高等学校试用教材

内燃机专业英语

（文选部分）

安徽工学院
湖南大学　主编
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编者的话

在党的新时期总任务精神鼓舞下，为实现四个现代化尽快培养工程技术人员，使学生迅速掌握外语这一工具，我们十所工科院校共同编写了这套《内燃机专业英语》试用教材，分为“基础部分”和“专业文选部分”两册出版。

本书内容力求在重视英语基础和语言的系统性与实践性的同时，尽早地结合内燃机专业知识，以便使学生在具备了一定的语言基础之后，能较快地阅读与翻译有关内燃机专业的英语书刊资料。

“文选部分”的编排以专业体系为主，从国外近期出版的内燃机专业书刊、手册、说明书等原文资料中选编了不同体裁的短文40篇。包括：内燃机简史和应用（3篇）、工作原理（4篇）、基本结构（18篇）、新技术、新产品（11篇）、新型内燃机（4篇）。为便于自学，每篇之后配有词汇表和注释。书后附有课文参考译文、内燃机常用英语缩写词和总词汇表。

“文选部分”主要供学完“基础部分”之后进行专业英语阅读之用。其中第1—25篇可供学习内燃机构造课时，课内外阅读；第26—40篇可供学习内燃机原理、设计和测试技术等课时，课内外阅读。此外，也可供业余工科大学、有关研究所、工厂的工人和技术人员学习英语时参考。

“文选部分”的主编为：安徽工学院卢志江和郑焕宇；湖南大学李淑芬和张正举；镇江农机学院励元龙和王亦男。参加编写的同志有：哈尔滨船舶工程学院兰荣祺；天津大学陈克谦和陈伟；北京农业机械化学院曹元寿和陈学仕；华中工学院陈

顺元；武汉水运工程学院康美君；武汉工学院曾小吟；佳木斯农机学院艾景堂。此外，上海交通大学杜宏玫；哈尔滨船舶工程学院梁在明也参加了部分工作。

湖南大学内燃机教研室副主任葛贤康老师对全书进行了审校，安徽工学院内燃机教研室副主任张道恒对参考译文也进行了审阅。在编写和审定过程中得到一机部教编室郝育生同志以及有关院校内燃机专业教师的大力支持和帮助，在此一并表示谢忱。

由于时间仓促，编写水平有限，书中定有不妥之处，请读者给予批评指正。

一九七九年十月

Contents

1. The Early Brief History of the Internal Combustion Engine

LENOIR 1860 Lenoir received credit for producing the first commercial internal combustion engine. The piston pulled in a charge of gas and air during the first part of the stroke, the charge was then ignited by an electric spark, and the piston was pushed to the end of its stroke. On the return stroke, the exhaust gases were pushed out.

The engine was very smooth in operation but had one very marked disadvantage — the thermal efficiency was only about 4%. This was due chiefly to the fact that combustion occurred at atmospheric pressure.

BEAU DE ROCHAS 1862 The following conditions were suggested by Beau de Rochas for the improvement of internal combustion engine economy: (1) The greatest possible cylinder volume with the least possible cooling surface; (2) the greatest possible rapidity of expansion; (3) the greatest possible expansion; and (4) the greatest possible pressure at the beginning of expansion.

He proposed also that an important factor in obtaining the best results would be the use of the "Beau de Rochas" four-stroke cycle principle of operation:

1. Suction during an entire outstroke of the piston.
2. Compression during the following instroke.

3. Ignition at top dead center and expansion during the third stroke.

4. Forcing out of burned gases from the cylinder on the fourth and last return stroke of the cycle.

OTTO 1867 In cooperation with Langen, Otto built a very bulky free-piston engine. A very long inverted cylinder was used. When the explosion occurred, the piston was moved up until power of the explosion was expended. Expansion and cooling of the gases caused a partial vacuum in the cylinder, with the result that the piston moved down due to its weight and atmospheric pressure on top of it. As the piston descended, a ratchet engaged the piston rod and engine shaft and thus power was transmitted. This engine's thermal efficiency of 12% was the best of its day.

In 1876, Otto built the "Otto Silent" gas engine which worked on the 4-cycle principle proposed by Beau de Rochas. This engine resembled present single-acting gas and oil engines. It used flame ignition and was very popular due to its 16% thermal efficiency.

DIESEL 1892 The original patent issued to Dr. Rudolf Diesel proposed an engine in which air would be compressed to such an extent that the resulting temperature would exceed by far the ignition temperature of the fuel. Thereafter, the fuel injection, from top dead center on, takes place so gradually hat combustion, due to the outward-moving piston and the pansion of the compressed gas, would occur without material essure or temperature rise. After stopping fuel injection,

further expansion of the gas-mass would take place.

He first attempted to develop a coal-dust engine but the idea was abandoned in favor of a fuel-oil engine. His first engines were failures due to the attempt to compress air to a pressure of 1500 pounds per square inch, and to lack of any provision for cylinder cooling. Diesel unsuccessfully attempted to utilize so much of the heat of combustion by a long expansion stroke that no further cooling would be required.

The third engine, built in 1895, was a success. It worked on the four-stroke cycle and had a compression pressure of 450 pounds per square inch which is comparable to present-day engines. It was water-cooled and fuel was injected by a blast of high-pressure air (air injection). The 24% thermal efficiency of this engine was a great improvement over all previous engines.

This brief history mentions only a very few of those who contributed materially to early developments leading up to the diesel engine. Since the days of Diesel, even greater numbers have continued the development, particularly of injection and combustion systems, so as to make possible our present-day engines.

New Words and Expressions

brief	[bri:f] *adj.*	简短的
commercial	[kəˈmə:ʃəl] *adj.*	商业的，商品的
credit	[ˈkredit] *n.*	盛誉，声誉，信誉

smooth	[smu:θ]	*adj.*	平稳的
disadvantage	[disəd'vɑ:ntidʒ]	*n.*	不利，缺点
thermal	['θə:məl]	*adj.*	热的，热量的
efficiency	[i'fiʃənsi]	*n.*	效率
chiefly	[tʃi:fli]	*adv.*	主要地
rapidity	[rə'piditi]	*n.*	迅速
factor	['fæktə]	*n.*	因素
entire	[in'taiə]	*adj.*	全部的，完全的
outstroke	['autstrəuk]	*n.*	外行冲程
instroke	['instrəuk]	*n.*	内行冲程
cooperation	[kəu,ɔpə'reiʃən]	*n.*	合作
bulky	['bʌlki]	*adj.*	庞大的
expend	[iks'pend]	*vt.*	花费，用光
partial	['pɑ:ʃəl]	*adj.*	部分的，不完全的
vacuum	['vækjuəm]	*n.*	真空
descend	[di'send]	*vi.*	下降，下行
ratchet	['rætʃit]	*n.*	棘轮
engage	[in'geidʒ]	*vt.*	接合，啮合；从事于
silent	['sailənt]	*adj.*	消声的，无声的
resemble	[ri'zembl]	*vt.*	类似，象
popular	['pɔpjulə]	*adj.*	受欢迎的，大众化的
propose	[prə'pəuz]	*vt.*	提议，提出
patent	['peitənt]	*n.*	专利
original	[ə'ridʒənəl]	*adj.*	最初的，最早的
thereafter	[ðɛər'ɑ:ftə]	*adv.*	此后，其后
outward	['autwəd]	*adv.*	向外，在外

coal-dust	['kəul'dʌst]	*n.*	煤粉
abandon	[ə'bændən]	*vt.*	抛弃，放弃
failure	['feiljə]	*n.*	失败
provision	[prə'viʒən]	*n.*	措施，准备
unsuccessfully	['ʌnsʌk'sesfuli]	*adv*	失败，不成功
utilize	['ju:tilaiz]	*vt.*	利用
previous	['pri:vjəs]	*adj.*	先的，前的

in cooperation with . . .	与…合作
in favor of	赞同，支持
lead up	导致

2. Diesel Engine Uses

Now let's look at the applications in which diesel engines are widely used. The reason why they are preferred in these applications is that their advantages, as a whole, are more important.[1]

Locomotives and Railcars. Almost all railroad locomotives now being built[2] are powered with diesel engines, and existing steam locomotives are being rapidly replaced with diesels. Locomotives for pulling trains and for switching service are mostly diesel-electric — that is, the diesel engine drives an electric generator which supplies electric power to electric motors connected to the wheels. You might say it is an electric locomotive which carries its own power plant along with it. Where passenger traffic is light, and only one or two cars are needed, diesel-electric railcars are used. They work like the locomotives, but each car carries its own diesel-electric power plant as well as the electric motors to drive the wheels.

The reason why the railroads have almost universally adopted the diesel engine is to save money. Compared to steam locomotives, diesels save money by using much less fuel and by being available for service for much more of the time. Compared to straight electric locomotives, diesels save the heavy investment required for overhead wires or third rails. Passengers prefer diesel-electric locomotives to

steam because trains start more smoothly, travel more comfortably at higher speeds, and give off little smoke.

Trucks, Buses, Taxis, Tractors, Power Shovels, Construction Machinery, Logging Equipment. Diesel engines have come into general use for all these applications. The principal reason is the saving in cost of fuel — the diesel engine uses fewer gallons of less costly fuel than the gasoline engine. True, the diesel costs more to begin with, but if it is used in a class of service which keeps it busy enough, the saving in cost of fuel soon pays back the extra investment.

Another advantage of the diesel is its greater pulling or "lugging" power when it slows down under a heavy load, in other words, the diesel loses less power at reduced speed than the gasoline engine.

Stationary Power Plants. Diesel engines are employed in a great many kinds of stationary power plants. The reasons are many; the chief ones are saving in cost of fuel compared to small steam or gasoline power plants, and lower total cost than that of bought electric power. Additional advantages enter into certain special applications such as isolated service stations, railway water stations, vacation resorts, lumber camps, mine power plants, oil-well drilling, and emergency power plants. Here the following advantages of the diesel are important: independence of water supply, lightness and compactness, freedom from fire hazard, and ability to start quickly.

Marine Uses. Diesels are now widely used in marine

service of many kinds, such as sea-going vessels (both passenger and freight), motorboats, ferryboats, tugs, naval vessels, and icebreakers. The main reason for these uses of diesels is, again, lower cost of fuel compared to steam. Submarines used to be powered with gasoline engines; now (unless nuclear-powered) they invariably use diesels, not only because of the greater range of travel due to their consuming less fuel, but also because of the reduced fire hazard. The latter is also an impelling reason for the use of diesels on motorboats.

Mines and Tunnels. Diesel locomotives are now preferred to electric locomotives for mine haulage and for tunnel construction because they are less expensive in both first cost and operating cost. Their exhaust gases contain little poisonous monoxide gas, which is an important objection to gasoline engines.

New Words and Expressions

reason	[ˈri:zn] *n.*	原因，理由
prefer	[priˈfə:] *v.*	提出，提起
locomotive	[ˈləukəˈməutiv] *n.*	机车，火车头
railcar	[ˈreilkɑ:] *n.*	有轨车
replace	[ri(:)ˈpleis] *vt.*	替换，代替，取代
train	[trein] *n.*	列车，火车
switch	[switʃ] *v. n.*	转换；转轨，开关
passenger	[ˈpæsindʒə] *n.*	乘客，旅客
traffic	[ˈtræfik] *n.*	运输
universally	[ju:niˈvə:səli] *adv.*	普通地，一般地