



应用技术型高校汽车类专业规划教材

配
课
件

下载地址

www.ccpres.com.cn

汽车专业英语

周 靖◎主 编

郭 栋 杨延勇◎副主编



人民交通出版社股份有限公司
China Communications Press Co., Ltd.

应用技术型高校汽车类专业规划教材

Qiche Zhuanye Yingyu

汽车专业英语

周 靖 主 编

郭 栋 杨延勇 副主编



人民交通出版社股份有限公司
China Communications Press Co., Ltd.

内 容 提 要

本书为应用技术型高校汽车类专业规划教材,用英语讲述了汽车各个系统的构造及工作原理,并选编了一些现代汽车技术和交通运输方面的英文内容。现代汽车技术方面内容包括电子喷射、防抱死制动系统、安全气囊等;交通运输方面内容包括交通安全和运输管理等。全书共32课,包括课文、词汇、注释和练习。为便于自学,书中对每篇课文中的语法难点和长句、难句做了较详细的分析。

本书既可作为高等院校汽车专业和其他相关专业课程的教材,也可供从事汽车工程及相关专业的管理人员和技术人员自学参考。

图书在版编目(CIP)数据

汽车专业英语 / 周靖主编. —北京:人民交通出版社股份有限公司,2015.3

应用技术型高校汽车类专业规划教材

ISBN 978-7-114-11874-6

I. ①汽… II. ①周… III. ①汽车工程—英语—高等学校—教材 IV. ①H31

中国版本图书馆 CIP 数据核字(2014)第 275038 号

应用技术型高校汽车类专业规划教材

书 名:汽车专业英语

著 作 者:周 靖

责任编辑:夏 韩

出版发行:人民交通出版社股份有限公司

地 址:(100011)北京市朝阳区安定门外外馆斜街3号

网 址:<http://www.ccpres.com.cn>

销售电话:(010)59757973

总 经 销:人民交通出版社股份有限公司发行部

经 销:各地新华书店

印 刷:北京市密东印刷有限公司

开 本:787×1092 1/16

印 张:9.5

字 数:220千

版 次:2015年3月 第1版

印 次:2015年3月 第1次印刷

书 号:ISBN 978-7-114-11874-6

定 价:22.00元

(有印刷、装订质量问题的图书由本公司负责调换)

应用技术型高校汽车类专业规划教材编委会

主 任

于明进(山东交通学院)

副主任(按姓名拼音顺序)

陈黎卿(安徽农业大学)

关志伟(天津职业技术师范大学)

唐 岚(西华大学)

陈庆樟(常熟理工学院)

何 仁(江苏大学)

于春鹏(黑龙江工程学院)

委 员(按姓名拼音顺序)

曹金梅(河南科技大学)

邓宝清(吉林大学珠海学院)

付百学(黑龙江工程学院)

李 斌(人民交通出版社股份有限公司)

李耀平(昆明理工大学)

柳 波(中南大学)

石美玉(黑龙江工程学院)

宋年秀(青岛理工大学)

尤明福(天津职业技术师范大学)

王良模(南京理工大学)

吴 刚(江西科技学院)

谢金法(河南科技大学)

徐立友(河南科技大学)

杨 敏(南京理工大学紫金学院)

赵长利(山东交通学院)

周 靖(北京理工大学珠海学院)

慈勤蓬(山东交通学院)

邓 涛(重庆交通大学)

姜顺明(江苏大学)

李学智(常熟理工学院)

廖抒华(广西科技大学)

石传龙(天津职业技术师范大学)

宋长森(北京理工大学珠海学院)

谭金会(西华大学)

王慧君(山东交通学院)

王林超(山东交通学院)

吴小平(南京理工大学紫金学院)

徐 斌(河南科技大学)

徐胜云(北京化工大学北方学院)

衣 红(中南大学)

赵 伟(河南科技大学)

瞿 琨(宁波工程学院)

秘 书

夏 韡(人民交通出版社股份有限公司)

前言

FOREWORD

当前随着汽车行业的快速发展,汽车人才需求激增,无论是汽车制造企业对于汽车研发、汽车制造人才的大量需求还是汽车后市场对于汽车服务型人才的大量需求,这些都需要高校不断地输送相关人才。而目前,我国高等教育所培养的大部分人才还是以理论知识学习为主,缺乏实践动手能力,在进入企业一线工作时,往往高不成低不就,一方面企业会抱怨招不到合适的人才,另一方面毕业生们又抱怨没有合适的工作可找,主要问题就在于人才培养模式没有跟上社会发展实际需求。

《国家中长期教育改革和发展规划纲要(2010-2020年)》中明确指出,要提高人才培养质量,重点扩大应用型、复合型、技能型人才培养规模。培养理论和实操兼具的人才,使之去企业到岗直接上手或稍加培养即可适应岗位。2014年2月26日,李克强总理在谈到教育问题时指出要建立学分积累和转换制度,打通从中职、专科、本科到研究生的上升通道,引导一批普通本科高校向应用技术型高校转型。可见国家对于应用型技术人才的培养力度将持续加大。

教材建设是高校教学和人才培养的重要组成部分,作为知识载体的教材则体现了教学内容和教学要求,不仅是教学的基本工具,更是提高教学质量的重要保证。但目前国内多所高校在应用型人才培养过程中普遍缺乏适用的教材,现有的本科教材远不能满足要求。因此,如何编写应用型本科教材是培养紧缺人才急需解决的问题。正是基于上述原因,人民交通出版社经过充分调研,结合自身汽车类专业教材、图书的出版优势,于2012年12月在北京组织召开了“高等教育汽车类专业应用型本科规划教材编写会”,并成立教材编写委员会。会议审议并通过了教材编写方案。

本系列教材定位如下:

(1)使用对象确定为拥有车辆工程、汽车服务工程或交通运输等专业的二、三本院校;

(2)设计合理的理论与实践内容的比例,主要解决“怎么做”的问题,涉及最基本的、较简单的“为什么”的问题,既满足本科教学设计需要,又满足应用型教育的需要;

(3)与现行汽车类普通本科规划教材是互为补充的关系,与高职高专教材有明显区别,深度上介于两者之间,满足教学大纲的需求,有比较详细的理论体系,具备系统性和理论性。

汽车专业英语是基础英语和汽车专业基础课的后续课程,学生在具备了较好的英语阅读能力后,通过专业汽车英文文献的阅读,一方面可以巩固已经掌握的词汇和语法知识,另一方面可以扩大专业词汇量,掌握科技文章的语法结构及文体方面的知识,提高阅读理解和翻译英文专业书刊的能力,使学生能以英语为工具,获得所需要的专业信息。本书为高等院校应用型本科类相关专业学生学习专业英语课程而编写,注重实践认识,同时也可供从事汽车工程及相关专业的管理人员和技术人员使用。

本书课文内容以汽车构造为主,主要讲述汽车各个系统的构造及工作原理,并选编了一些有关现代汽车技术和交通运输方面的内容。在内容编排上以汽车发动机,底盘构造和汽车新技术为主,尽可能使汽车专业知识具有系统性和完整性,取材时考虑难度适中,既注重专业领域新知识的传递,图文并茂,通俗易懂。根据形势发展和教学需要,增添了交通运输方面的课文。全书共5单元,每个单元由课文、词汇、短语和句子注释、练习组成。

本书由北京理工大学珠海学院周靖主编,山东理工大学郭栋和北京理工大学珠海学院杨延勇副主编。在编写过程中,编者参阅了国内外许多相关书籍和杂志,由于编者水平有限,恳请读者对本书的内容和章节安排等提出宝贵意见,并对书中存在的错误及不当之处提出批评和修改建议,以便本书再版修订时参考。

应用技术型高校汽车类专业规划教材编委会

2014年7月

目录

CONTENTS

Unit One Automotive Basics	1
Lesson 1 Fundamentals of Automobile	1
Unit Two Engine Construction	7
Lesson 2 Internal Combustion Engine Basics	7
Lesson 3 Engine Body	12
Lesson 4 Valve System	17
Lesson 5 The Fuel Delivery System	21
Lesson 6 Fuel Injection System	26
Lesson 7 Cooling System	30
Lesson 8 Lubrication System	34
Lesson 9 Turbochargers and Superchargers	38
Lesson 10 Emission Control Systems	41
Lesson 11 VR6/W12 Engine	45
Lesson 12 Hybrid – electric Vehicle	48
Unit Three Chassis Construction	52
Lesson 13 Power Train	52
Lesson 14 Clutch	56
Lesson 15 Transmission	59
Lesson 16 Final Drive and Differential	68
Lesson 17 Body and Frame	71
Lesson 18 Suspension System	73
Lesson 19 Steering System	81
Lesson 20 Brake System	86
Lesson 21 Wheels and Tires	92
Unit Four Automotive Electric Equipments	96
Lesson 22 Ignition System	96

Lesson 23	Starting System	101
Lesson 24	Antilock Braking System	104
Lesson 25	The Air-conditioning System	108
Lesson 26	Air Bags	113
Lesson 27	Electric Car	118
Lesson 28	Electric Power Steering	123
Unit Five	Traffic Safety and Transport Management	126
Lesson 29	Factors Influencing the Stability and Control of Vehicle	126
Lesson 30	Speed Limits	131
Lesson 31	Vehicle Fuel Economy	135
Lesson 32	Quality Management in Transport	139
参考文献	143

Unit One Automotive Basics

Lesson 1 Fundamentals of Automobile

The modern automobile contains more than 15000 separate individual parts that must work together. These parts can be grouped into four major categories: engine, chassis, body and electrical equipment(Fig. 1-1).

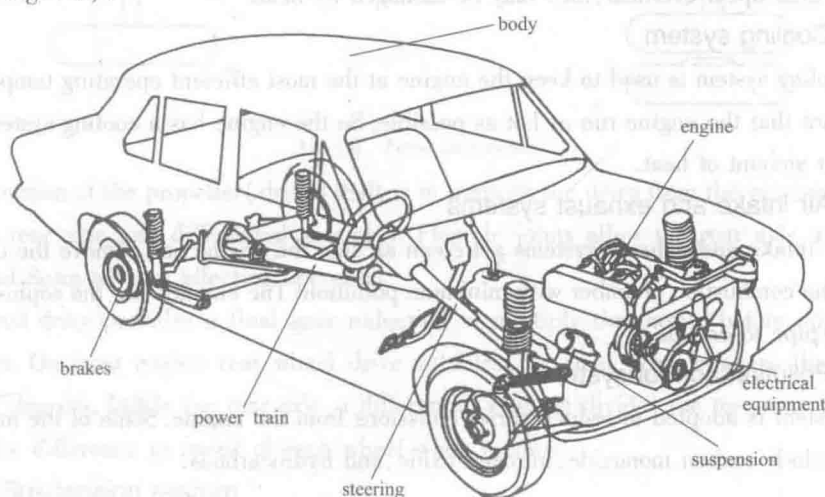


Fig. 1-1 Layout of a car

1 Engine

The engine acts as the power unit. The internal combustion engine is most common. As its name indicates, it obtains its power by burning a liquid fuel inside the engine cylinder and converts the expanding force of the combustion into rotary force used to propel the vehicle. There are two types of engine: gasoline(also called a spark-ignition engine) and diesel(also called a compression-ignition engine). Both engines are called heat engines; the burning fuel generates heat which causes the gas inside the cylinder to increase its pressure and supply power to rotate a shaft connected to the transmission.

All engines are designed to operate with several interconnected technical systems that make an engine run correctly. They are briefly defined here and will be addressed in more detail in later units.

1.1 Fuel system

The fuel system is designed to mix air and fuel in the engine for combustion. This air and fuel



mixing should produce an efficient combustion process.

1.2 Ignition system

The ignition system is designed to ignite the air and fuel that have been mixed in the fuel system. In order to do this, a very high voltage is needed to produce a spark within the combustion chamber.

1.3 Starting and charging systems

The starting and charging systems are designed to start the engine and keep the battery fully charged during operation.

1.4 Lubrication system

This system is designed to keep all of the engine parts lubricated so that friction is reduced. Without lubrication inside the engine, the moving parts that are continuously rubbing against each other would heat up. If overheated, they may be damaged by heat.

1.5 Cooling system

The cooling system is used to keep the engine at the most efficient operating temperature. It is very important that the engine run as hot as possible. So the engine has a cooling system to remove just the right amount of heat.

1.6 Air intake and exhaust systems

The air intake and exhaust systems get clean air into the engine and remove the dirty exhaust gases from the combustion chamber with minimum pollution. The engines use the sophisticated duct and exhaust pipe to do this.

1.7 Pollution control system

This system is adopted to reduce various emissions from the engine. Some of the more common pollutants include carbon monoxide, nitrogen oxide, and hydrocarbons.

2 Chassis

The chassis is an assembly of those systems that are the major operating part of a vehicle. During the manufacturing process the body is flexibly bolted to the chassis. The major components of the basic chassis are the power train, suspension, steering, and brake systems.

- (1) Power train system—conveys the drive to the wheels.
- (2) Suspension—absorbs the road shocks.
- (3) Steering—controls the direction of the movement.
- (4) Brake—slows down the vehicle.

2.1 Power train system

Power train system conveys the drive to the wheels. The main components are clutch, gearbox, driveshaft, final drive, and differential (Fig. 1-2).

The clutch or torque converter has the task of connecting and disconnecting engine's power from the driving wheels of the vehicle; this action may be manual or automatic.

The transmission has gears that control the amount of power delivered to the wheels. The

transmission increases the power(torque) to start the car moving. This torque is reduced when the transmission changes gears at higher speeds. The transmission also contains a set of gears that can reverse the direction of the wheels. Gear selection may be done by the driver or automatically by a hydraulic control system.

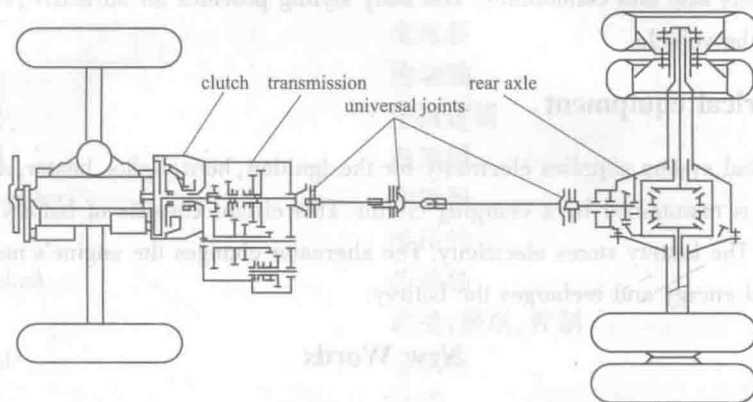


Fig. 1-2 Power train system

The function of the propeller(drive) shaft is to transmit the drive from the gearbox to the input shaft of the rear axle and differential assembly. Flexible joints allow the rear axle and wheels to move up and down without affecting operation.

The final drive provides a final gear reduction to multiply the torque before applying to the driving axles. On front engine rear wheel drive vehicles, the final drive changes the direction of drive by 90 degrees. Inside the rear axle, a differential gear set divides the torque to the axles and allows for the difference in speed of each wheel when cornering.

2.2 Suspension system

The purpose of the complete suspension system is to isolate the vehicle body from road shocks and vibrations, which will otherwise be transferred to the passengers and load. It must also keep the tire in contact with the road regardless of road surface.

2.3 Steering system

The steering system, under the control of the driver at the steering wheel, provides the means by which the front wheels are directionally turned. The steering system may be the power assisted to reduce the effort required to turn the steering wheel and make the vehicle easier to maneuver.

2.4 Braking system

The braking system has three main functions—first, to reduce the speed of the vehicle, when necessary; second, to stop the car in as short a distance as possible; third, to hold the vehicle stationary. The braking action is achieved as a result of the friction developed by forcing a stationary surface(the braking lining) into contact with a rotating surface(the drum of disc).

Each wheel has a brake assembly, of either the drum type or the disc type, hydraulically operated when the driver applies the foot brake pedal.



3 Body

An automobile body is a sheet metal shell with windows, doors, a hood, and a trunk deck built into it. It provides a protective covering for the engine, passengers, and cargo. The body is designed to keep passengers safe and comfortable. The body styling provides an attractive, colorful, modern appearance for the vehicle.

4 Electrical equipment

The electrical system supplies electricity for the ignition, horn, lights, heater, and starter. The electricity level is maintained by a charging circuit. This circuit consists of battery and alternator (or generator). The battery stores electricity. The alternator changes the engine's mechanical energy into electrical energy and recharges the battery.

New Words

category	种类, 类型
chassis	底盘
body	车身
electrical equipment	电气设备
act as	担当, 起作用
power unit	动力装置
internal combustion engine	内燃机
cylinder	汽缸
transmission	变速器
ignite	点燃, 点火
combustion chamber	燃烧室
voltage	电压
charged	充电
lubrication	润滑
friction	摩擦
rub	相互摩擦
intake	吸入, 进气
exhaust	废气
sophisticated	复杂的; 精致的
duct	管, 管道
emission	排放物
carbon monoxide	二氧化碳
nitrogen oxide	氮氧化物, 一氧化氮
hydrocarbon	碳氢化合物

assembly	总成, 装配
power train	传动系统
suspension	悬架
steering	转向
clutch	离合器
gearbox	变速器
driveshaft	传动轴
final drive	主减速器
differential	差速器
torque converter	变矩器
hydraulic	液压的
propeller shaft	传动轴
maneuver	调遣; 操纵, 控制
sheet metal	金属板
shell	外壳
hood	(发动机)罩
trunk deck	行李舱盖
horn	喇叭, 号角
alternator	交流发电机

Notes to the Text

1. As its name indicates, it obtains its power by burning a liquid fuel inside the engine cylinder and converts the expanding force of the combustion into rotary force used to propel the vehicle.

顾名思义, 它通过燃料在汽缸内燃烧来获取能量并将燃烧所产生的膨胀力转换为旋转力来驱动汽车。

2. The burning fuel generates heat which causes the gas inside the cylinder to increase its pressure and supply power to rotate a shaft connected to the transmission.

燃烧所产生的热量使汽缸内的压力升高并为与传动系相连的曲轴旋转提供动力。

3. The steering system may be the power assisted to reduce the effort required to turn the steering wheel and make the vehicle easier to maneuver.

转向系统可以采用动力转向来减小施加在转向盘上所需的力, 使汽车易于操纵。

4. The braking action is achieved as a result of the friction developed by forcing a stationary surface (the braking lining) into contact with a rotating surface (the drum or disc).

制动动作是通过强制固定表面(制动片)与旋转表面(制动鼓或盘)接触所产生的摩擦力来实现的。

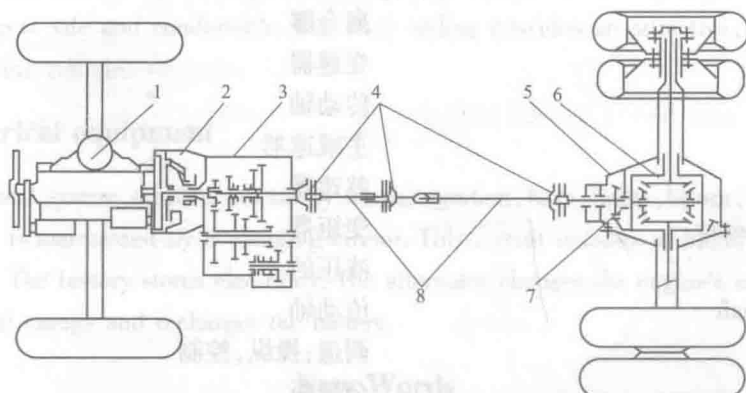
Exercises

I. Answer the following questions.

1. List the main parts of an automobile.



2. How does an internal combustion engine convert fuel energy to mechanical energy?
3. List the main parts of a power train system.
4. Why a suspension system is used on vehicle?
5. What are the three functions of the braking system?



II. Identify the English names of automobile assemblies according to the picture.

1. _____ 2. _____ 3. _____ 4. _____ 5. _____ 6. _____ 7. _____

8. _____

Unit Two Engine Construction

Lesson 2 Internal Combustion Engine Basics

Engine is an important part of the automobile; it acts as the heart of a person, which provides the power that cars need to run on the road. All the automotive engines today are the internal combustion engine because the fuel is burnt inside their cylinders and the energy is provided. If combustion takes place outside the cylinder, the engine is called an external combustion engine.

1 Engine terms

Power is produced by the linear motion of a piston in a cylinder. However, this linear motion must be changed into rotary motion to turn the wheels of cars or trucks. The piston is attached to the top of a connecting rod by a pin, called a piston pin. The bottom of the connecting rod is attached to the crankshaft. The connecting rod transmit the up-and-down motion of a piston to the crankshaft, which changes it into rotary motion.

The power stroke “uses up” the gas, so means must be provided to expel the burnt gas and recharge the cylinder with a fresh petrol-air mixture; this control of gas movement is the duty of the valves; an inlet valve allows the new mixture to enter at the right time and an exhaust valve lets out the burnt gas after the gas has done its job. Engine terms are as shown in Fig. 2-1.

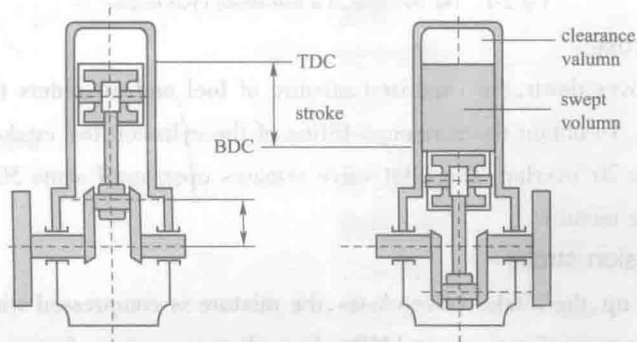


Fig. 2-1 Engine terms

TDC (Top Dead Center): the position of the crank and piston when the piston is farther away from the crankshaft.

BDC (Bottom Dead Center): the position of the crank and piston when the piston is nearest to the crankshaft.



Stroke: the distance between BDC and TDC; stroke is controlled by the crankshaft.

Bore: the internal diameter of the cylinder.

Swept volume: the volume between TDC and BDC.

Engine capacity: this is the swept volume of all the cylinder, e. g. a four-stroke having a capacity of two liters (2000cm^3) has a cylinder swept volume of 500cm^3 .

Clearance volume: the volume of the space above the piston when it is at TDC.

Compression ratio = (swept vol + clearance vol) / (clearance vol)

Two-stroke: a power stroke every revolution of the crank.

Four-stroke: a power stroke every other revolution of the crank.

2 The four-stroke engine principle

The most common engine is the four-stroke piston engine. In this engine, four strokes of the piston in the cylinder are required to complete one full operating cycle. Each stroke is named after the action it performs: intake, compression, power, and exhaust (Fig. 2-2).

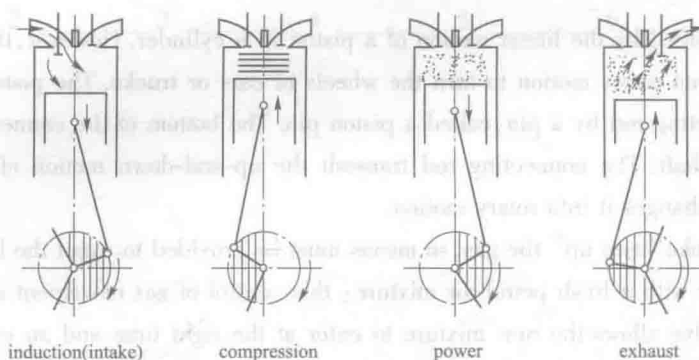


Fig. 2-2 The operation of a four-stroke cycle engine

2.1 Intake stroke

As the piston moves down, the vaporized mixture of fuel and air enters the cylinder through the open intake valve. To obtain the maximum filling of the cylinder, the intake valve opens about 10° before TDC, giving 20° overlap. The inlet valve remains open until some 50° after BDC to take advantage of incoming mixture.

2.2 Compression stroke

The piston turns up, the intake valve closes, the mixture is compressed within the combustion chamber, while the pressure rises to about 1MPa , depending on various factors including the compression ratio, throttle opening and engine speed. Near the top of the stroke the mixture is ignited by a spark which bridges the gap of the spark plug.

2.3 Power stroke

The expanding gases of combustion produce a rise in pressure of the gas to some 3.5MPa , and the piston is forced down in the cylinder. The exhaust valve opens near the bottom of the stroke.

2.4 Exhaust stroke

The piston moves back up with the exhaust valve open some 50° before BDC, allowing the pressure within the cylinder to fall and to reduce “back” pressure on the piston during the exhaust stroke, and the burned gases are pushed out to prepare for next intake stroke. The intake valve usually opens just before the exhaust stroke.

This 4-stroke cycle is continuously repeated in every cylinder as long as the engine remains running.

For a diesel engine, only air enters the combustion chamber in the intake stroke. When the piston begins to move upward on the compression stroke, the temperature at the end of this stroke increases to $750 \sim 950\text{K}$ because of high compression ratio. At or shortly before TDC, high-pressure fuel is injected into the hot air and combustion takes place. This is why the diesel engine is called a compression-ignition engine.

3 Engine systems

An engine is composed of many systems. They work together and rely on each other for good performance. The major parts of the engine are engine block, engine head, pistons, connecting rods, crankshaft, and valves. The other parts are joined to make systems. These systems are the fuel system, intake system, ignition system, cooling system, lubrication system, and exhaust system. These will be discussed in detail later.

New Words

linear	直线的, 线形的
piston	活塞
connecting rod	连杆
crankshaft	曲轴
power stroke	做功行程
expel	排出
inlet (intake) valve	进气门
exhaust valve	排气门
term	措辞, 术语
TDC	上止点
BDC	下止点
Bore	缸径
swept volume	有效容积
engine capacity	发动机排量
clearance volume	余隙容积, 燃烧室容积
compression ratio	压缩比
intake stroke	进气行程

