



交通职业教育教学指导委员会推荐教材
高等职业院校汽车运用技术专业教学用书



高等职业教育汽车运用技术专业规划教材

Qiche Shiyong Yingyu

汽车实用英语

(下册)

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为贯彻《国务院关于大力推进职业教育改革与发展的决定》以及教育部等六部委《关于实施职业院校制造业和现代服务业技能型紧缺人才培养培训工程的通知》精神,全面实施《2003—2007 年教育振兴行动计划》中提出的“职业教育与培训创新工程”,积极推进课程改革和教材建设,为职业教育教学和培训提供更加丰富、多样和实用的教材,更好地满足职业教育改革与发展的需要,交通职业教育教学指导委员会汽车运用与维修学科委员会组织全国交通职业技术学院的专业教师,按照教育部颁布的《汽车运用与维修专业领域技能型紧缺人才培养培训指导方案》的要求,紧密结合目前汽车维修行业实际需求,编写了高等职业教育规划教材,供高等职业院校汽车运用技术专业教学使用。

本系列教材符合国家对技能型紧缺人才培养培训工作的要求,注重以就业为导向,以能力为本位,面向市场、面向社会,为经济结构调整和科技进步服务的原则,体现了职业教育的特色,满足了汽车运用技术领域高素质专业实用人才培养的需要。

本系列教材在组织编写过程中,认真总结了全国交通职业院校多年来的专业教学经验,注意吸收发达国家先进的职教理念和方法,形成了以下特色:

1. 专业培养目标设计基本指导思想是以行业关键技术操作岗位和技术管理岗位的岗位能力要求为核心,确定专业知识和能力培养目标,对实际现场操作能力要求达到中级技术工人水平,在系统专业知识方面要求达到高级技师水平,并为毕业生在其职业生涯中能顺利进入汽车运用工程师行业奠定良好发展基础;
2. 全套教材以《汽车文化》、《汽车专业英语》、《汽车电工与电子基础》、《汽车机械基础》、《汽车发动机构造与维修》、《汽车底盘构造与维修》、《汽车电气设备构造与维修》、《汽车维修质量检验》八门课程搭建专业基本能力平台,以若干专门化适应各地各校的实际需求;
3. 打破了教材传统的章节体例,以专项能力培养为单元确定知识目标和能力目标,使培养过程实现“知行合一”;

4. 在内容的选择上,注重汽车后市场职业岗位对人才的知识、能力要求,力求与相应的职业资格标准衔接,并较多地反映了新知识、新技术、新工艺、新方法、新材料的内容;

5. 本套教材将力图形成开放体系,一方面除本次推出清单所列教材之外,还将根据市场实际需求,陆续推出不同车系专门化教材;另一方面,还将随行业实际变化及时更新或改编部分专业教材。

《汽车实用英语》(下册)是汽车运用与维修专业领域技能型紧缺人才培养培训课程之一,本书在编排中做到每单元前有教学目标,单元后有单词和词汇、句子注释和练习题,便于教师教学和学生自学,突出重点、难点,方便学生复习和巩固汽车专业英语知识。本书有大量的插图,而且全书内容主要取自外文原著,较好地反映专业英语自身特色。其语法、句子结构在尊重原著的情况下作了一些修改,以符合高等职业技术教育的要求。全书既介绍了汽车传统知识,也介绍了汽车新技术新结构,以及国外的新设备、新仪器的使用。涉及面广,大大拓宽了汽车专业英语的知识面,增加了学习汽车专业英语的兴趣。对从事外文资料阅读和翻译工作起到抛砖引玉的作用。本书附有参考翻译,既增强了本书的自学性、阅读性,也降低了教学难度,促进了高等职业技术教育的开展。

参加本书编写工作的有:浙江交通职业技术学院马林才,刘颖,陈蕾,吕凤军,吴涛。马林才负责编写单元一、二、四、六、七、八、九、十、二十一以及中文翻译,刘颖负责编写单元三、五、十二以及中文翻译和全书的语法分析,陈蕾负责编写单元十一、十三、十四以及中文翻译,吕凤军负责编写单元十五、十六、二十以及中文翻译,吴涛负责编写单元十七、十八、十九以及中文翻译。全书由浙江交通职业技术学院马林才主编,四川交通职业技术学院陈斌主审。

限于编者经历和水平,教材内容难以覆盖全国各地的实际情况,希望各教学单位在积极选用和推广本系列教材的同时,注重总结经验,及时提出修改意见和建议,以便再版修订时改正。

交通职业教育教学指导委员会
汽车运用与维修学科委员会
2005 年 5 月



Unit 1 Introduction to the Four-stroke Engine	
单元一 四冲程发动机介绍	1
Reading Material	
Two-stroke Engine Operation	
二冲程发动机工作过程	8
Unit 2 Engine Construction	
单元二 发动机构造	11
Reading Material	
Engine Gaskets and Engine Radiator	
发动机衬垫和发动机散热器	18
Unit 3 Engine Fuel System	
单元三 发动机燃油供给系	21
Reading Material	
Engine Measurement and Performance Characteristics	
发动机计量和工作特性	28
Unit 4 Engine Cooling System and Lubricating System	
单元四 发动机冷却系和润滑系	33
Reading Material	
Air Conditioning System	
空调系统	40
Unit 5 Engine Ignition System and Starting System	
单元五 发动机点火系和起动系	43
Reading Material	
Light, Wires and Seat Adjuster	
车灯、导线和座椅调节器	50
Unit 6 Engine Troubleshooting	
单元六 发动机故障诊断及维修	53

Reading Material	
Engine Service and Maintenance	
发动机维修与保养	58
Unit 7 Fuel Injection Manual	
单元七 燃油喷射系统维修手册	62
Reading Material	
Lubrication-system Service and Maintenance	
润滑系维修和保养	68
Unit 8 Introduction to Chassis	
单元八 底盘介绍	72
Reading Material	
Body Construction	
车身结构	80
Unit 9 Automobile Testing Equipment	
单元九 汽车检测设备	83
Reading Material	
Engine Noise Diagnosis	
发动机异响的诊断	89
Unit 10 Introduction to the Emission Control Systems	
单元十 汽车排放控制系统介绍	93
Reading Material	
Present Engine Technology	
当今发动机技术	100
Unit 11 Automobile Sensors	
单元十一 汽车传感器	105
Reading Material	
Kinds of Cars	

汽车种类	112
Unit 12 Introduction to the Automatic Transmissions	
单元十二 自动变速器介绍	115
Reading Material	
Manual transmission	
手动变速器	121
Unit 13 Anti-lock Brake System	
单元十三 防抱死制动系统	125
Reading Material	
ABS and Wheel-slip	
ABS 和车轮滑移	131
Unit 14 ITS and GPS	
单元十四 智能运输系统和全球定位系统	134
Reading Material	
The Future Car and Automated Driving	
未来汽车和自动驾驶	140
Unit 15 OTC Monitor Tester	
单元十五 OTC 故障诊断仪	142
Unit 16 SST Operating Instructions	
单元十六 传感器模拟仪操作指南	151
Unit 17 Engine Analyzer	
单元十七 发动机分析仪	158
Unit 18 The Wheel Computer-Aligner	
单元十八 计算机车轮定位仪	166
Unit 19 Toyota Computer-Controlled System	
单元十九 丰田汽车计算机控制系统	174

Unit 20 ES 300 Body Electrical Simulator Instructor Information

单元二十 凌志 300 车身电器模拟板介绍 183

Unit 21 2ZZ-GE Engine Simulator

单元二十一 2ZZ-GE 发动机模拟仪 192

参考译文 202

参考文献 271



Unit 1 Introduction to the Four-stroke Engine

单元一 四冲程发动机介绍

学习目标



知识目标

1. 掌握与发动机四冲程的工作过程、发动机分类相关的专业术语、词汇；
2. 掌握发动机常见术语的英语表达方法。



技能目标

1. 能对关于发动机四个冲程的资料进行中英互译；
2. 能进行相关内容的阅读和翻译；
3. 能在汽车实物上标识出英语单词或词汇。

Internal Combustion Engine

The engine is a self-contained power unit which converts the heat energy of fuel into mechanical energy for moving the vehicle.^[1] Because fuel is burned within the engine, it is known as an internal combustion engine. In the internal combustion engine, air/fuel mixture is introduced into a closed cylinder where it is compressed and then ignited. The burning of the fuel causes a rapid rise in cylinder pressure which is converted to useful mechanical energy by the piston and crankshaft. The most common engine is the four-stroke piston engine. These four strokes are intake stroke, compression stroke, power stroke and exhaust stroke.

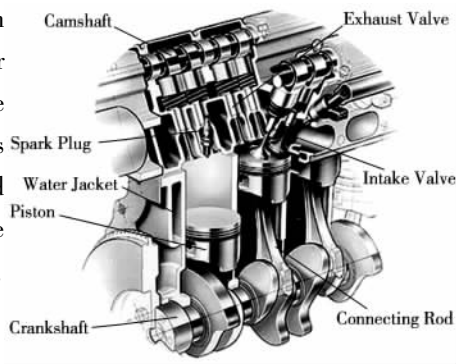


Fig. 1-1 Engine

Intake Stroke

The intake stroke of a four-stroke engine begins with the piston at top dead center (TDC). The starter causes the crankshaft to rotate in a clockwise direction. The crankshaft, through the connecting rod, forces the piston to move downward. This downward movement of the piston creates a vacuum, a difference in pressure, in the space above the piston. The engine manufacturer times the intake valve action so that it opens automatically at or slightly before the piston starts down. Therefore, a mixture of gasoline and air, pushed by the atmospheric pressure outside the engine, rushes through the intake manifold and into the engine cylinder. At the same time, the exhaust valve remains closed during this downward stroke of the piston. This valve closure prevents the entering air/fuel charge from



escaping through the exhaust port. After the piston reaches the bottom of its first stroke, the cylinder is practically full of an air/fuel charge. The drawing of an air/fuel charge into the cylinder in this manner, during the downward movement of the piston, constitutes the intake stroke of the piston. [2]

Compression Stroke

After the piston reaches bottom dead center (BDC), it moves upward again as the starter continues to turn the crankshaft in a clockwise direction. As the piston is beginning to move upward, the intake valve closes, and the exhaust valve remains closed. Since both valves are closed, the piston compresses the air/fuel mixture in the small space between the top of the piston and the cylinder head. As the piston reaches TDC again during its upward travel, the compression stroke of the piston is over. The air/fuel charge is now under compression so that it will produce a great deal of power when the spark plug ignites it.

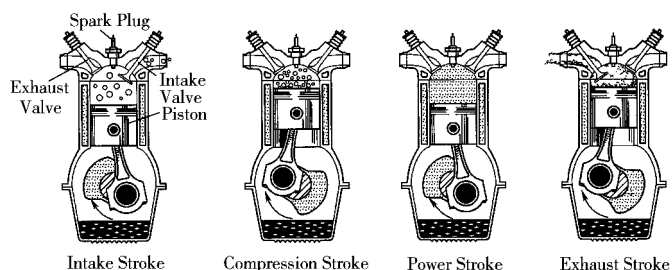


Fig. 1-2 Engine Four-stroke

Power Stroke

Just as or slightly before the piston reaches TDC on the compression stroke with the air/fuel mixture fully compressed, a timed electrical spark appears at the spark plug. This spark ignites the compressed air/fuel mixture. The burning mixture begins to expand; the pressure in the combustion chamber above the piston immediately increases. This results in a high pressure applied to the top of the piston. Now, both valves remain closed during the power stroke. This assures that the total force of the expanding gas applies itself to the head of the piston. This tremendous force pushes the piston downward on the power stroke, causing the connecting rod to rotate the crankshaft. [3] In other words, the force resulting from the expansion of the burning air/fuel mixture is turning the crankshaft.

Exhaust Stroke

Near the end of the downward movement of the piston on the power stroke, the camshaft opens the exhaust valve, but the intake valve remains closed. Although much of the gas pressure has expended itself driving the piston downward, some pressure still remains when the exhaust valve opens. This remaining pressurized gas flows comparatively freely from the cylinder through the passage (port) opened by the exhaust valve. [4] Then, as the piston again moves up in the cylinder, it drives any remaining gases out of the cylinder past the open exhaust valve. In other words, while the exhaust valve is open, the upward movement of the piston provides an effective method for



discharging all waste gases from the engine cylinder and combustion chamber. As the crankshaft nears the end of its second complete revolution, the piston again approaches the TDC position. At this point the exhaust valve is closing and the intake valve starts to open. Both valves are open together for a short period of time in order to accelerate the fresh air/fuel charge to flow into the cylinder. As the piston travels through the TDC position and starts downward again in the cylinder, a new operating cycle begins. The four strokes are continuously repeated in every cylinder as long as the engine remains running.

Flywheel

The engine cycle has only one power stroke where the piston is actually driving the crankshaft. During the other three strokes, the rotating crankshaft is moving the piston up or down in its cylinder. Thus, during the power stroke, the crankshaft tends to speed up; during the other three strokes, it tends to slow down. To keep the crankshaft turning smoothly between two power strokes, the flywheel is attached to the end of the crankshaft.^[5] This wheel resists any effort to change its speed of rotation. When the crankshaft tends to speed up or slow down, flywheel inertia resists it. In fact, the flywheel absorbs power from the crankshaft during the power stroke and returns it to the crankshaft during the remaining three piston strokes of the engine cycle.

Multiple-Cylinder Engines

The single-cylinder engine just described as above provides only one power stroke during every two crankshaft revolutions or delivers power only one-fourth of the time. To provide a more even and continuous flow of power, automobiles have engines with four, six, or eight cylinders. These engines have power strokes arranged so as to follow one another closely or overlap one another.

Engine Classification

For identification purposes, manufacturers classify automobile engines by their cylinder arrangement, valve arrangement, and type of system used to cool the engine.^[6]

Engine manufacturers basically use three distinct ways to arrange the cylinders in an engine: in-line, V-shape, or opposed. In-line engines, for example, have a single row of cylinders, one behind the other. Most four- and six-cylinder engines have this design. A V-type engine has two rows or banks of cylinders. Also, the cylinders, at their centerlines, usually have an inclination of 60 or 90 degrees. Horizontally opposed engines have two banks of cylinders 180 degrees apart.

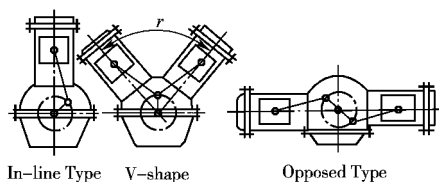


Fig. 1-3 Engine Arrangement

Automobile engines have their valves arranged in one of three ways. In an L-head engine, the valves are in the block, sitting side by side, adjacent to the cylinder. This engine design was at one time very common, but because of its limited compression ratio, the usage now has been confined. The F-type engine has one valve in the cylinder head and one in the engine block. Modern automotive engines utilize the third type of valve arrangement, with both valves in the cylinder head.

Manufacturers also classify engines as being either air- or water-cooled. In these air-cooled



engines, the cylinders are cooled by the air flowing around. A liquid-cooled engine uses a liquid coolant as the medium to remove heat from the engine. With this system, the engine has the water jackets in the block and head, which surround the cylinders and combustion chambers and through which coolant circulates freely.^[7] This coolant enters the engine from the bottom of the radiator and circulates throughout the engine, where it absorbs heat. Then it exits from the upper water jackets and pours into the upper portion of the radiator. As the coolant passes through the radiator, it picks up the heat contained in the coolant and passes this heat to the air flowing around the radiator passages or tubes. Thus, the coolant leaving the lower tank is cool ready to flow through the engine again.

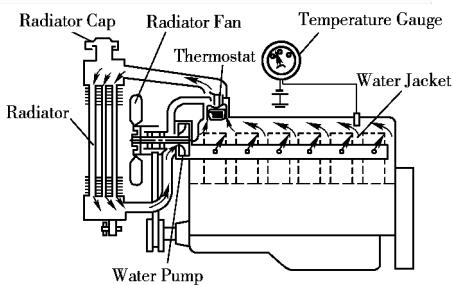


Fig. 1-4 Water-cooled Engine

New Words

- | | |
|-----------------------------------|---------------------------|
| 1. introduction [intrə'dʌktʃ(ə)n] | n. 介绍, 传入, 初步, 导言, 绪论, 入门 |
| 2. unit ['ju:nit] | n. 元件, 部件, 零件, 装置 |
| 3. vehicle ['wi:ik(ə)l] | n. 交通工具, 车辆 |
| 4. engine ['endʒin] | n. 发动机 |
| 5. cylinder ['silində(r)] | n. 气缸, 圆筒, 圆柱体 |
| 6. combustion [kəm'bʌstʃ(ə)n] | n. 燃烧 |
| 7. burn [bɜ:n] | vi. 燃烧 vt. 燃烧 |
| 8. convert [kən'veɪt] | vt. 使转变, 转换 |
| 9. piston ['pist(ə)n] | n. 活塞 |
| 10. crankshaft ['kræŋkʃɑ:ft] | n. 曲轴 |
| 11. ignition [ig'niʃ(ə)n] | n. 点火, 点燃 |
| 12. intake ['inteik] | n. 入口, 进口 |
| 13. starter ['stɑ:tə(r)] | n. 起动机 |
| 14. clockwise ['klɒkwaiz] | adj. 顺时针方向的 adv. 顺时针方向地 |
| 15. movement ['mu:vmənt] | n. 运动, 动作, 运转 |
| 16. vacuum ['vækjuəm] | n. 真空 adj. 真空的 |
| 17. gasoline ['gæsəli:n] | n. 汽油 |
| 18. manifold ['mænifəuld] | n. 进、排气歧管 |
| 19. stroke [strəuk] | n. 冲程, 行程 |
| 20. remain [ri'mein] | vi. 保持, 逗留, 剩余 |
| 21. charge [tʃɑ:dʒ] | n. 充气, 装料 |
| 22. draw [drɔ:] | vt. 吸引, 吸入 |
| 23. constitute ['kɒnstɪtju:t] | vt. 组成, 构成 |



24. compress [kəm'pres]	vt. 压缩,浓缩
25. travel [ˈtræv(r)l]	v. 旅行,传播,行进
26. power [ˈpaʊə(r)]	n. 能量,动力
27. ignite [ɪgˈnaɪt]	v. 点火,点燃
28. spark [spɑ:k]	n. 火花
29. revolution [revəˈlu:ʃ(ə)n]	n. 旋转,转数,旋转一周
30. expand [ɪkˈspænd]	vt. 使膨胀,详述,扩张
31. apply [əˈplai]	vt. 申请,应用,作用
32. expend [ɪkˈspend]	vt. 消耗,花费,支出
33. passage [ˈpæsidʒ]	n. 通道,通路
34. port [pɔ:t]	n. 通道,港口,端口
35. approach [əˈprəʊtʃ]	vt. 接近,动手处理
36. accelerate [əkˈseləreɪt]	vt. 加速,促进,催促
37. continuously [kənˈtinjuəsli]	adv. 不断地,连续地
38. attach [əˈtætʃ]	vt. 安装上,系上,贴上
39. resist [rɪˈzɪst]	vt. 抵抗,反抗,抗,忍得住
40. inertia [ɪˈnə:ʃə]	n. 惯性,惯量
41. even [ˈi:v(ə)n]	adj. 平滑的,偶数的,平均的
42. automobile [ˈɔ:təməbi:l]	n. 汽车
43. arrange [ə'reɪndʒ]	v. 排列,安排
44. flywheel [ˈflaɪwi:l]	n. 飞轮
45. arrangement [ə'reɪndʒmənt]	n. 排列,安排
46. centerline [ˌsentə(r)ˈlaɪn]	n. 中心线
47. inclination [ɪnkliˈneɪʃ(ə)n]	n. 倾斜,交角,倾角
48. adjacent [əˈdʒeɪsənt]	adj. 邻近的,接近的
49. coolant [ˈku:lənt]	n. 冷却液
50. medium [ˈmi:diəm]	n. 媒体,媒介,介质
51. radiator [ˈreɪdɪeɪtə(r)]	n. 散热器
52. tank [tæŋk]	n. 水箱
53. overlap [əʊvəˈlæp]	v. (与……)交迭,部分重叠
54. bank [bæŋk]	n. 一排,一系列
55. camshaft [ˈkæmfɑ:ft]	n. 凸轮轴

Phrases and Expressions

1. self-contained	自备的
2. internal combustion engine	内燃机
3. heat energy	热能



4. mechanical energy	机械能
5. air/fuel mixture	空气燃油混合物(可燃混合气)
6. intake stroke	进气行程
7. compression stroke	压缩行程
8. power stroke	作功行程
9. exhaust stroke	排气行程
10. top dead center (TDC)	上止点
11. connecting rod	连杆
12. intake valve	进气门
13. atmospheric pressure	大气压力
14. intake manifold	进气歧管
15. exhaust valve	排气门
16. bottom dead center (BDC)	下止点
17. spark plug	火花塞
18. speed up	加速
19. slow down	(使)慢下来
20. combustion chamber	燃烧室
21. result in	导致
22. side by side	并排,并肩
23. compression ratio	压缩比
24. cylinder head	气缸盖
25. engine block	气缸体
26. water jacket	水套

Notes on the Text

1. The engine is a self-contained power unit which converts the heat energy of fuel into mechanical energy for moving the vehicle.

发动机是个自备动力的装置,它将燃料的热能转换成机械能,用于推动车辆前进。

语法:which converts...引导定语从句。

2. The drawing of an air/fuel charge into the cylinder in this manner, during the downward movement of the piston, constitutes the intake stroke of the piston.

可燃混合气在活塞向下运动时被吸入气缸,这个过程就是进气行程。

语法:during the downward movement of the piston 作时间状语从句。

3. This tremendous force pushes the piston downward on the power stroke, causing the connecting rod to rotate the crankshaft.

在作功行程时,巨大的气体压力推动活塞向下运动,带动连杆转动曲轴。

语法:causing the connecting rod to rotate the crankshaft 是现在分词作结果状语从句。



4. This remaining pressurized gas flows comparatively freely from the cylinder through the passage (port) opened by the exhaust valve.

残余的带压废气相对顺畅地从已被排气门打开的排气道中排出。

5. To keep the crankshaft turning smoothly between two power strokes, the flywheel is attached to the end of the crankshaft.

为了使曲轴在两个相连的做功行程间平稳地转动,我们将飞轮安装在曲轴的后端。

6. For identification purposes, manufacturers classify automobile engines by their cylinder arrangement, valve arrangement, and type of system used to cool the engine.

发动机制造商将汽车发动机按气缸排列、气门布置以及冷却系统的类型进行分类。

语法: for identification purposes 作目的状语。

7. With this system, the engine has the water jackets in the block and head, which surround the cylinders and combustion chambers and through which coolant circulates freely.

在水冷式发动机上,发动机气缸体和气缸盖内均有水套,它围绕着气缸和燃烧室,内部有冷却液自由循环流动。

语法: which 引导的定语从句修饰 the water jackets。

Exercises

1. Choose the best answer from the following choices according to the text

1) In the internal combustion engine, air/fuel mixture is introduced into a closed _____ where it is compressed and then ignited.

- A. tank B. spark C. cylinder D. flywheel

2) The air/fuel charge is now under _____ so that it will produce a great deal of power when the spark plug ignites it.

- A. compression B. inflation C. vacuum D. ignition

3) As the crankshaft nears the end of its second complete revolution, the piston again approaches the _____ position.

- A. BDC B. BBTC C. TDC D. ATDC

4) Thus, the coolant leaving the lower tank is _____ ready to flow through the engine again.

- A. hot B. cool C. cold D. warm

2. Translate the following into Chinese

- | | | |
|-------------------------------|----------------------|-------------------------|
| 1) internal combustion engine | 2) vehicle | 3) power stroke |
| 4) exhaust valve | 5) gasoline | 6) liquid-cooled engine |
| 7) flywheel | 8) air-cooled engine | 9) crankshaft |

3. Translate the following into English

- | | | |
|-----------|---------|---------|
| 1) 四冲程发动机 | 2) 进气行程 | 3) 排气行程 |
| 4) 燃烧室 | 5) 气缸 | 6) 活塞 |
| 7) 可燃混合气 | 8) 火花塞 | 9) 连杆 |



4. Translate the following sentences into Chinese

1) In the internal combustion engine, an air-fuel mixture is introduced into a closed cylinder where it is compressed and then ignited.

2) The intake stroke of a four-stroke engine begins with the piston at top dead center (TDC).

3) After the piston reaches bottom dead center (BDC), it moves upward again as the starter continues to turn the crankshaft in a clockwise direction.

4) Just as or slightly before the piston reaches TDC on the compression stroke with the air/fuel mixture fully compressed, a timed electrical spark appears at the spark plug.

5) The engine cycle has only one power stroke where the piston is actually driving the crankshaft.

5. Translate the following passage into Chinese

The engine is considered by most to be the definitive factor of an automobile. It provides the motivational force for the vehicle and drives the electrical and auxiliary systems required for operation. The internal combustion engine changes energy forms to provide propulsion. Combustible materials are detonated to create a forceful explosion (and thus expansion of gasses) that is then converted into some form of rotational motion. This rotational force or torque is then applied to the wheels to provide linear motion. Engines can consist of two or four-cycle piston units, turbines, rotary units, or free piston units. The most common is the four-cycle piston engine.

Reading Material

Two-stroke Engine Operation

二冲程发动机工作过程

In the four-stroke engine, the complete cycle of events requires four piston strokes. In the two-stroke engine, or two-stage engine, the intake and compression strokes and the power and exhaust strokes are in a sense combined. This permits the engine to produce a power stroke every two piston strokes, or every crankshaft rotation.

In the two-stroke engine, the piston acts as a valve, clearing valve ports in the cylinder wall as it nears BDC.^[1] A fresh air-fuel charge enters through the intake port, and the burned gases exit through the exhaust port. The complete cycle of operation is as follow: As the piston nears TDC, ignition takes place. The high combustion pressures drive the piston down, and the thrust through the connecting rod turns the crankshaft. As the piston nears BDC, it passes the intake and exhaust ports in the cylinder wall. Burned gases, still under some pressure, begin to stream out through the exhaust port. At the same time, the intake port, now cleared by the piston, begins to deliver air-fuel mixture, under pressure, to the cylinder.^[2] The top of the piston is shaped to give the incoming mixture an upward movement. This helps to sweep the burned gases ahead and out through the



exhaust port.

After the piston has passed through BDC and starts up again, it passes both ports, thus sealing them off.^[3] Now the fresh air-fuel charge above the piston is compressed and ignited. The same series of events take place again and continue as long as the engine runs.

In most engines, this pressure is put on the mixture in the crankcase. The crankcase is sealed except for a leaf, or reed, valve at the bottom. The reed valve is a flexible, flat metal plate that rests snugly against the floor of the crankcase. There are holes under the reed valve that connect to the engine carburetor. When the piston is moving up, a partial vacuum is produced in the sealed crankcase. Atmospheric pressure lifts the reed valve off the holes, and air-fuel mixture enters the crankcase. After the piston passes TDC and starts down again, pressure begins to build up in the crankcase. This pressure closes the reed valve so that further downward movement of the piston compresses the trapped air-fuel mixture in the crankcase. The pressure which is built up on the air-fuel mixture then causes it to flow up through the intake port into the engine cylinder when the piston moves down far enough to clear the intake port.^[4]

The two-stroke engine is not only very simple but gives nearly twice the power of a four-stroke engine from a cylinder of given size, but it is wasteful of gasoline, as some mixture inevitably finds its way into the exhaust system on the combines intake/exhaust stroke, and there are always some combustion products left in the cylinder which reduce the rapid burning of the fuel. This kind of engine is always used in motorcycle.

New Words

- | | |
|----------------|---------------|
| 1. require | v. 需要 |
| 2. combine | v. 合并, 结合 |
| 3. permit | v. 允许 |
| 4. clear | n. 清除, 开通 |
| 5. stream | v. 流出 |
| 6. shape | v. 成型, 成形 |
| 7. sweep | v. 扫过, 扫气 |
| 8. seal | v. 密封, 封 |
| 9. leaf | n. 叶片 |
| 10. reed | n. 簧片 |
| 11. rest | vt. 依靠, 搁在 |
| 12. snugly | adv. 贴身地, 紧贴地 |
| 13. inevitably | adv. 不可避免 |
| 14. motorcycle | n. 摩托车, 机车 |