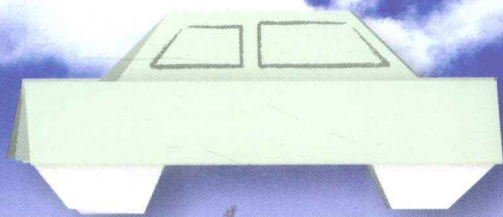


卓越工程师教育培养计划配套教材

车辆工程系列



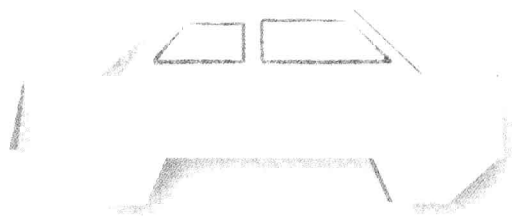
汽车专业英语

陈浩 王岩松 主编

清华大学出版社

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北 京

内 容 简 介

本书以汽车技术基础理论为基础,结合汽车主要总成,分别介绍车身、发动机、燃油系统、电器系统、冷却和润滑系统、排气系统、排放控制系统、悬架系统、转向系统、制动系统、传动系、安全系统等相关组件和基本工作原理,并在阅读材料增加最新的汽车发展的相关技术,以便为读者介绍紧贴技术发展的最新汽车专业英语知识。

本书为汽车相关专业的本科教材,也适合从事汽车相关工作的人员阅读。

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图书在版编目(CIP)数据

汽车专业英语/陈浩,王岩松主编.--北京:清华大学出版社,2013.1

(卓越工程师教育培养计划配套教材·车辆工程系列)

ISBN 978-7-302-31008-2

I. ①汽… II. ①陈… ②王… III. ①汽车工程—英语—教材 IV. ①H31

中国版本图书馆 CIP 数据核字(2012)第 304170 号

责任编辑:庄红权

封面设计:常雪影

责任校对:赵丽敏

责任印制:沈 露

出版发行:清华大学出版社

网 址: <http://www.tup.com.cn>, <http://www.wqbook.com>

地 址:北京清华大学学研大厦 A 座 邮 编:100084

社 总 机:010-62770175 邮 购:010-62786544

投稿与读者服务:010-62776969, c-service@tup.tsinghua.edu.cn

质 量 反 馈:010-62772015, zhiliang@tup.tsinghua.edu.cn

印 装 者:三河市李旗庄少明印装厂

经 销:全国新华书店

开 本:185mm×260mm 印 张:9.75 字 数:228 千字

版 次:2013 年 1 月第 1 版 印 次:2013 年 1 月第 1 次印刷

印 数:1~3000

定 价:22.00 元

产品编号:050121-01

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汽车是促进社会经济发展和提高人类生活质量不可或缺的交通工具。进入 21 世纪以来,我国综合国力进一步增强,人民生活水平不断提高,汽车产业高速发展。2009 年,我国因汽车产销量突破 1300 万辆而成为全球第一汽车产销大国。2010 年,我国汽车产销量均超 1800 万辆,稳居世界第一。2011 年,我国汽车产销量双超 1840 万辆,再次刷新全球历史纪录。2002 年至 2011 年的 10 年间,我国汽车产销量平均增幅超过 22%,汽车产业已经成为我国经济发展重要的支柱产业。

培养造就一大批适应汽车产业发展需求的人才队伍,是保障我国汽车产业长期繁荣与可持续发展的关键。伴随我国汽车产业的高速发展,汽车人才的短缺问题日益凸显。这不仅反映在人才培养数量上不能满足需求,而且体现在人才培养质量上存在较大差距。国外高校的汽车专业教育更加强调学生的动手能力和实践能力,学生有很多机会到汽车企业和制造车间进行实践锻炼,所以其开发创新能力更强。改革开放以来,我国的高等工程教育取得了巨大成就,但也存在人才培养模式单一,缺乏多样性和适应性,工程教育中工程性缺失、实践环节薄弱,评价体系导向重论文、轻设计、缺实践等问题。走中国特色新型工业化道路、建设创新型国家、建设人才强国等已经成为教育界和企业界的共识,这对高等工程教育发展提出了迫切要求。教育部于 2010 年开始实施的“卓越工程师教育培养计划”就是要培养造就一大批创新能力强、适应经济社会发展需要的高质量各类型工程技术人才,为国家走新型工业化发展道路、建设创新型国家和人才强国战略服务。

上海工程技术大学车辆工程专业在建设过程中,以服务国家和地区经济建设为宗旨,始终坚持学科链、专业链对接产业链的办学模式。2010 年,车辆工程专业被列为教育部“卓越工程师教育培养计划”首批试点专业。为满足车辆工程专业“卓越工程师教育培养计划”的需要,上海工程技术大学车辆工程专业的骨干教师与上海汽车工业(集团)公司和上海交运(集团)公司的技术骨干合作编写了“卓越工程师教育培养计划”车辆工程专业系列教材。该系列教材包括《汽车发动机构造》、《汽车底盘构造》、《汽车车身结构》、《汽车理论》、《汽车设计》、《汽车工程测试基础》、《汽车制造工艺学》(配习题集)、《汽车车身制造工艺》、《UG CAD 教程》、《汽车造型基础》、《车辆工程英语精读教程》、《车辆工程英语听力教程》、《汽车专业英语》等。

系列教材在编写过程中,按照理论与实践相结合的原则,参阅了大量的中外文参考书籍和文献资料,吸收和借鉴了现有部分教材的优点,参考了汽车企业的相关材料。系列教材强



调理论联系实际,体现“面向工业界、面向世界、面向未来”的工程教育理念,以社会对汽车车辆工程人才的需求为导向,以实际的汽车车辆工程为背景,以汽车工程技术为主线,着力于提升学生的工程素质,强化培养学生的工程能力。系列教材具有基础性、系统性、应用性等特点,能够满足车辆工程专业“卓越工程师教育培养计划”的教学目标和要求。

上海工程技术大学 陈力华

2012年1月



近年来,随着汽车技术的日新月异,我国汽车行业也迅速发展起来,亟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。本书以汽车构造和工作原理为基础,旨在使学生熟悉本专业的英语词汇及用法,培养学生阅读和翻译英语专业资料的能力,更好地直接从国外技术资料中获取准确可靠的知识与信息,力争在帮助读者提高汽车专业英语知识水平的同时,使他们了解当今汽车领域的前沿技术和最新动态。

本书在编写过程中关注了国内外许多最新的学科成果和国内汽车技术动态,在汽车技术相关的理论基础上,紧密联系当前汽车市场的实际情况,突出汽车专业英语的特点,注重基础理论,涵盖汽车专业英语的各个方面,为学生提供全面、完整的汽车专业英语知识。教材紧紧围绕汽车专业英语的核心内容,注重基本理论,增加汽车技术发展的相关阅读材料,紧跟科技发展的需要,为学生提供了最新的汽车技术信息和相关的专业英语知识。

本书共十个单元,主要以汽车构造为主,涵盖了车身、发动机、燃油系统、电器系统、冷却和润滑系统、排气系统和排放控制系统、悬架系统、转向系统、制动系统、传动系、安全系统等内容。本书内容主要选自国外汽车相关的书刊、著作和技术资料,基本保持了原文的风格,同时参考了大量外文网站内容,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,体例编排上图文并茂,便于识读、理解、记忆和灵活运用,使学生在学完本课程之后,能够更好地与原厂外文资料零距离接轨,帮助读者更清晰明了地学习和掌握相关知识。

本书由上海工程技术大学陈浩编写了第1、2、3、5单元,上海工程技术大学陈力华编写了第4单元,上海工程技术大学王岩松编写了第6单元,上海工程技术大学张若平编写了第7、9、10单元,上海工程技术大学杨亚莉编写了第8单元,杨亚莉同时负责核对每篇英文课文的语法、时态,并编写课后注释,全书由主编陈浩统稿。

本书可作为高等院校汽车专业及其相关专业的教材,也可作为高职高专、成人教育等汽车工程类专业教材及其相关专业的教材,并可供相关工程技术人员和汽车服务业、维修业人员阅读参考。

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

2012年8月



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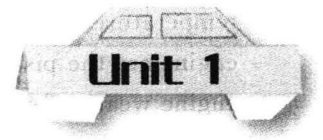
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Automobile Basics

1.1 Introduction

The word *automobile* literally means self-moving. It is derived from the Greek word *autos*, which means self, and the French word *mobile*, which means moving. An automobile is a wheeled motor or vehicle used for transporting passengers and cargoes and designed to run primarily on roads. Automobile is fine pieces of precision engineering, technology and design, with 15,000 individual parts and working units each.

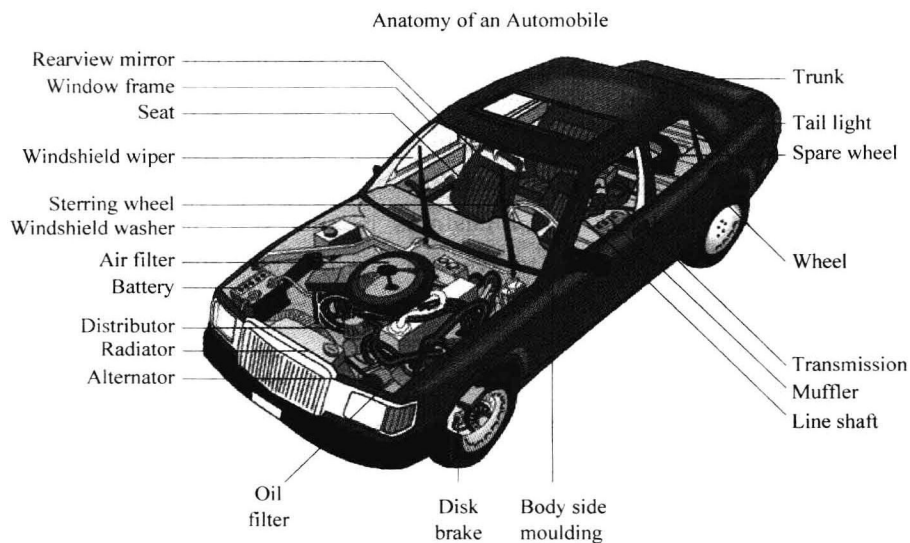


Fig. 1.1 Basic car components

Along with the development of science and technology, many engineering improvements have been done. However, the basic principles have remained the same since the advent of automobile in the 1870s. It has an internal-combustion engine, four rubber wheels and a protective body. To provide the energy required to make the car move, the engine needs either petrol or diesel, air, and electric current. The engine



temperature is usually kept relatively low by water or air. The major moving parts of the engine are the pistons. They move up and down very quickly inside cylinders. To reduce engine wear and prevent seizure the pistons are lubricated by oil. The clutch connects the engine to the gearbox by means of plates and the drive shafts are arranged to suit whether the car is front-or rear-wheel drive.

1.2 Automotive History

Automobile as we know it was not invented in a single day by a single inventor. The history of automobile reflects an evolution that took place worldwide. It is estimated that over 100,000 patents created the modern automobile.

Starting in the late 1700s, European engineers began tinkering with motor-powered vehicles. Steam, combustion, and electrical motor's had all been attempted by the mid 1800s. Automotive production on a commercial scale started in France in 1890. Commercial production began at the beginning of the 1900s in the United States. In those days, the European industry consisted of small independent firms that would turn out a few cars by means of precise engineering and handicraft methods. The American automobile plants were assembly line operations, which meant using parts made by independent suppliers and putting them together at the plants.

At the beginning of the century the automobile entered the transportation market as a toy for the rich. Along with the demand for travel freely for the general population, automobile became cheaper and more accessible to the middle class. Henry Ford freed common people. The automobile created mobility on a scale never known before, and the total effect on living habits and social customs is endless. The convenience of the automobile freed people from the need to live near rail lines or stations; they could choose locations almost anywhere in an urban area, as long as roads were available to connect them to other places.

1.3 Principal Components

Today's average car contains more than 15,000 separate, individual parts that must work together. Fig. 1.2 shows the major systems of a vehicle. These parts can grouped into the following major categories:

- **Body and frame** — support and enclose the vehicle
- **Engine** — provides dependable, efficient power for the vehicle
- **Computer systems** — monitor and control various vehicle systems
- **Fuel system** — provides a combustible air-fuel mixture to power the engine
- **Power-Supply system** — generates and/or distributes the power needed to operate the vehicle's electrical and electronic components

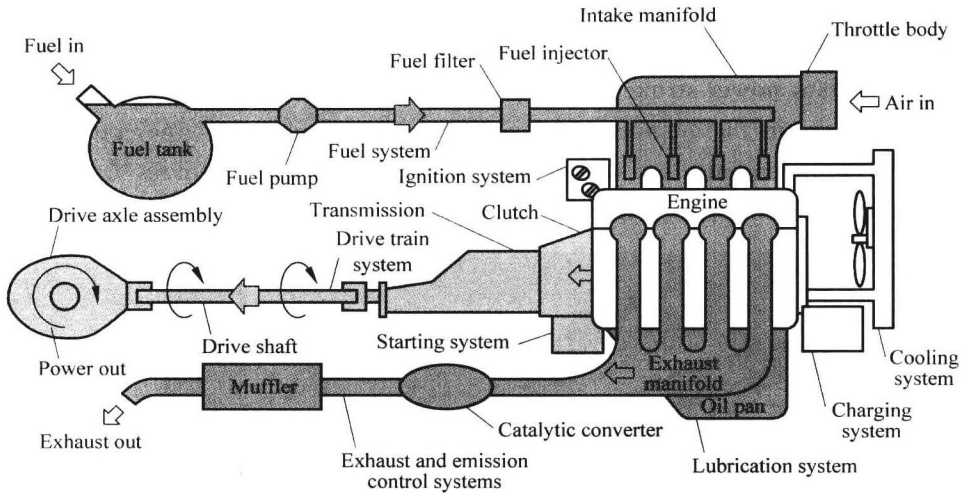


Fig. 1.2 General location of the major vehicle systems

- **Cooling and lubrication systems** — prevent engine damage and wear by regulating engine operating temperature and reducing friction between internal engine parts
- **Exhaust and emission control systems** — quiet engine noise and reduce toxic substances emitted by the vehicle
- **Drive train systems** — transfer power from the engine to the drive wheels
- **Suspension, steering, and brake systems** — support and control the vehicle
- **Accessory and safety systems** — increase occupant comfort, safety and convenience

1.3.1 Frame, Body and Chassis

The body and frame are the two largest sections of a motor vehicle. The *frame* is the strong metal structure that provides a mounting place for the other parts of the vehicle. The frame holds the engine, transmission, suspension, and other assemblies in position.

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.

The term *chassis* is often used when referring to a vehicle's frame and everything mounted to it except the body-tires, wheels, engine, transmission, drive axle assembly, and frame.

1.3.2 Engines

The *engine* acts as the power unit, which is designed to convert energy into useful mechanical motion. The internal-combustion engine (ICE) is widely used in modern automobile. The internal-combustion engine is a device used to convert the chemical



energy of the fuel into heat energy, and then to convert this heat energy into usable mechanical energy. The working process includes four strokes, which are intake stroke, compression stroke, power stroke and exhaust stroke. In practical work, the reciprocating movement of piston in the cylinder is converted to rotary motion of the crankshaft. The internal-combustion engines can be divided into two types: gasoline (spark-ignition engine) and diesel (compression-ignition engine).

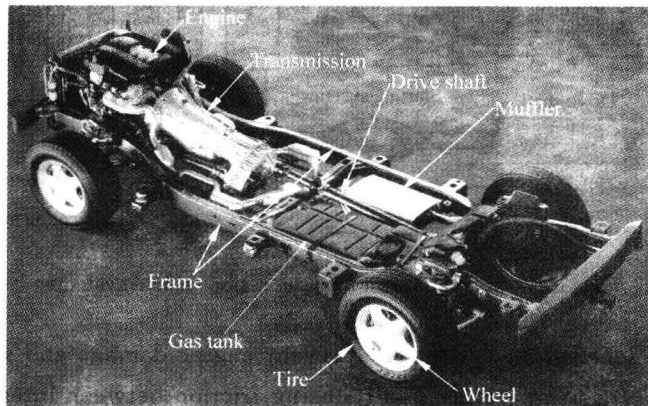


Fig. 1.3 Body over frame construction

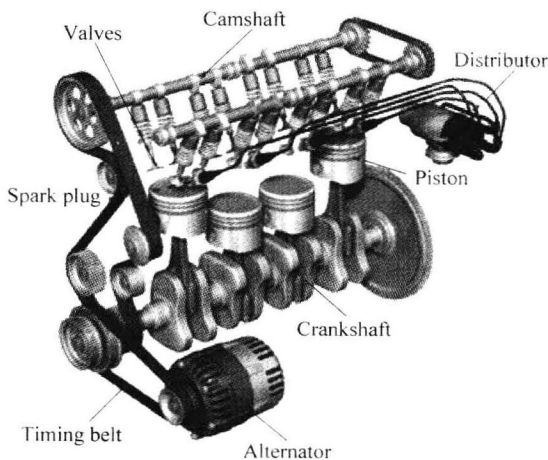


Fig. 1.4 Major parts on an automotive engine

1.3.3 Computer System

The computer system uses electronic and electrical devices to monitor and control various systems in the vehicle, including the fuel, ignition, drive train, safety and security systems. The use of computer systems has improved vehicle efficiency and dependability. Three major parts are included in computer system: sensors, control module and actuators.