARGERS AND SUPERCHARGING SYSTEMS	(96)
New Words	(97)
CHAPTER 13 IGNITION SYSTEMS	(98)
13.1 CONVENTIONAL IGNITION SYSTEM	(98)
13.2 ELECTRONIC AND COMPUTERIZED IGNITION SYSTEMS	(100)
New Words	(105)
CHAPTER 14 CHARGING SYSTEMS AND STARTING SYSTEMS	(107)
14.1 AUTOMOTIVE BATTERIES	(107)
14.2 CHARGING SYSTEMS	(107)
14.3 STARTING SYSTEMS	(108)
New Words	(111)
CHAPTER 15 EMISSION AND CONTROL SYSTEMS	(112)
15.1 TYPES OF POLLUTANTS	(112)
15.2 POSITIVE CRANKCASE VENTILATION (PCV) SYSTEM	(113)
15.3 EVAPORATIVE EMISSION CONTROLS	(113)
15.4 HEATED AIR INTAKE	(114)
15.5 EXHAUST GAS RECIRCULATION (EGR)	(114)
15.6 CATALYTIC CONVERTERS	(115)
New Words	(116)
CHAPTER 16 COMPUTERIZED ENGINE CONTROL SYSTEMS	(118)
16.1 ENGINE COMPUTER SYSTEM	(118)
16.2 INPUT COMPONENTS (SENSORS)	(119)
16.3 OUTPUT COMPONENTS (ACTUATORS)	(126)
New Words	(127)



CHAPTER 17 AUTOMOTIVE CLUTCHES	(128)
17.1 PRESSURE PLATE ASSEMBLY	(128)
17.2 FRICTION DISC	(129)
17.3 MULTIPLE DISC CLUTCHES	(129)
17.4 CLUTCH RELEASE BEARING (THROW-OUT BEARING)	(130)
17.5 CLUTCH LINKAGE	(130)
17.6 FLYWHEEL DESIGN	(132)
New Words	(133)
CHAPTER 18 MANUAL TRANSMISSIONS	(134)
18.1 MAIN GEARS AND SHAFTS	(134)
18.2 TYPES OF TRANSMISSIONS	(135)
18.3 SYNCHRONIZERS	(136)
18.4 TRANSMISSION CASE AND LUBRICATION	(136)
18.5 SHIFTING FORKS	(137)
18.6 SHIFT MECHANISMS	(139)
New Words	(139)
CHAPTER 19 AUTOMATIC TRANSMISSIONS	(140)
19.1 MAJOR PARTS OF THE AUTOMATIC TRANSMISSION	(140)
19.2 TORQUE CONVERTER	(140)
19.3 PLANETARY GEAR SYSTEM	(143)
19.4 CLUTCHES, BANDS, AND SERVO PISTONS	(145)
19.5 HYDRAULIC SYSTEM	(148)
19.6 TRANSMISSION CONTROLS	(150)
19.7 ELECTRONIC AND COMPUTER-CONTROLLED TRANSMISSIONS	(150)
19.8 CVT	(152)
New Words	(153)
CHAPTER 20 DRIVE LINES, DIFFERENTIALS, AND AXLES	(154)
20.1 REAR-WHEEL DRIVE SHAFTS AND OPERATION	(154)
20.2 FRONT-WHEEL DRIVE SYSTEMS	(157)
20.3 DIFFERENTIALS AND AXLES	(159)
New Words	(161)
CHAPTER 21 FOUR-WHEEL/ALL-WHEEL DRIVE SYSTEMS	(162)
21.1 PRINCIPLES OF FOUR-WHEEL/ALL-WHEEL DRIVE SYSTEMS	(162)
21.2 FOUR-WHEEL DRIVE COMPONENTS	(164)
New Words	(165)
CHAPTER 22 BRAKING SYSTEMS	(166)
22.1 COMMON BRAKING SYSTEM PRINCIPLES	(166)
22.2 COMMON BRAKING SYSTEM COMPONENTS AND OPERATION	(168)



22.3 POWER BRAKES	(171)
22.4 ANTILOCK BRAKE SYSTEMS (ABS)	(173)
New Words	(178)
CHAPTER 23 SUSPENSION SYSTEMS	(179)
23.1 FRONT SUSPENSION	(179)
23.2 REAR SUSPENSION	(183)
23.3 SHOCK ABSORBERS	(185)
23.4 COMPUTER-CONTROLLED SUSPENSION SYSTEMS	(190)
23.5 MACPHERSON STRUT SUSPENSION	(192)
New Words	(193)
CHAPTER 24 STEERING SYSTEMS	(194)
24.1 STEERING SYSTEM PARTS	(194)
24.2 FRONT END GEOMETRY AND ALIGNMENT	(197)
24.3 POWER STEERING	(200)
New Words	(202)
CHAPTER 25 TIRES AND WHEELS	(203)
25.1 TIRES	(203)
25.2 WHEELS AND RIMS	(205)
New Words	(207)
REFERENCE	(208)

CHAPTER 1 AUTOMOTIVE BASICS

The automobile has become one of the most important technological innovations in the world. Our society is still benefiting from a revolution that began over 100 years ago, called the automotive revolution. The mass production of automobiles affected history in the twentieth century more than any other invention.

People today do not have to be told how important the automobile is to their lives. The automobile is used to get people to work, deliver food and other commodities to stores, and to move people, services, and products throughout the country.

Each working day more than 100 000 automobiles roll off assembly lines around the world. Now the world's largest manufacturing industry, automotive manufacturing has strongly influenced the economic and social evolution of modern technological societies. For example, the following industries have grown because of the development of the automobile:

1. Petroleum refining
2. Road construction and maintenance
3. Motor vehicle manufacturing
4. Parts manufacturing and distribution
5. Automobile sales and servicing
6. Passenger transportation
7. Insurance companies
8. Support companies such as plastics, steel, electronics, rubber, glass, and fabric manufacturers, and many others.

Today's average car contains more than 15 000 separate, individual parts that must work together. In order to study the automobile, it is important to review the basic parts of the vehicle (Figure 1 - 1). The vehicle can be subdivided into several major categories: the body and frame, the engine or power source, the drive lines and running gear, and the suspension system.

1.1 BODY AND FRAME

The body and frame section of the automobile is the basic foundation of the vehicle. All other components and systems are attached to the body and frame. The frame supports the car body, engine, powertrain and wheels, and the drive lines and running gear. Figure 1 - 2 shows the body and frame of a typical vehicle. There are several types of body and frame configurations. The separate body and frame construction has been used for the longest time. This type is illustrated in Figure 1 - 2(A). Another type of construction is called the unitized body. This type of vehicle is designed with the frame and body in one unit as shown in Figure 1 - 2(B). The unitized body is used in many ve-

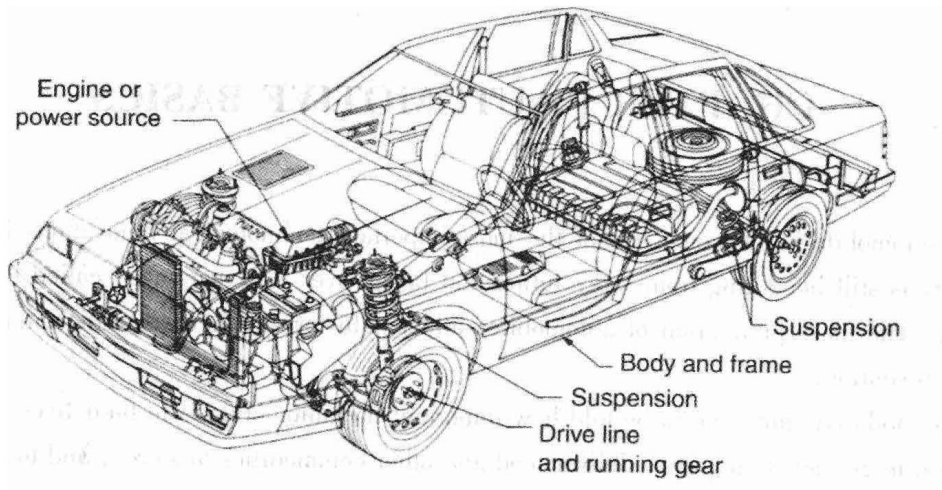


Figure 1 - 1 The basic parts of the automobile

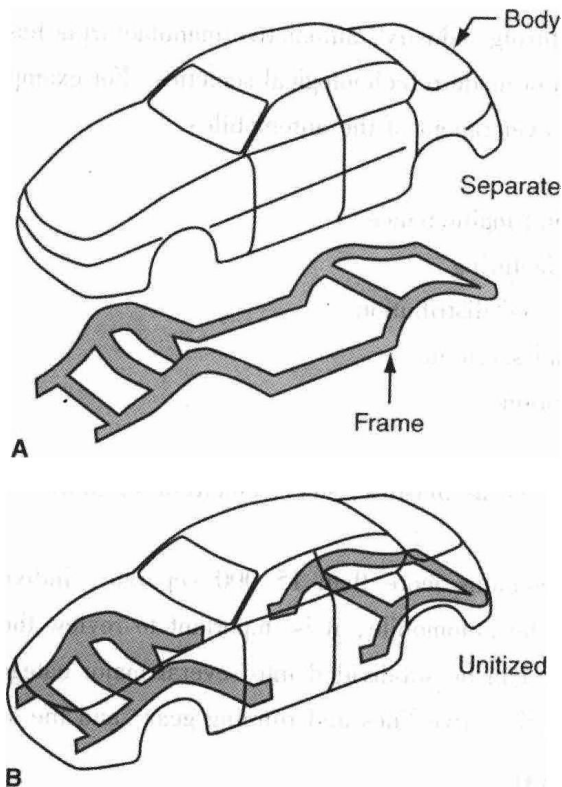


Figure 1 - 2 Two common types of body and frame configurations used in today's automobiles today.

1.2 BASIC ENGINE

The engine is used to power the vehicle. The engine is also called the power source or motor. The word motor is defined as that which imparts motion. So a motor can be any device that produces power. However, the power source in the automobile is usually referred to as the engine.



Most automobiles use the gasoline engine as a power source. However, other power sources are being tested and introduced every year. For example, the diesel engine is also being used as a power source in some vehicles today. In addition, some automotive engineers predict the use of gas turbines, electric batteries, and fuel cells for future power sources in the automobile.

Today, another power source called the hybrid power system, is being studied and used in some vehicles. Several manufacturers are designing and selling hybrid vehicles.

Most automobiles use the reciprocating piston or Otto cycle engine (Figure 1 – 3). However, certain car manufacturers also offer rotary design engines as an optional power source. Figure 1 – 4 shows the rotary engine used on certain vehicles.

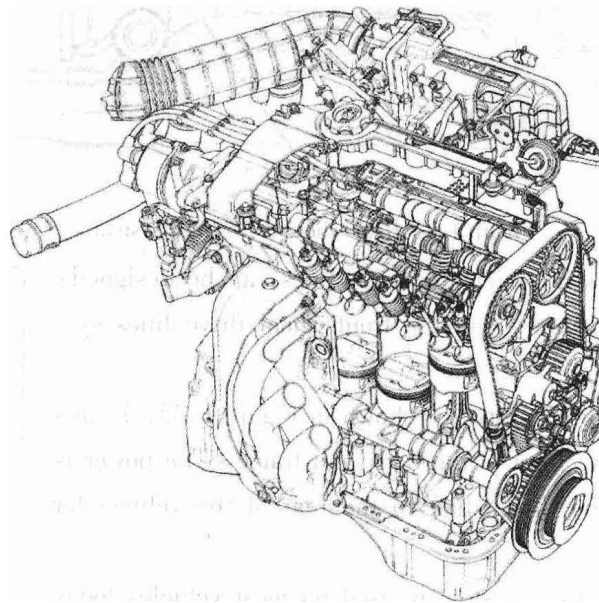


Figure 1 – 3 Reciprocating piston engines

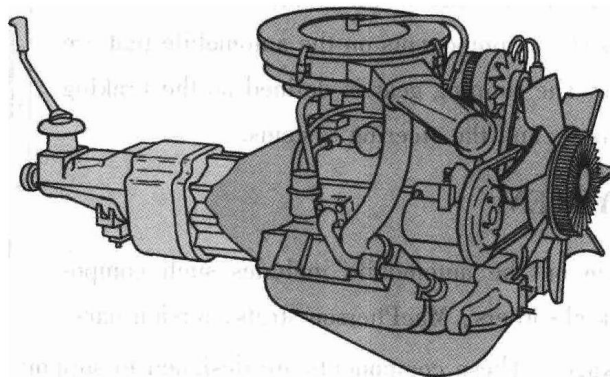


Figure 1 – 4 Rotary engine

The engine is typically located in the front of the vehicle. But some vehicles have rear engines. In addition, certain manufacturers have developed engines that are placed in the middle of the body and frame.



1.3 DRIVE LINES AND RUNNING GEAR

The drive lines are those components that transmit the power from the engine to the wheels. This action propels the vehicle in a forward or reverse direction. As shown in Figure 1 - 5, the drive lines include components such as the transmission, drive shafts, differential, and rear axles.

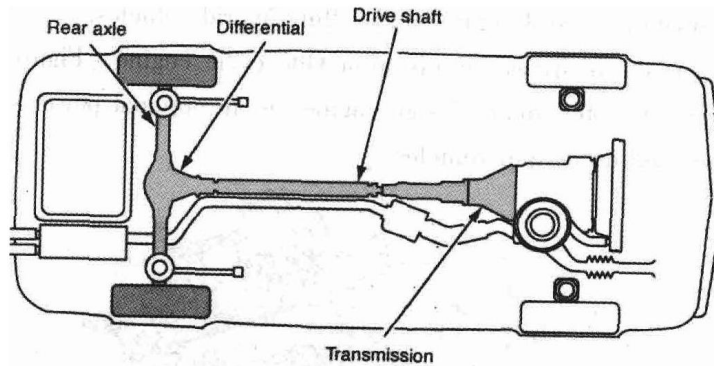


Figure 1 - 5 Rear-wheel drive lines system

There are two methods in which the drive lines can be designed: the rear-wheel drive lines system and the front-wheel drive lines system.

The rear-wheel drive lines system is shown in Figure 1 - 5. In this system, the engine is in the front of the body and frame. The power is then transmitted through the drive shaft to the rear of the vehicle for propulsion.

The front-wheel drive lines system is used on most vehicles today (Figure 1 - 6). In this system the engine is in the front of the vehicle. The drive lines and running gear are also in the front.

The running gear consists of components on the automobile that are used to control the vehicle. The running gear is defined as the braking systems, the wheels and tires, and the steering systems.

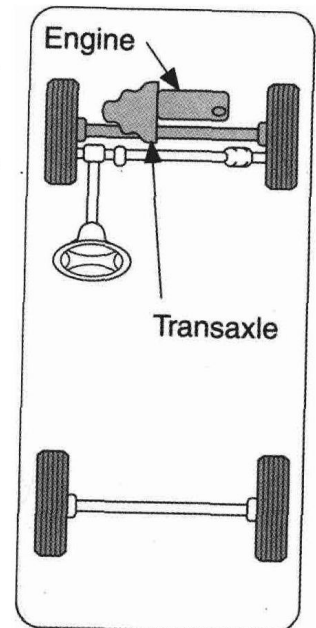


Figure 1 - 6 Front-wheel drive lines system

1.4 SUSPENSION SYSTEM

The suspension system on the automobile includes such components as the springs, shock absorbers, MacPherson struts, torsion bars, axles, and connecting linkages. These components are designed to support the body and frame, the engine, and the drive lines on the road. Without these systems, the comfort and ease of driving would be reduced. Figure 1 - 7 illustrates some of the components that are used on a typical rear-suspension system with a differential used for rear-wheel drive.

The springs and shock absorbers are used to support the axles of the vehicle. Shock absorbers are used to slow the upward and downward movement of the vehicle. This action occurs when the car

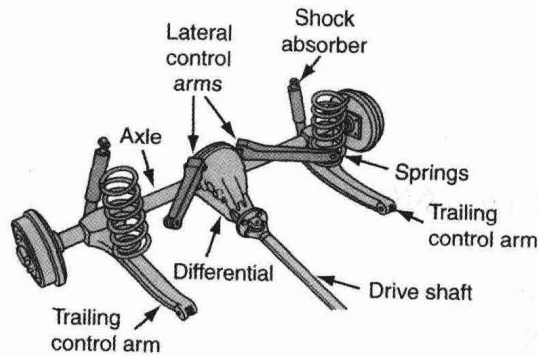


Figure 1 - 7 Suspension components

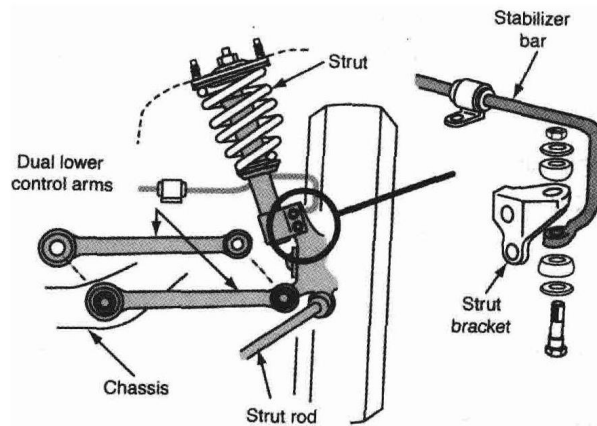


Figure 1 - 8 Rear-suspension system for a front-wheel-drive vehicle

goes over a rough road. The axles and control arms are those components that connect the springs, axle, and shock absorbers to the vehicle frame and to the wheels.

Not all rear-suspension systems are the same. Figure 1 - 8 shows a rear-suspension system for a front-wheel-drive vehicle. It uses strut rods and stabilizer bars as well.

New Words

automobile 汽车(美)
 assembly line 装配线
 petroleum refining 石油加工
 body and frame 车身与车架
 engine 发动机、引擎
 drive line 传动系统
 running gear 控制装置
 suspension system 悬架系统
 unitized body 整体式车身
 gasoline engine 汽油机



Special English for automobile

diesel engine 柴油机
gas turbine 燃气轮机
battery 电池、电池组
fuel cell 燃料电池
hybrid power system 混合动力系统
piston 活塞
rotary engine 转子发动机
vehicle 交通工具、车辆
transmission 变速箱、变速器
drive shaft 传动轴
differential 差速器
rear axle 后轴、后桥
rear-wheel drive 后轮驱动
front-wheel drive 前轮驱动
braking system 制动系统
wheel 车轮
tire 轮胎
steering system 转向系统
spring 弹簧
shock absorber 减震器
MacPherson strut 麦弗逊式悬架
torsion bar 扭力杆
strut rod 支撑杆、推杆
stabilizer bar 横向稳定杆

CHAPTER 2 ENGINE CLASSIFICATIONS

An automobile engine is designed to convert the chemical energy in fuel into mechanical energy to move a vehicle forward or backward.

Engines can be classified several ways. These include (1) by the location of the combustion, (2) by the type of combustion, and (3) by the type of internal motion.

2.1 CLASSIFIED BY THE LOCATION OF THE COMBUSTION

2.1.1 INTERNAL COMBUSTION ENGINES

In an internal combustion engine (ICE), combustion occurs within the engine. The combustion process occurs directly on the parts that must be moved to produce mechanical energy. The fuel is burned within the engine (Figure 2 - 1). A gasoline engine is an internal combustion engine.

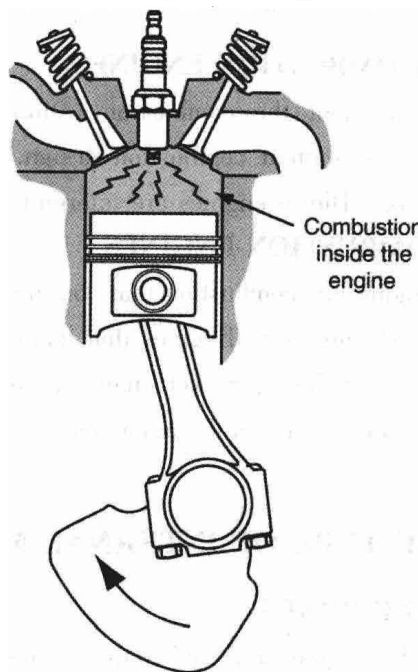


Figure 2 - 1 Internal combustion engine

2.1.2 EXTERNAL COMBUSTION ENGINES

In an external combustion engine, the combustion is removed from the parts that must be moved (Figure 2 - 2). For example, the boiler in a steam engine is external. It is not touching the piston. Actually, the thermal energy in an external combustion engine heats another fluid. In this case, it is water. Water, converted to steam, pushes against the piston.

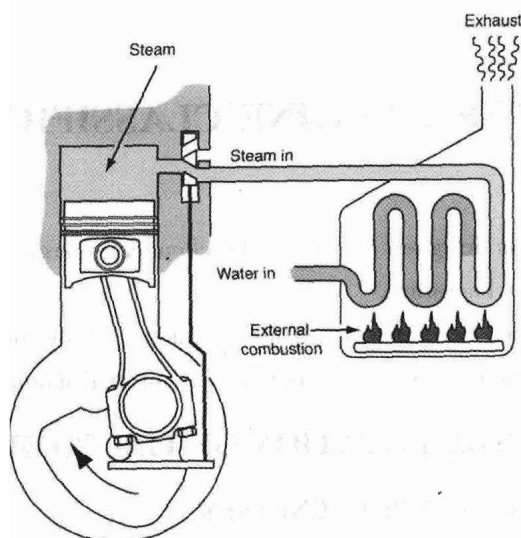


Figure 2 - 2 External combustion engine

2.2 CLASSIFIED BY THE TYPE OF COMBUSTION

2.2.1 INTERMITTENT COMBUSTION ENGINES

Intermittent combustion means that the combustion within an engine starts and stops. A standard gasoline engine has an intermittent combustion design. The combustion starts and stops many times during engine operation. Diesel engines are intermittent combustion engines as well.

2.2.2 CONTINUOUS COMBUSTION ENGINES

A continuous combustion engine has combustion that continues all of the time. The combustion does not stop. It keeps burning continuously. Engines that use continuous combustion include turbine engines (such as a helicopter engine), rocket engines, and jet (or reaction) engines. Research has shown that turbines could be used in the automobile, but they are very costly for this purpose.

2.3 CLASSIFIED BY THE TYPE OF INTERNAL MOTION

2.3.1 RECIPROCATING ENGINES

In a reciprocating engine, the motion produced from the energy within the fuel moves parts up and down. The motion reciprocates—moves back and forth or up and down. Gasoline and diesel engines are reciprocating engines. In this case, the power resulting from the burning of an air and fuel mixture starts the piston moving. The piston starts, then stops, then starts, then stops, and so on. In this engine, the reciprocating motion must then be changed to rotary motion. A crankshaft is designed to change this motion. Figure 2 - 3 shows the up-and-down motion of the piston in the cylinder.

2.3.2 ROTARY ENGINES

In a rotary engine, the parts that are moving rotate continuously. For example, a turbine and a