交通高职高专院校统编教材

JIAOTONG GAOZHI GAOZHUAN YUANXIAO TONGBIAN JIAOCAI

汽车专业英语

（汽车检测与维修、汽车运用技术专业用）

王怡民　主编

卢晓春　主审

人民交通出版社

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内 容 提 要

本书系汽车检测与维修专业英语，全书分三部分。第一部分为汽车总体构造，分为9单元，讲述了汽车各主要系统的构造和工作原理。第二部分为汽车检测与维修，分为3单元，讲述了汽车检测仪器的使用和工作原理，发动机燃油喷射系统维修手册和发动机故障排除。第三部分为汽车新结构和新技术，分为7单元，讲述了汽车电子燃油喷射系统、汽车排放控制系统、传感器、汽车防抱死制动系统、自动变速器、安全气囊以及汽车智能运输系统和全球定位系统。每课中的阅读材料包括二冲程发动机工作过程、柴油机工作过程、发动机维修、发动机噪音诊断、发动机及发动机性能的计量、汽车安全带、汽车空调、汽车当今技术与自动驾驶、解码器等知识。为便于学习，本书在课后都附有词汇表、重点和难点句子的注释、课后练习，书后还附有总词汇表和汽车缩略语。

本书作为高职教育汽车检测与维修专业的专业英语教材，也可供汽车维修与检测及相关专业工程技术人员、技师阅读。

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前　言

为了适应并推动高等职业技术教育的发展，落实交通部科教司《高职高专专业教材建设规划方案意见》（高[1999]171号文件）精神，在交通部科教司领导下，交通高职教育工作委员会组织编写了汽车检测与维修、汽车运用技术、汽车运用工程等相关专业用高职高专统编教材。为此，我们编写了这本汽车检测与维修专业英语教材。本书可作为高职教育汽车检测与维修专业的专业英语教材，也可供汽车维修与检测及相关专业工程技术人员、技师阅读。

本书分三部分，共19个单元。第一部分为汽车总体构造，分为9单元，讲述了汽车各主要系统的构造和工作原理。第二部为汽车检测与维修，分为3单元，讲述了汽车检测仪器的使用和工作原理，发动机燃油喷射系统维修手册和发动机故障排除。第三部为汽车新结构和新技术，分为7单元，讲述了汽车电子燃油喷射系统、汽车排放控制系统、传感器、汽车防抱死制动系统、自动变速器、安全气囊以及汽车智能运输系统和全球定位系统。每课中的阅读材料包括二冲程发动机工作原理、柴油机工作原理、发动机维修、发动机噪音诊断、发动机及发动机性能的计量、汽车安全带、汽车空调、汽车当今技术与自动驾驶、解码器等知识。本书材料选自国外的专业书刊、修理企业的外文资料、国外的维修手册、国内各大院校的汽车专业英语教材以及网上有关介绍汽车的最新技术资料。为便于学习，本书在课后都附有词汇表、重点和难点句子的注释、课后练习。书后还附有总词汇表和汽车缩略语。

本书由浙江交通职业技术学院王怡民主编，马林才副主编。本书第一单元、第三单元、第四单元、第七单元、第十单元、第十三单元、第十四单元、第十九单元由王怡民编写，第二单元、第五单元、第六单元、第八单元、第十一单元、第十五单元、第十六单元由马林才编写，第九单元、第十二单元、第十七单元、第十八单元由陈蕾编写。

本书由广东交通职业技术学院卢晓春主审，由张美田担任责任编委。

本书在编写过程中得到了上海交通职业技术学院汤定国、南京交通职业技术学院高进军、吉林交通职业技术学院刘锐、河北交通职业技术学院刘振楼等人的大力支持，还得到浙江交通职业技术学院陈文华、刘颖老师的大力支持和协助，在此一并表示感谢。

由于编写时间紧迫，经验不足，水平有限，缺点错误在所难免，恳请广大师生和读者批评指正。

编　者

CONTENT

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Unit 1

Four-Stroke Engine and Engine classification

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 (combustion) 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 cycle piston engine.

The "cycle" as in two or four, of an internal combustion piston engine is defined by how many strokes of different direction must be accomplished to complete one cycle of combustion.[2] One cycle is defined as the time between two ignitions of combustible material. The cycles are often divided into strokes. Each stroke is the motion in one direction. The following is the cycle of a four-stroke engine:

Intake Stroke

The intake stroke of a four-cycle engine begins with the piston at top dead center (TDC). Activating the starter causes the crankshaft to begin rotating 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 rushes through the intake manifold and into the engine cylinder, pushed by the atmospheric pressure outside the engine. 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.[3] The crankshaft, by this time, has now rotated about 180 degrees.

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 starts moving upward, the intake valve closes, and the exhaust valve remains closed. Since both valves are closed, the piston compresses the air/fuel mixture to a pressure of about 100 to 150 psi 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 crankshaft has rotated 360 degrees from its starting point.[4] The air/fuel charge is now under compression so that it will produce a great deal of power when the spark plug ignites it.

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 charge. The burning mixture begins to expand; the pressure in the combustion chamber above the piston immediately increases to around four times compression pressure before ignition. This results in a high pressure with the total force thus applied to the top of the piston around 2 tons.

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.[5] In other words, the force resulting from the expansion of the burning air/fuel mixture is turning the crankshaft.

The violent, sudden explosion does not take place in the engine cylinder. Actually, the air/fuel mixture burns progressively, but it does so in a very short period of time. This assures that the expansion of the gas is also progressive and thereby applies more of a pushing force to the piston head instead of a hammering-type blow. This push is more effective in producing power than a sudden sharp blow.

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. By this time, the crankshaft is approaching 540 degrees of total rotation since the cycle began but is turning due to the force applied to the piston by the burning air/fuel mixture.

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.[6] 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 expelling all waste gases from the engine cylinder and combustion chamber.

As the crankshaft nears the end of its second complete revolution, or 720-degree rotation, 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 fuel/air charge as it starts 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.

Need for a 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 successive power strokes, a heavy wheel, the flywheel, is attached to the end of the crankshaft.[7] This wheel resists any effort to change its speed of rota-

tion. 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 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. For example, a four-cylinder engine has a power stroke in a cylinder every 180 degrees of crankshaft rotation. A six-cylinder engine has a power stroke every 120 degrees of crankshaft rotation, and an eight-cylinder engine fires an air/fuel charge in a given cylinder every 90 degrees of crankshaft rotation. The power strokes in the four-cylinder engine follow each other, one after another. However, the six and eight-cylinder engines have power strokes that actually 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.[8] 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 with the cylinders of each bank situated one behind each other. Also, the cylinders, at their centerlines, usually have an inclination of 60 or 90 degrees. Although some V-4 engines have been built, most automotive V-type engines have six or eight cylinders. Horizontally opposed engines have two banks of cylinders 180 degrees apart.

Classification by Valve Arrangement

Automobile engines also have their valves arranged in one of three ways. For example, in an L-head engine, the valves are in the block, sitting side by side, adjacent to the cylinder. Most people refer to this engine designas a flathead because the cylinder head itself is somewhat flat, containing only the combustion chambers, spark plugs opening, and water jackets.[9] 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. The intake valve operates in the head, while the exhaust valve is in the engine block. This engine type offers a slightly higher compression ratio than the L-head engine.

Modern automotive engines utilize the third type of valve arrangement, with both valves in the cylinder head. With the overhead, or I-head, arrangement, the manufacturers can raise or lower the compression ratio to fit operating requirements. Furthermore, this engine can have the camshaft located either in the block or above the cylinder head.

When a manufacturer installs the camshaft in the block of an I-head engine, the valves require more components to open them than in any other engine style. The valve-opening mechanism of this engine design will consist of a camshaft, lifters, pushrods, and rocker arms. However, this engine has more problems with valve action at higher engine rpm than either the L-or F-type engines due to inertia on the addi-

tional valve-train components.

To compensate for inertia on valve-train components, many manufacturers install the camshaft above the cylinder head, over or to one side of the valves.[10] The valves themselves open directly with valve lifters (cam followers) or sometimes rocker arms. But at least the pushrods and sometimes the rocker arms are eliminated; this improves valve action by reducing valve train inertia at high engine rpm.

Classification by Type of Cooling

Manufacturers also classify engines as being either air- or water-cooled. In these air-cooled engines, the cylinders are individual barrels equipped with metal fins. This design provides a large radiating surface from which the heat generated inside the cylinder can easily pass to the surrounding air. Also, to increase and direct the airflow around all the cylinders and other hot areas for improved cooling, these engines have a belt-driven blower and a series of metal-cooling shrouds.

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.[11] 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.

New Words

1. vehicle['vi:ikəl] *n*. 交通工具，车辆
2. engine['eʌdʒin] *n*. 发动机
3. cylinder['silindər] *n*. 气缸，圆筒，圆柱体
4. combustion[kəm'bʌstʃən] *n*. 燃烧
5. piston['pistən] *n*. [机]活塞
6. crankshaft['kræŋkʃa:ft] *n*. [机]曲轴
7. ignition[ig'niʃən] *n*. 点火，点燃
8. intake['inteik] *n*. 入口，进口
9. starter['sta:tər] *n*. 起动器
10. clockwise['klɔkwaiz] *adj*. 顺时针方向的 *adv*. 顺时针方向地
11. vacuum['vækjuəm] *n*. 真空，*adj*.真空的
12. gasoline['gæsəli:n] *n*. 汽油
13. manifold['mænifəuld] *n*. 进、排气歧管
14. stroke ['strəuk] *n*. 冲程，行程
15. charge ['tʃa:dʒ] *n*. 充气，装料
16. cycle ['saikəl] *n*. 周期，循环
17. spark[spa:k] *n*. 火花
18. revolution[revə'lu:ʃən] *n*. 旋转，转数

19. overlap[əuvə'læp] *v*. (与...)交迭
20. arrangement [ə'reindʒmənt] *n*. 排列，安排
21. component[kəm'pəunənt] *n*. 成分，部件，零件，元件
22. inertia[i'nə:ʃə] *n*. 惯性，惯量
23. airflow [eəfləu] *n*. 气流
24. blower['bləuə] *n*. 送风机，吹风机
25. flywheel['flaiwi:l] *n*. 飞轮
26. bank[bæŋk] *n*. 一系列，一排
27. shroud[ʃraud] *n*. 遮蔽物，覆盖物

Phrases and Expressions

1. self-contain 自备的
2. internal combustion (IC) engine 内燃机
3. air-fuel mixture 空气燃油混合物(可燃混合气)
4. intake stroke 进气行程
5. top dead center (TDC) 上止点
6. connecting rod 连杆
7. atmospheric pressure 大气压力
8. spark plug 火花塞
9. combustion chamber 燃烧室
10. result in 导致
11. compression stroke 压缩行程
12. power stroke 作功行程
13. exhaust valve 排气门
14. intake valve 进气门
15. rocker arm 摇臂
16. pushrod 推杆
17. two banks of 两排

Notes to 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，将燃料的热能转换成机械能，用于驱动车辆。

which converts...引导定语从句。

2. The "cycle" as in two or four, of an internal combustion piston engine is defined by how many strokes of different direction must be accomplished to complete one cycle of combustion.

在四冲程或二冲程活塞式内燃机里，用一个燃烧周期内所完成的方向各异的行程数目来定义发动机的循环。

此为试读，需要完整PDF请访问：www.ertongbook.com

3. 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.

当活塞向下运动时,可燃混合气以这样的方式被吸入气缸,这就成为了活塞的进气行程。

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

4. As the piston reaches TDC again during its upward travel, the compression stroke of the piston is over; the crankshaft has rotated 360 degrees from its starting point.

当活塞向上运动时,重新到达上止点,压缩行程终了;从起始点算起,曲轴已经转过了 360 度。

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

巨大的气体压力推动活塞在作功行程时向下运动,致使连杆转动曲轴。

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

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

剩余的带压气体相对顺畅地从被排气门打开的排气道中排出。

7. To keep the crankshaft turning smoothly between successive power strokes, a heavy wheel, the flywheel, is attached to the end of the crankshaft.

为了使曲轴在两个连续的作功行程间平稳地转动,将一个重的轮子—飞轮,安装在曲轴的末端。

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

为便于区分,厂商将汽车发动机按发动机排列、气门排列以及发动机的冷却系统的类型进行分类。

for identification purposes 作目的状语。

9. Most people refer to this engine design as a flathead because the cylinder head itself is somewhat flat, containing only the combustion chambers, spark plugs opening, and water jackets.

由于气门倒置式发动机的气缸盖稍微有点平坦,所以多数人将这种设计的发动机称为是平头发动机。它的气缸盖仅仅包含燃烧室、火花塞孔和水套。

containing only the combustion chambers, spark plugs, and water jackets 是现在分词作伴随状语。

10. To compensate for inertia on valve-train components, many manufacturers install the camshaft above the cylinder head, over or to one side of the valves.

为减小作用在气门机构上的惯性,很多厂商将凸轮轴安装在气缸盖上,处于气门的上端或一侧。

11. 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,水套在发动机气缸体和气缸盖内,水套围绕着气缸和燃烧室,并且,冷却液在水套内自由循环流动。

which 引导的定语从句修饰 the water jackets。

Exercises

1. Questions to the text

1) What is an internal combustion engine?

2) List the four strokes of a four-stroke engine?

3) What is the purpose of a flywheel?

4) What is the purpose of multiple-cylinder engine?

5) List the two types of cooling systems used in automobile engine?

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

3. Translate the following into English

1) 四冲程发动机

2) 进气行程

3) 压缩行程

4) 作功行程

5) 排气行程

6) 多缸发动机

7) 水冷式发动机

8) 风冷式发动机

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-cycle 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.

6) The valve-opening mechanism of this engine design will consist of a camshaft, lifters, pushrods, and rocker arms.

7) 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.

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 of 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

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[ri'kwaiər] *v*. 需要
2. combine['kɔmbain] *v*. 合并,结合
3. permit[pə'mit] *v*. 允许
4. clear[kliər] *n*. 清除,开通
5. stream[stri:m] *v*. 流出
6. shape [ʃeip] *v*. 成型,成形
7. sweep [swi:p] *v*. 扫过,扫气
8. seal[si:l] *v*. 密封,封
9. leaf[li:f] *n*. 叶片
10. reed [ri:d] *n*. 簧片
11. rest[rest] *vt*. 依靠,搁在
12. snugly['snʌgli] *adv*. 贴身地,紧贴地
13. inevitably [in'evitəbli] *adv*. 不可避免
14. motorcycle [məutə'saikəl] *n*. 摩托车,机车

Phrases and Expressions

1. two-stage engine 二冲程发动机
2. in a sense 在某种意义上
3. seal off 密封
4. leaf(reed) valve 片阀
5. air-fuel mixture 空气燃油混合物(可燃混合气)

Notes to Text

1. In the two-stroke engine, the piston acts as a valve, clearing valve ports in the cylinder wall as it nears BDC.

在二冲程发动机中,活塞起到阀门的作用,当活塞接近下止点时,使气缸壁上的进排气口打开。

2. At the same time, the intake port, now cleared by the piston, begins to deliver air-fuel mixture, under pressure, to the cylinder.

同时,活塞将进气口打开,开始将受压的可燃混合气送入气缸。

3. After the piston has passed through BDC and starts up again, it passes both ports, thus sealing them off.

当活塞经过下止点后,并重新向上运动时,它经过两个气口,并将它们堵住。

4. 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.

当活塞向下运动直到露出进气口,可燃混合气上形成的压力使得可燃混合气上升,并通过进气口进入气缸。

Unit 2

Engine Construction

The engine block forms the main framework, or foundation, of the engine.[1] The block is cast mainly from gray iron or iron alloyed with other metals such as nickel or chromium. However, some blocks have been made from aluminum. In any case, the block itself has many components cast into it or assembled onto it.

The cylinders are cast into the block. The cylinders are circular, tubelike openings in the block, which act as guides for the pistons as they move up and down. In aluminum blocks, the manufacturer usually installs cast-iron or steel cylinder sleeves (liners) because these metals can withstand the wear caused by the moving pistons better than aluminum can. The water jackets are also cast into the block. The water jackets are open spaces between the inner and outer surfaces of the block and cylinders through which the coolant flows.[2] Finally, the block has cast-in bores for both the camshaft and crankshaft.

Many parts also attach by fastening devices to the average engine block. These items include the water pump, oil pan, timing gear or chain cover, the flywheel or clutch housing, the ignition distributor, oil and fuel pump, and the cylinder head. The ignition distributor usually attaches to the block via a C-shaped clamp and a cap screw. The oil pump usually mounts to the upper crankcase area of the block.

Cylinder Head

The cylinder head is bolted to a very flat surface above the cylinder portion of the block.[3] The manufacturer casts the head in one piece from iron, from iron alloyed with other metals, or from aluminum alloy. Aluminum has the advantage of combining lightness with rather high heat conductivity. This means simply that an aluminum head tends to operate cooler, other factors being equal.

Depending on the style of engine, the cylinder head serves many functions. For example, in all engine types the head forms an upper cover for the cylinders; therefore, the head forms the upper portion of the combustion chamber. All modern heads provide an access point into the combustion chamber for the spark plug.

The final major components attached to the head are the manifolds: one intake and one or more exhaust.

Pistons

The engine manufacturer fits a piston into each cylinder of the engine. The piston is a movable part or plug that receives the pressure from the burning air/fuel mixture and converts this pressure into reciprocating (up-and-down) motion.[4] In other words, a piston will move within the cylinder due to the force exerted on it by the pressure of the ignited air/fuel mixture.

Manufacturers make most engine pistons from aluminum, which is less than half the weight of iron. Iron pistons were common in early automotive engines. However, aluminum expands faster than iron with

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