

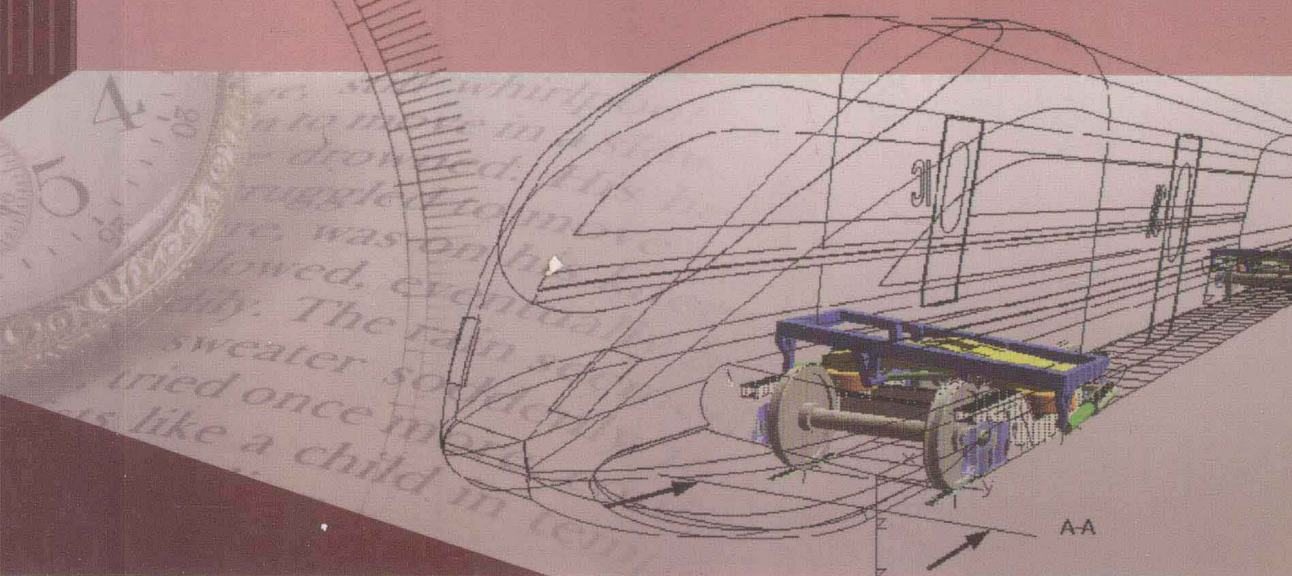
JICHE CHELIANG ZHUANYE
YINGYU

高等学校教材

JICHE CHELIANG ZHUANYE YINGYU

机车车辆专业英语

丁旺才 李宁洲 主编



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内 容 简 介

本书比较全面系统地介绍了铁路机车车辆的结构组成和工作原理,内容涉及内燃机车、电力机车、铁道车辆和城市轨道车辆,以及牵引供电系统、磁悬浮列车等。作为铁路车辆的重要组成部分,制动系统、悬挂系统、柴油机、转向架、传动控制系统等方面的内容在相关章节作了专门介绍。全书共分 15 章,各章均设置有课文、词汇、注释及练习题。适于学生重点学习本专业方向的专业知识,并根据需要学习其他方面的内容。本书可作为车辆工程专业内燃机车、电力机车、铁道车辆、城市轨道车辆、动车组等专业方向的专业英语教材,也可作为从事与机车车辆有关工作的工程技术人员参考书。

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兰州交通大学“十一五”规划教材

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出版说明

近年来,兰州交通大学认真贯彻落实教育部有关文件精神,不断推进教育教学改革。学校先后出资数百万元,设立了教学改革、专业建设、重点课程(群)建设、教材建设等项基金,并制定了相应的教学改革与建设立项计划、项目管理及奖励办法等措施。根据培养“基础扎实、知识面宽、能力强、素质高、具有创新精神的应用型”的高级专门人才的总体要求,学校各院(部)认真组织广大教师积极参加教学改革与建设,开展系统的研究与实践,取得了一系列教学改革与建设成果。

教学内容和课程体系的改革是教学改革的重点和难点,学校投入力量最大,花费时间最长,投入精力最多,取得的成效也最为显著,突出反映在教材建设方面。“十五”期间,学校共资助“十五”规划教材45本,资助普通教材56本,这些教材是一些学术造诣较深、教学水平较高、教学经验比较丰富的教师担任主编,骨干教师参编,同行专家主审而定稿的。在教材中凝聚了编著教师多年的教学、科研积累和成果,为推进教育创新、深化教学改革、提高教学质量做出了贡献。

2005年,在认真学习教育部相关文件精神的基础上,根据学校的办学指导思想 and 人才培养目标定位,各专业修订了新的人才培养方案,构建了“通识教育基础上的宽口径专业教育”的人才培养模式。为配合新的人才培养方案的实施,进一步深化教育教学改革,学校在“十五”教材建设的基础上,制定了“十一五”教材建设规划。“十一五”期间,学校将进一步加强教材建设工作,更好地发挥教材在人才培养中的重要作用。本着“重点支持优势、特色专业教材,兼顾一般教材,优选编者,保证质量”的原则,设立教材建设专项基金,力争在“十一五”期间出版一批高水平、高质量、有特色的教材。

本教材为学校“十一五”教材建设资助计划项目,并通过了学校教材编审委员会审定。希望该教材在教学实践过程中,广泛听取使用意见和建议,适时进一步修改、完善和提高。

兰州交通大学“十一五”规划
教材评审委员会
2006年4月

前 言

机车车辆专业英语是车辆工程铁路特色专业或机械设计制造及其自动化专业机车车辆方向的一门重要的必修课程。随着我国高速、重载列车以及城市轨道交通的迅猛发展,与国外的技术交流日趋频繁,对于机车车辆专业的本、专科学生以及从事相关专业工作的工程技术人员来说,熟练掌握专业英语对于促进国际合作与交流,了解并学习国内外本专业的最新发展动态和技术知识是十分必要的。为满足车辆工程专业教学的需求,我们编写了《机车车辆专业英语》一书。

本教材主要内容包括与内燃机车、电力机车、铁道车辆和城市轨道车辆结构组成、作用原理有关的英文阅读、专业词汇和翻译训练。本教材的主要内容和特点为:

(1)教材结合车辆工程专业内燃机车、电力机车、铁道车辆和城市轨道车辆等专业方向的内容,合理设置内容章节,有利于学生学习本专业方向内容和知识拓展。

(2)教材选材内容丰富,体现最新机车车辆的科技发展,如高速列车、磁悬浮车辆的内容。

(3)教材内容注重实用、全面。在介绍机车车辆主要结构和工作原理的基础上,体现了电力机车和城市轨道车辆相关牵引控制的内容,同时体现有关制动、装备、钩缓、悬挂系统等方面的内容,还涉及一些运用与检修方面的内容。

(4)图文并茂,生动活泼,便于学生自学。课文中插入大量的示意图或构造图,使教材通俗易懂、具有较强的可读性。

本教材第1、2、11、12、13章由丁旺才编写,第3、4、5、6章和附录由李宁洲编写,第7、8章由王红编写,第9、10、15章由商跃进编写,第14章由尧辉明编写。全书由丁旺才加工定稿,李宁洲选编注解和习题,尧辉明选编词组

解释。编写工作得到兰州交通大学教务处、机电工程学院和机车车辆系有关老师的大力支持,初稿完成后曾在兰州交通大学车辆工程专业本科生中试用,相关老师提出许多宝贵意见,在此表示衷心感谢。本书得到了兰州交通大学“青蓝”人才工程资助计划资助。

由于时间和水平有限,书中错误和不当之处在所难免,恳请读者不吝指正。

编 者

2008. 6

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CHAPTER 1 Introduction to Railway

In medieval times people mostly travel led by foot or horseback and any form of transportation was mainly for moving goods.

The first railways were laid down in the seventeenth and eighteenth century for horse drawn trains of wagons in collieries and quarries. These “hauling ways” initially had a surface of stone slabs or timber baulks, which soon proved unsatisfactory as the loads carried inevitably grew heavier.

A railway consists of two steel rails which are held a fixed distance apart upon a road-bed. Vehicles, guided and supported by flanged steel wheels, and connected into trains, are propelled as a means of transportation.

Within that definition there is a host of variations in forms of propulsion, details of track structure, train make-up or “consist”, dominant class of traffic and so on which fall within the meaning of the term “railway”.

The railway concept combined three critical factors:

1. It reduced friction to an extent that let the heavy locomotive not only move itself across the land but have enough power left over to move a good load at an unprecedented speed.
2. It reduced the cost of a low-friction railway, making it possible for the railway to penetrate any area of the country where raw materials were found or people lived and worked.
3. It provided a guideway, removing the limitation of transporting everything in single vehicles. This spread the cost of motive power and crew over a number of practical loads.

Railways have usually been built for economic reasons, but some were also constructed as part of their country's military establishment. Railways in many countries were constructed to make available stores of raw materials—forests, coal deposits, oil fields, and ranges of iron and copper ore.

We can probably agree that railways are important to themselves and to their owners; but just how important are they to the people and the land they serve? At one time to speak of the country's transportation system was to refer only to the railways, but this is no longer true today, when there is a widespread network of highways, airways, waterways, and pipe-



lines. Nevertheless, railways must continue for any foreseeable future to constitute the backbone of the transportation system. Railways can provide dependable economical, and rapid movement for all types of commodities, especially those classed as bulk freight, or for any other type moving in large volumes. Passenger traffic moves in comfort and with reasonably rapid speed. Railways share in the efficient handling of mass commutation traffic. Even for short haul and merchandise traffic the railway can provide a service that is prompt, dependable and economical.

Railways have built-in depreciation—tracks, rolling stock, and motive power must be maintained and renewed.

Railway track

A rail is a long piece of iron. A railway track always has two rails. They always have to be the same distance apart, or the train will fall off. If a train does fall off, people say that it was derailed.

Another way to say “railway track” is railway line. Sometimes people just say railway. In America, people say railroad. They are all the same thing.

Today most railways have rolling stock with hard steel flanged wheels running on two rails set at or about 1,435 mm standard gauge, supported in some way to spread loads to the ground below.

The track structure's function is to transform the intense load of the wheel on the head of the rail to a moderate, distributed pressure which the earth underneath can sustain under all weather conditions without settling. The main elements of typical present-day track structure include rails, crossties, fasteners, ballast, turnout, etc.

“Subgrade” is the term used for the natural soil stratum, or embankment soil, after trimming off organic topsoil and made ground, upon which the track bed is constructed.

The “trackbed” comprises the ballast and any subballast layers and is there to support the track, to drain water from the bottom of the sleepers and to distribute the imposed track load to such a degree that the subgrade can resist the imposed bearing pressure adequately.

Various other civil engineering skills were also involved in the construction of railways. These included the building of bridges, tunnels and gravity wall as well as extensive earthworks and drainage.

Train

The business of the railway is the selling and delivery of transportation. From an economic standpoint, it's the ability to assemble and move a large number of coupled cars as a



unit that distinguishes rail systems; so the real name of the game is running trains. Combining the vehicles into trains is important in increasing the capacity of a narrow transportation corridor, particularly important in providing needed mobility without wasting vast areas of real estate. The rails and the flanged wheels guide the individual cars and let them roll with minimum friction, but action of the train as a whole is considerably more complicated than just the sum of the actions of its parts.

In order to have a train, locomotives and cars (freight cars, passenger cars or other rolling stock) must be coupled together by couplers. Today there is a very wide range of rolling stock used throughout the world on different railways. This range includes the following basic types:

- Locomotives
- Freight wagons
- Passenger coaches
- Multiple units (with motive power in-built)
- Metro cars (usually multiple units)
- Light rail / Trams (usually articulated units)
- Railway service cars (cranes, tampers and trolleys etc.)

Signals

The railway is classified as a “single degree of freedom” mode of transport, that is, rail vehicles can only go back and forth along the “guideway”. With only this one degree of freedom in which to maneuver, attaining high unit capacity and safety on an all-weather basis depends on a control system that keeps its vehicles in proper relation to each other. If paths cross or vehicles overtake each other from the same or opposite directions, a collision is inevitable.

The purpose of signal systems is not so much to increase safety as it is to step up the efficiency and capacity of a line in handling traffic. Nevertheless, it is convenient to discuss signal system principles in terms of the three types of collisions they must prevent—rear-end side-on, and head-on.

All modern signalling systems have the following six basic objectives:

- To control trains in a safe manner for the conditions ahead.
- To maintain a safe distance to any train ahead or dead end ahead.
- To prevent the setting of conflicting movements.
- To ensure that points are locked in the correct position.
- To enable trains to operate to the headway required.

To enable trains to operate to the scheduled speed with minimum disruption consistent with safety.

The terms railway generally refers to the track and other closely associated items, i. e., signals, crossings, bridges, etc. The railway is a type of a land transportation mode. A railway has but one thing to sell—the service of transportation. The traffic department is the sales and marketing department of a railroad, and its job is to sell transportation. It obtains and administers traffic.

Words and Expressions

1. roadbed [ˈrəʊdbed] *n.* 路基
2. slab [slæb] *n.* (石)板
3. baulk [bɔː(ɪ)k] *n.* (木)梁
4. unprecedented [ʌnˈpresɪdəntɪd] *adj.* 空前的
5. penetrate [ˈpenɪtreɪt] *vt.* 穿透, 看穿 *vi.* 刺入, 看穿, 渗透
6. backbone [ˈbækboʊn] *n.* 脊椎, 中枢, 意志力, 勇气, 毅力, 决心
7. commutation [ˌkɒmjʊ(ː)ˈteɪʃən] *n.* 交换, 通勤
8. foreseeable [fɔːˈsiːəbl] *adj.* 可预知的, 能预测的, 能看透的
9. turnout [ˈtəʊnaʊt] *n.* 道岔
10. crosstie [ˈkrɒstai] *n.* 枕木
11. subgrade [ˈsʌbgreɪd] *n.* 地基, 路基
12. stratum [ˈstreɪtəm] *n.* 地层, 层, 社会阶层
13. embankment [ɪmˈbæŋkmənt] *n.* 堤坝
14. trackbed [ˈtrækˈbed] 道床
15. ballast [ˈbæləst] *n.* 道砟
16. subballast [sʌbˈbæləst] *n.* 底层道砟
17. sleeper [ˈsliːpə] *n.* 轨枕
18. earthworks [ˈɜːθwɜːk] *n.* 土木工程
19. drainage [ˈdreɪnɪdʒ] *n.* 排水
20. corridor [ˈkɒrɪdɔː] *n.* 走廊
21. crossing [ˈkrɒsɪŋ] *n.* 平交道口

Notes

1. These “hauling ways” initially had a surface of stone slabs or timber baulks, which soon proved unsatisfactory as the loads carried inevitably grew heavier.

这种拖拉方式起初依靠石板或木梁的平面进行,但随着载重的不断增大,证明这种



方式是不可行的。

2. Within that definition there is a host of variations in forms of propulsion, details of track structure, train make-up or “consist”, dominant class of traffic and so on which fall within the meaning of the term “railway”.

在该定义下,有许多不同的形式,如驱动方式、轨道结构、列车组成、交通管辖等都落到铁路这个术语的范畴内。

3. The “trackbed” comprises the ballast and any subballast layers and is there to support the track, to drain water from the bottom of the sleepers and to distribute the imposed track load to such a degree that the subgrade can resist the imposed bearing pressure adequately.

道床由道砟和所有底层道砟组成,从而支撑轨道,从轨枕底排水,并且分散施加在轨道上的载荷,以至路基足以承受的压力程度。

4. Combining the vehicles into trains is important in increasing the capacity of a narrow transportation corridor, particularly important in providing needed mobility without wasting vast areas of real estate.

将车辆连接组成列车,对增大这种狭长通道交通方式的运输能力至关重要,特别是提供了必需的资产流动以免造成大量不动产的浪费。

Exercises

1. Please chiefly describe the characteristics of the railway.

2. What are the basic objectives of modern signalling systems?

3. Put the following phrases into Chinese:

locomotive; freight wagon; passenger coach; multiple units; metro car; light rail; railway service cars

4. Put the following sentences into Chinese:

(1) The main elements of typical present-day track structure include rails, crossties, fasteners, ballast, turnout, etc.

(2) The purpose of signal systems is not so much to increase safety as it is to step up the efficiency and capacity of a line in handling traffic.

5. Put the following paragraphs into Chinese:

The terms railway generally refers to the track and other closely associated items, i. e., signals, crossings, bridges, etc. The railway is a type of a land transportation mode. A railway has but one thing to sell—the service of transportation. The traffic department is the sales and marketing department of a railroad, and its job is to sell transportation. It obtains and administerstraffic.

CHAPTER 2 The Train

Unit 1 Types of Trains

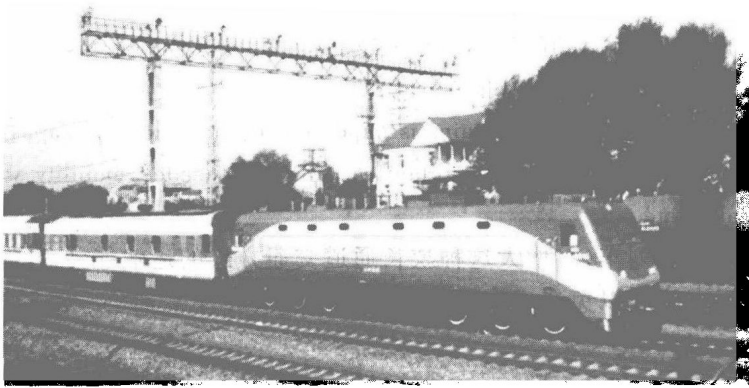


Fig. 2.1 A train

1. Introduction

There are various types of trains designed for particular purposes. A train can consist of a combination of a locomotive and attached railroad cars (Fig. 2.1), or a self-propelled multiple unit (or occasionally a single powered coach, called a railcar). Trains can also be hauled by horses, pulled by a cable, or run downhill by gravity.

Special kinds of trains running on corresponding special “railways” are atmospheric railways, monorails, high-speed railways, maglev, rubber-tired underground, funicular and cog railways.

A passenger train may consist of one or several locomotives, and one or more coaches. Alternatively, a train may consist entirely of passenger carrying coaches, some or all of which are powered as a “multiple unit”. In many parts of the world, particularly Japan and Europe, high-speed rail is utilized extensively for passenger travel.

Freight trains comprise wagons or trucks rather than carriages, though some parcel and mail trains (especially Travelling Post Offices) are outwardly more like passenger trains.



In the United Kingdom, a train hauled by two locomotives is said to be “double-headed”, but in Canada and the United States, it is quite common for a long freight train to be headed by three, four, or even five locomotives.

Trains can also be mixed, hauling both passengers and freight, see e. g. Transportation in Mauritania. Such mixed trains became rare in many countries, but were commonplace on the first 19th century railroads.

Special trains are also used for track maintenance; in some places, this is called Maintenance of Way.

A single uncoupled rail vehicle is not technically a train, but is usually referred to as such for signaling reasons.

2. Passenger trains

Passenger trains (Fig. 2. 2) have **passenger cars** (Fig. 2. 3). Passenger trains travel between stations; the distance between stations may vary from under 1 km to much more.

Long-distance trains, sometimes crossing several countries, may have a dining car; they may also have sleeping cars, but not in the case of high-speed rail, these arrive at their destination before the night falls and are in competition with airplanes in speed. Very long distance trains such as those on the Trans-Siberian railway are usually not high-speed.

Very fast trains sometimes tilt, like the Pendolino. Tilting is a system where the passenger cars automatically lean into curves, reducing the centrifugal forces acting on passengers and permitting higher speeds on curves in the track with greater passenger comfort.

For trains connecting cities, we can distinguish inter-city trains, which do not halt at small stations, and trains that serve all stations, usually known as local trains or “stoppers”.

For shorter distances many cities have networks of commuter trains, serving the city and its suburbs. Some carriages may be laid out to have more standing room than seats, or to facilitate the carrying of prams, cycles or wheelchairs. Some countries have some double-decked passenger trains for use in conurbations. Double deck high speed and sleeping trains are becoming more common in Europe.

Passenger trains usually have emergency brake handles that the public can operate. Abuse is punished by a fine.

Large cities often have a metro system, also called underground, subway or tube. The trains are electrically powered, usually by third rail, and their railroads are separated from other traffics, without level crossings. Usually they run in tunnels in the city center and sometimes on elevated structures in the outer parts of the city. They can accelerate and decelerate faster than heavier, long-distance trains.





Fig. 2.2 Passenger train

A light one—or two car rail vehicle running through the streets is not called a train but a tram, trolley, or streetcar, but the distinction is not strict.



Fig. 2.3 Interior of a passenger car in a long-distance train

The term light rail is sometimes used for a modern tram, but it may also mean an intermediate form between a tram and a train, similar to metro except that it may have level crossings. These are often protected with crossing gates. They may also be called a trolley.

Maglev trains and monorails represent minor technologies in the train field.

The term rapid transit is used for public transport such as commuter trains, metro and