XIANDAI DIANTI JISHU XILIE JIAOCAI

现代电梯技术系列教材

高等院校、电梯企业及特种设备安全监督检
验研究院等单位合作编写
国内第一套系统的电梯技术教材

电梯专业英语

nglish

主编　蒋晓梅

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Elevator English

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《现代电梯技术系列教材》编委会

序　言

电梯经过150多年的发展，在技术上日趋成熟，特别是随着微型计算机控制技术在电梯上的广泛应用，安全、可靠、高效、高速、智能化控制的电梯作为运输设备，已成为城市交通的重要组成部分，为人们的社会活动提供了便捷、迅速、优质的服务。

如今，电梯不仅是代步的工具，也是人类物质文明的标志。随着我国现代化建设规模的不断拓展，中国已成为世界上最大的电梯市场，整个电梯行业的发展蒸蒸日上，具有极其广阔的前景。我国现有各种电梯约200万台，并且以每年生产各类电梯30万台左右的速度向前发展，目前，我国电梯的产量已占世界产量的1/2。

我国目前虽然已是电梯生产大国，但还不是电梯生产强国，在高速电梯、特种电梯及其关键技术上与国外先进技术还有一定的差距，同时如此大的电梯生产规模对高素质的电梯设计、制造、安装和维修人员的需求日益增加，培养、培训大量高素质电梯专业人员成为日益迫切的要求。在这种形势下，2010年经教育主管部门批准，我国第一个“电梯工程”本科专业方向在常熟理工学院正式开办。

为了满足专业教材建设的需要，同时也为了满足从事电梯设计、制造、安装和维修人员学习进修的需要，常熟理工学院、广东特检院、苏州特检院、苏州大学出版社等组织电梯行业内专家编写了“现代电梯技术系列教材”，包括《电梯技术》、《电梯电气原理与设计》、《电梯制造技术》、《电梯检验检测技术》、《特种电梯与升降设备》、《电梯安装施工管理与建筑工程基础》、《电梯故障诊断与维修》、《电梯法律法规与安全标准》、《电梯选型设计》、《电梯专业英语》等。

该系列教材以国家电梯标准和建筑设计标准为准绳，内容全面、系统、先进、实用、规范。在先进性方面，介绍了国内外电梯研究的最新成果，如可靠性设计技术、智能控制技术、先进制造技术等；在系统性方面，按照电梯设计、制造、安装施工、检测、电梯法律法规与安全标准、故障诊断与维修、特种电梯、电梯选型设计、电梯专业英语等内容系统编写；在实用性方面，通过应用实例说明理论和方法的应用。

我们相信“现代电梯技术系列教材”的出版，将对我国电梯人才的培养以及我国电梯工业的发展产生积极的推动作用。

中国电梯协会副秘书长

2013年1月

前　言

目前中国已成为世界上最大的电梯市场，整个电梯行业的发展蒸蒸日上，具有广阔的前景。随着世界经济一体化步伐的加快，越来越多的企业开始融入到国际化的合作与竞争之中。为了适应企业国际化的需要，培养具有较高英语实际运用能力的电梯专业人才，编写合适的电梯专业英语教材十分必要。

本书以电梯技术最新发展与应用为背景，对电梯专业中涉及的相关领域和知识进行归纳与总结，重点介绍基本概念、原理、方法与应用。每个主题单元分为四个部分：Technical and Practical Readings 部分是与本章主题密切相关的精读部分，是课程中讲解和学习的主体部分，有一定的难度；Supplementary Readings 部分是与该章主题相关的泛读部分，以便读者自学和掌握专业词汇，供读者课余时间拓展知识面；Words and Expressions 部分是重点难点词汇和短语解析；Notes 部分是重点难点句子分析和相关内容的背景分析。为了保证本书的先进性和实用性，文章大部分出自电梯行业国际知名杂志提供的最新技术应用文章。

本书以培养高等学校电梯专业技术应用型人才为目的，以能力培养为本位，以贴近企业用人和学生就业的实际需求为导向，扩充学生的专业英语词汇，力求使学生了解和掌握今后工作所需的电梯专业英语知识，重点掌握专业术语和概念的英文表述，提高专业英文文献的阅读能力。

本书的第 1、第 3、第 4、第 5、第 6、第 8 单元由蒋晓梅老师和何春燕老师编写；第 2、第 7 单元由阮一晖老师和陈庆樟老师编写。全书由蒋晓梅老师统稿，徐青根老师主审。本书在编写过程中，行业专家对本教材的编写提出了许多宝贵的意见和建议，作者在此表示衷心的感谢。

由于编者水平有限，错误和不当之处在所难免，恳请各位读者批评指正。

编　者

2013 年 1 月

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Unit 1

Elevator Overview

Part I Technical and Practical Readings

Reading A: At a Glance

In 1852 Elisha Graves Otis, invented the first safety brake for elevators. With his installation of the first safe elevator in 1853 he literally started the elevator industry. His invention enabled buildings and architects' imaginations to climb ever skyward, giving a new and bolder shape to the modern urban skyline. Elisha Otis' invention of the elevator helped usher in the era of the modern skyscraper. Until this system of pulleys, weights and brakes came into existence, it was impractical for a building to be more than six stories high. Rochester is home to the first building in upstate New York to have a passenger elevator (then called a vertical railroad). It was installed in the Power's building, where it is still in operation today.

Imagine the skyline of a modern city if the elevator did not exist. Most of the architecture of the 20th and 21st centuries would be impossible. Office towers, hotels and high-rise apartments would hardly stand in their present forms.

The need for vertical transport is as old as civilization. Over the centuries, mankind has employed ingenious forms of lifting. The earliest lifts used man, animal and water power to raise the load. Lifting devices relied on these basic forms of power from the early agricultural societies until the dawn of the Industrial Revolution.

From ancient times through the Middle Ages, and into the 13th century, man or animal power was the driving force behind hoisting devices. In ancient Greece,

Archimedes developed an improved lifting device operated by ropes and pulleys, in which the hoisting ropes were coiled around a winding drum by a capstan and levers. By AD 80, gladiators and wild animals rode crude elevators up to the arena level of the Roman Coliseum.

Medieval records contain numerous drawings of hoists lifting men and supplies to isolated locations. Among the most famous is the hoist at the monastery of St. Balaam in Greece. The monastery stood on a pinnacle approximately 200 ft above the ground. Its hoist, which employed a basket or cargo net, was the only means up or down.

The first elevator designed for a passenger was built in 1743 for King Louis XV at his palace in France. The one-person contraption went up only one floor, from the first to the second. Known as the "Flying Chair", it was on the outside of the building, and was entered by the king via his balcony. The mechanism consisted of a carefully balanced arrangement of weights and pulleys hanging inside a chimney. Men stationed inside the chimney then raised or lowered the Flying Chair at the king's command.

By 1850 steam and hydraulic elevators had been introduced, but it was in 1852 that the landmark event in elevator history occurred: the invention of the world's first safety elevator by Elisha Graves Otis. He introduced the safety elevator, which prevented the fall of the cab if the cable broke. The design of the Otis safety elevator is somewhat similar to one type still used today. A governor device engages knurled roller(s), locking the elevator to its guides should the elevator descend at excessive speed. He demonstrated it at the New York exposition in the Crystal Palace in a dramatic, death-defying presentation in 1854. The first passenger elevator was installed by Otis in New York in 1857. After Otis' death in 1861, his sons, Charles and Norton, built on his heritage, creating Otis Brothers & Co. in 1867. By 1873 over 2,000 Otis elevators were in use in office buildings, hotels and department stores across America, and five years later the first Otis hydraulic passenger elevator was installed. The era of the skyscraper followed ... and in 1889 Otis revealed the first successful direct-connected geared electric elevator machines.

In 1898 overseas business had added to the company's growth, and Otis Brothers merged with 14 other elevator entities to form the Otis Elevator Company. In 1903 Otis introduced the design that would become the "backbone" of the elevator industry. The gearless traction electric elevator, engineered and proven to outlast the building itself. This ushered in the age of high-rise structures, ultimately including New York's Empire State Building, Chicago's John Hancock Center, and Toronto's CN Tower.

The development of elevators was led by the need for movement of raw materials

including coal and lumber from hillsides. The technology developed by these industries and the introduction of steel beam construction worked together to provide the passenger and freight elevators in use today.

New Words and Expressions

safety brake		紧急刹车,安全制动
usher	*v.*	引领
skyscraper	*n.*	摩天大楼
pulley	*n.*	滑轮
office tower		高层办公楼
high-rise apartment		高层公寓
hoisting rope		曳引绳
winding drum machine		鼓轮式卷扬机
capstan	*n.*	绞盘
lever	*n.*	控制杆,杠杆
gladiator	*n.*	角斗士
arena	*n.*	竞技场
coliseum	*n.*	大体育场
monastery	*n.*	修道院
pinnacle	*n.*	尖顶;(尤指哥特式建筑上的)小尖塔
contraption	*n.*	新发明;奇妙的器械装置
cab	*n.*	轿厢,座舱
cable	*n.*	电缆
governor	*n.*	限速器
guide	*n.*	导轨
descend	*v.*	下降
gearless driving machine		无齿轮曳引机
passenger and freight elevator		客货两用电梯

Notes

1. Until this system of pulleys, weights and brakes came into existence, it was impractical for a building to be more than six stories high. Rochester is home to the first building in upstate New York to have a passenger elevator (then

called a vertical railroad).

在滑轮、配重和安全制动器系统诞生之前，超过6层高的建筑物是不切实际的。罗切斯特是最早出现在纽约州北部第一座建筑物的一个乘客电梯(当时称为垂直铁路)。

2. In ancient Greece, Archimedes developed an improved lifting device operated by ropes and pulleys, in which the hoisting ropes were coiled around a winding drum by a capstan and levers.

在古希腊，阿基米德研发了一种经改进的用绳子和滑轮操纵的起重设备，其中曳引绳通过绞盘和杠杆绕在鼓轮式卷扬机周围。

3. The monastery stood on a pinnacle approximately 200 ft above the ground. Its hoist, which employed a basket or cargo net, was the only means up or down.

修道院坐落在离地面约200英尺的尖塔之上，吊车采用篮子或装卸网，这是唯一的升降方式。

4. The mechanism consisted of a carefully balanced arrangement of weights and pulleys hanging inside a chimney.

该机构涉及烟囱内配重和内挂滑轮的小心平衡的安排。

5. A governor device engages knurled roller(s), locking the elevator to its guides should the elevator descend at excessive speed.

如果电梯以过快的速度下降，限速器装置利用安全钳的滚花辊，锁定电梯轿厢至导轨上。

6. The gearless traction electric elevator, engineered and proven to outlast the building itself.

无齿轮曳引电梯的工程应用证明了它超过建筑本身的意义。

7. The development of elevators was led by the need for movement of raw materials including coal and lumber from hillsides.

电梯的发展源于在山坡上运送煤炭和木材等原料的需要。

Reading B: Uses of Elevators

Passenger Service

A passenger elevator is designed to move people between a building's floors. Passenger elevators capacity is related to the available floor space. Generally passenger elevators are available in capacities from 1,000 to 6,000 pounds (about 454 -2,722 kg) in 500 lb (about 227 kg) increments. Generally passenger elevators in buildings

eight floors or less are hydraulic or electric, which can reach speeds up to 200 ft/min (about 1.0 m/s) hydraulic and up to 500 ft/min electric. In buildings up to ten floors, electric and gearless elevators are likely to have speeds up to 500 ft/min (about 2.5 m/s), and above ten floors speeds begin at 500 ft/min (about 2.5 m/s) up to 2,000 ft/min (about 10 m/s).

Passenger elevators may be specialized for the service they perform, including: hospital emergency (code blue), front and rear entrances, a television in high-rise buildings, double decker, and other uses. Cars may be ornate in their interior appearance, may have audio visual advertising, and may be provided with specialized recorded voice instructions. An express elevator does not serve all floors. For example, it moves between the ground floor and a sky lobby, or it moves from the ground floor or a sky lobby to a range of floors, skipping floors in between. These are especially popular in eastern Asia.

Freight Elevators

A freight elevator, or goods lift, is an elevator designed to carry goods, rather than passengers. Freight elevators are generally required to display a written notice in the car that the use by passengers is prohibited (though not necessarily illegal), though certain freight elevators allow dual use through the use of an inconspicuous riser. Freight elevators are typically larger and capable of carrying heavier loads than a passenger elevator, generally from 2,300 to 4,500 kg. Freight elevators may have manually operated doors, and often have rugged interior finishes to prevent damage while loading and unloading. Although hydraulic freight elevators exist, electric elevators are more energy efficient for the work of freight lifting.

Stage Lifts

Stage and orchestra lifts are specialized lifts, typically powered by hydraulics that are used to lift entire sections of a theater stage. For example, Radio City Music Hall has four such lifts: an "orchestra lift" that covers a large area of the stage, and three smaller lifts near the rear of the stage. In this case, the orchestra lift is powerful enough to raise an entire orchestra, or an entire cast of performers (including live elephants) up to stage level from below.

Vehicle Elevators

Vehicle elevators are used within buildings or areas with limited space (in lieu of ramps), typically to move cars into the parking garage or manufacturer's storage. Geared hydraulic chains (not unlike bicycle chains) generate lift for the platform and there are no counterweights. To accommodate building designs and improve

accessibility, the platform may rotate so that the driver only has to drive forward. Most vehicle elevators have a weight capacity of 2 tons.

As projected, the new ship lift at the Three Gorges Dam will be even higher and able to lift vessels of up to 3,000 tons displacement. However, as yet engineers have been unable to design a mechanism with the lifting power called for in the lift specifications. The boat lift at Longtan is reported to be even higher in total with a maximum vertical load.

Aircraft Elevators

On aircraft carriers, elevators carry aircraft between the flight deck and the hangar deck for operations or repairs. These elevators are designed for much greater capacity than other elevators, up to 200,000 pounds (about 90 tonnes) of aircraft and equipment. Smaller elevators lift munitions to the flight deck from magazines deep inside the ship.

On some passenger double-deck aircraft such as the Boeing 747, Lockheed L-1011 or other widebody aircraft lifts transport flight attendants and food and beverage trolleys from lower deck galleys to upper passenger carrying decks.

Residential Elevator

The residential elevator is often permitted to be of lower cost and complexity than full commercial elevators. They may have unique design characteristics suited for home furnishings, such as hinged wooden shaft-access doors rather than the typical metal sliding doors of commercial elevators. Construction may be less robust than in commercial designs with shorter maintenance periods, but safety systems such as locks on shaft-access doors, fall arrestors, and emergency phones must still be present in the event of malfunction.

Limited Use/Limited Application

The limited-use, limited-application (LU/LA) elevator is a special purpose passenger elevator used infrequently, and which is exempt from many commercial regulations and accommodations. For example, a LU/LA is primarily meant to be handicapped accessible, and there might only be room for a single wheelchair and a standing passenger.

Dumbwaiter

Dumbwaiters are small freight elevators that are intended to carry food rather than passengers. They often link kitchens with rooms on other floors.

Paternoster

A special type of elevator is the paternoster, a constantly moving chain of boxes. A

similar concept, called the man lift or human lift, moves only a small platform, which the rider mounts while using a handhold and it was once seen in multi-story industrial plants.

Scissor Lift

The scissor lift is yet another type of lift. As most of these lifts are self-contained, these lifts can be easily moved to where they are needed.

Rack-and-pinion Lift

The rack-and-pinion lift is another type of lift. This lifts are simpler in construction, but noisy and slow. They are nonetheless the most used type of lift for buildings under construction (to move materials and tools up and down).

Material Handling Belts and Belt Elevators

A different kind of elevator is used to transport material. It generally consists of an inclined plane on which a conveyor belt runs. The conveyor often includes partitions to prevent the material from sliding backwards. These elevators are often used in industrial and agricultural applications. When such mechanisms (or spiral screws or pneumatic transport) are used to elevate grain for storage in large vertical silos, the entire structure is called a grain elevator.

There have occasionally been lift belts for humans; these typically have steps about every seven feet along the length of the belt, which moves vertically, so that the passenger can stand on one step and hold on to the one above. These belts are sometimes used, for example, to carry the employees of parking garages, but are considered too dangerous for public use.

New Words and Expressions

capacity	*n.*	容量
specialized	*adj.*	专门的
car	*n.*	轿厢
ornate	*adj.*	装饰华丽的
express elevator		高速电梯
sky Lobby		空中走廊,顶部大厅
accommodate	*v.*	容纳
goods lift		货梯
inconspicuous	*adj.*	不显著的
manually operated doors		手动门
stage lifts		舞台升降机

orchestra	*n.*	管弦乐队
vehicle elevator/lift		车辆电梯
in lieu of		代替
ramp	*n.*	斜坡,斜轨
parking garage		汽车停车场
storage	*n.*	贮藏,仓储
counterweight	*n.*	对重
aircraft elevator		飞机升降舵
flight deck		飞行甲板
double-deck		双层
trolley	*n.*	手推车
residential elevator		住宅电梯
malfunction	*n.*	故障
dumbwaiter	*n.*	杂物电梯
paternoster	*n.*	斗式升降机
rack-and-pinion		齿轮齿条副
belt elevator		带式升降机
inclined plane		斜面
conveyor belt		传送带
pneumatic transport		气动输送

Notes

1. Generally passenger elevators in buildings eight floors or less are hydraulic or electric, which can reach speeds up to 200 ft/min (1.0 m/s) hydraulic and up to 500 ft/min electric.
   在8层楼或以下的建筑物客梯一般采用液压或电动,液压电梯速度可达到200英尺/分钟(约1.0米/秒)和电动电梯速度500英尺/分钟。
2. Passenger elevators may be specialized for the service they perform, including: hospital emergency (code blue), front and rear entrances, a television in high-rise buildings, double decker, and other uses.
   乘客电梯有专门的服务功能,包括:医院急诊(代码蓝色)、前后入口、高层建筑内的电视、双层电梯及其他用途。
3. Cars may be ornate in their interior appearance, may have audio visual advertising, and may be provided with specialized recorded voice