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轨道交通车辆专业英语

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PREFACE

在“一带一路”倡议的背景下，中国铁路“走出去”的步伐不断加快，国际轨道交通专业人才的培养越来越重要，国内轨道交通特色高校在铁路职业教育中的作用越来越突出。在这种形势和需求下，“轨道交通车辆专用英语”课程应运而生。

《轨道交通车辆专业英语》适用于铁道机车、铁道车辆、动车组维修技术、城市轨道交通车辆维修等专业。通过这本书，学生可以全面了解轨道交通各专业的知识，可以将其作为轨道交通相关专业的学习指南。本书共包括五个项目，内容难易适中，从通识性知识到专业知识均有涉及，同时注重沟通交流能力的培养，能够满足相应岗位需求。每个单元都有重点词汇、长难句翻译、练习活动以及谚语等部分，从不同角度培养学生的基础英语阅读理解、翻译以及口语沟通能力。

本教材由郑州铁路职业技术学院牛晨旭、赵慧、王闪闪担任主编，吕蒙、马茜、刘文博和中国铁路郑州局集团公司郑州动车段王国启共同担任副主编，郑州科技学院李莎担任主审。具体分工如下：项目一和项目二由牛晨旭编写；项目四由王闪闪编写；项目五由赵慧编写；项目三单元一、附录由吕蒙编写；单元二由中国铁路郑州局集团公司郑州动车段王国启编写；单元三、单元四由马茜编写；单元五由刘文博编写。

由于编者水平有限，书中疏漏和不妥在所难免，诚望广大读者、同行批评指正。

编者

2021年11月

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Project I

History of Railway in China

Leading in:

Do you know the history of railway development in China? Do you know what the first electrified railway in China was?

On the Speech at the Ceremony Marking the Centenary of the Communist Party of China, July 1, 2021, General Secretary Xi Jinping declared on behalf of the Party and the people that through the continued efforts of the whole Party and the entire nation, we have realized the first centenary goal of building a moderately prosperous society in all respects. This means that we have brought about a historic resolution to the problem of absolute poverty in China, and we are marching in confident strides toward the second centenary goal of building China into a great modern socialist country in all respects.

Unit 1 The Founding of the People's Republic of China Ushered in a New Era of Railway Development

Part 1: Reading Material

The century-old development history of railway is the epitome of the great struggle of the Party leading the people to carry out revolution, construction and reform in the railway field. The century-old changes of the railway ran through the history of the Party and witnessed the great historical leap of the Chinese nation from standing up, getting rich to becoming stronger.

From the birth of the first railway to the eve of the founding of the People's Republic of China, China's railway has experienced an arduous and tortuous development process. In 1876, Wusong Railway, the first commercial railway in China, was completed and opened to traffic. It was planned by the United States and forcibly built by Britain without the consent of the Qing Government.

In October 1921, the first Communist party organization among Chinese railway workers was established in Changxindian Machine Factory. In the subsequent wave of revolution, railway workers, under the leadership of the Communist Party, resisted imperialism and road bureau abuse and disregard for workers, making an important contribution to the struggle for workers' rights. Railway workers also responded to the call actively, as an essential force in the Chinese revolutionary front organized forces to participate in the Northern Expedition, and laid a vital foundation for the return of the right of way to the people after the founding of the People's Republic of China.

Under the leadership of the Communist Party, the railway cause ushered in a new development. The management systems and mechanisms in all aspects of the railway have been facilitated, and a large number of railway-related scientific research institutes and universities have been established one after another, breaking the situation of stagnant development more than 70 years before liberation and moving to the stage of orderly development. In June 1952, Chengdu—Chongqing Railway, the first railway of the People's Republic of China, was completed and opened to traffic, realizing the desire of the Sichuan people to build railway for nearly half a century. In July 1975, the Baocheng Railway completed its electrification transformation, becoming the first electrified railway in China. Its completion opened the prelude to China's railway modernization construction.

Part 2: Vocabulary

epitome	象征
stagnant	停滞不前的
prelude	前奏
modernization construction	现代化建设

Part 3: Commentaries for Long Difficult Sentences

1. The century-old development history of railway is the epitome of the great struggle of the Party leading the people to carry out revolution, construction and reform in the railway field.

铁路百年发展史是党领导人民在铁路领域进行革命、建设、改革的伟大斗争的缩影。

2. Under the leadership of the Party, the railway cause ushered in a new development. In the Party's leadership, the railway cause ushered in a new development.

3. In July 1975, the Baocheng Railway completed its electrification transformation,

becoming the first electrified railway in China.

1975年7月，宝成铁路完成电气化改造，成为中国第一条电气化铁路。

Part 4: Exercise and Activity

1. Please work in pairs to write a composition regarding to the development railway vehicle.

The composition shall incorporate your basic knowledge of railway development. You can write the composition based on your own experience, interviewing other railway workers or you can search it online. Please write at least 200 words and show your own opinion of Chinese railway development.

2. Use mind mapping software to map railway development in the world. If there is no software, you can draw it on the paper.

3. Please translate the following paragraph into English.

高速铁路简称“高铁”，根据国际铁路联盟的建议，是指通过改造原有铁路使其设计速度达到 200 km/h，或新建线路的设计速度达到 250 km/h 以上。其主要技术优势表现在：速度快、旅行时间短，行车密度高、运量大，乘坐舒适性好，土地占用面积小，能耗低，环境污染小，列车运行准点，安全可靠，不受气候影响，社会经济效益好。

4. Please work with your partner to do the role play based on the following dialogue. You can add content and enrich the scene, or you can make your own dialogue based on your own experience.

A: Excuse me, can you help me?

B: Certainly.

A: Can you tell me how to get to Changsha?

B: You can get there by regular train or high-speed rail.

A: What is high-speed rail?

B: High-speed rail is faster than the regular rail. The average speed is about 300 km/h.

A: How much time would I save if I take the high-speed rail?

B: About 2 hours. It only takes 37 minutes from Hengyang to Changsha.

A: Wonderful! How much is the fare?

B: Eighty Yuan. And you can buy the ticket from the TVM. It's very convenient.

A: How often does the high-speed train run?

B: About every half an hour.

A: Oh, good. By the way, the speed is so fast, will I feel uncomfortable?

B: Don't worry. You will feel comfortable because the train runs very smoothly.

A: That's great. I'll take the high-speed train. Thank you very much.

B: You're welcome.



高铁站场景对话

Part 5: Proverbs

1. The early bird catches the worm.早起的鸟儿有虫吃。
2. Well begun is half done.好的开始，就是成功的一半。
3. Where there is a will, there is a way.有志者，事竟成。

Unit 2 To Reach the World and Achieve Development through Opening Up

Part 1: Reading Material



中国铁路发展

Since the 21st century, with the introduction to high-speed rail technology, the railway modernization construction has been accelerated. In 2007, the sixth railway speed increase was officially launched, with the EMU running at a speed of over 200 km/h. Since then, China has entered an era of high-speed railway. In 2009, China's high-speed railway technology realized independent innovation on the basis of its introduction, and successfully realized its role transformation from a runner to a leader. China's railway has achieved new development in traction power transformation, locomotive and rolling stock construction, and supporting transportation equipment, and outstanding achievements have been made in railway modernization. Until now, China's railway equipment, especially high-speed rail equipment products, has been sold to more than 100 countries on six continents, starting the era of China's high-speed railway going to worldwide.

In 2011, the China-Europe international intermodal freight train running between China and Europe and countries along the Belt and Road route was opened for the first time. In July 2014, China's first overseas high-speed railway line, Ankara and Istanbul, was opened to traffic, which is the first electrified high-speed railway project contracted and implemented by Chinese enterprises abroad. In 2012, the construction of the Addis Ababa-Djibouti railway, the first standard gauge electrified railway in East Africa, was the early achievement of the "Belt and Road" initiative and "Ten Cooperation Plan" of China-Africa Cooperation Summit. It is the first railway of the whole industrial chain "going out" of Chinese enterprises overseas, and is known as the "Tanzan railway" in the new era.

Entering the new era, China's railway has achieved independent development at a new starting point. China's railway development has unswervingly taken the road of independent innovation, focusing on tackling independent innovation and industrial application of key

technologies, forming a number of major scientific and technological innovation achievements, such as Fuxing, and high-speed rail technology has reached the world's leading level. Until now, China has become the country equipped with the longest high-speed rail mileage, the highest transportation density and the most complex network operation scenario.

The Communist Party of China (CPC), thoroughly tempered and full of vigor and vitality, has always been in the forefront of the times and achieved the 100-year history of China's railway development. The development of China's railway has witnessed the historical journey of the leadership of the Party and the people in promoting the great rejuvenation of the Chinese nation, and the great leap of the Chinese nation from standing up, getting rich to becoming stronger. A hundred years on from its founding, the Communist Party of China is still in its prime, and remains as determined as ever to achieve lasting greatness for the Chinese nation. Under the strong leadership of the Communist Party of China, we will fulfill the mission of building a strong transportation country and putting the railway first" and realize the great rejuvenation of the Chinese nation.

Part 2: Vocabulary

revolution	革命；旋转
witness	目击；证明；为……作证
arduous	努力的；费力的；险峻的
tortuous	拐弯抹角的；冗长费解的
imperialism	帝国主义
bureau	局，处
stagnant	(经济、社会等)停滞不前的，不景气的
intermodal	联合运输的，用于综合运输的
Communist Party of China (CPC)	中国共产党
unswervingly	坚定不移地
vigor	[生物]活力，精力
vitality	活力，热情
rejuvenation	更新；复苏
Belt and Road Initiative	“一带一路”倡议

Part 3: Commentaries for Long Difficult Sentences

1. Through the continued efforts of the whole Party and the entire nation, we have

realized the first centenary goal of building a moderately prosperous society in all respects.

经过全党全国各族人民持续奋斗，我们实现了第一个百年奋斗目标，在中华大地上全面建成了小康社会，历史性地解决了绝对贫困问题，正在意气风发向着全面建成社会主义现代化强国的第二个百年奋斗目标迈进。

2. Railway workers also actively responded to the call, organized forces to participate in the Northern Expedition, became an important force in the Chinese revolutionary front, and laid an important foundation for the return of the right of way to the people after the founding of the People's Republic of China.

铁路工人还积极响应号召，组织力量参加北伐战争，成为中国革命战线的一支重要力量，为新中国成立后路权回归人民奠定了重要基础。

3. China's railway development has unswervingly taken the road of independent innovation, focusing on tackling independent innovation and industrial application of key technologies, forming a number of major scientific and technological innovation achievements such as Fuxing, and high-speed rail technology has reached the world's leading level.

我国铁路发展坚定不移地走自主创新之路，着力攻关关键技术自主创新和产业化应用，形成了复兴号等一批重大科技创新成果，高铁技术达到世界领先水平。

4. China's high-speed railway technology realized independent innovation on the basis of its introduction, and successfully realized its role transformation from a runner to a leader.

我国高铁技术在引进的基础上实现了自主创新，成功实现了从跟跑者到领先者的角色转变。

5. The Communist Party of China (CPC), thoroughly tempered and full of vigor and vitality, has always been in the forefront of the times and achieved the 100-year history of China's railway development.

中国共产党始终走在时代的前列，砥砺前行，充满生机与活力，成就了中国铁路百年发展历程。

6. The century-old changes of the railway ran through the history of the Party and witnessed the great historical leap of the Chinese nation from standing up, getting rich to becoming stronger.

铁路百年沧桑，贯穿了党的历史，见证了中华民族从站起来、富起来到强起来的伟大历史飞跃。

Part 4: Exercise and Activity

1. Discuss in your group on the relationship between the great rejuvenation of the Chinese nation and railway development, and choose one member in the group to give a presentation.

2. Please work in pairs to make up a conversation regarding the Chinese railway development.

A: Where is your hometown?

B: Well, my hometown is in Zhengzhou.

A: Can you introduce Zhengzhou to us, please?

B: OK. Zhengzhou is called “The city pulled by train” .

A: That’s interesting. Why?

B: Since Zhengzhou is located at the intersection of Longhai Railway and Beijing—Guangzhou Railway, which makes Zhengzhou a national railway hub and known as the heart of China's railway.

A: Yes, I heard that Zhengzhou is the first one who owns “米” (Chinese Character) shaped high speed railway network.

B: I believe your hometown—Zhengzhou will develop increasingly better.

A: Thank you.



郑州铁路
发展对话

Part 5: Proverbs

1. Out of sight out of mind.眼不见，心为静。

2. Strike the iron while it is hot.趁热打铁。

3. Success belongs to the persevering.坚持就是胜利。

Unit 3 Basic Knowledge of Railway

Part 1: Reading Material

1. Railway line

Railway line is the basis of locomotive and train operation. It directly bears the pressure from the locomotive and rolling stock wheelsets. In order to ensure the safety, stability and uninterrupted operation of the train with the maximum speed are specified, so that the railway transport department can complete the passenger and cargo transport task in good quality, and the railway line must always keep in good condition. The railway line is an integral structure composed of subgrade, bridge and



铁路线路

tunnel engineering and rail building. The curve set in the turning place of railway line is circular curve. In general, the larger the radius of the circular curve is, the higher the driving speed can be. But the engineering cost is also higher. Therefore, the circle curve radius can be selected reasonably from large to small according to specific conditions when designing the curve line.

The track plays the role of guiding locomotive vehicles, directly bears the enormous pressure from the wheel, and passes it to the roadbed or bridge and tunnel construction. The track is composed of steel rail, sleeper, ballast, connection parts, anti-climbing equipment and turnout.

2. Station

Station is the main place for the passenger transportation, freight transportation and transportation organization work, which includes a station line, passenger and freight equipment etc. Section is the railway line between two adjacent stations, and a railway line is divided into several sections by the station.

The station is the base for the transport of passengers and goods, where passengers boarding and alighting, freight handling and other related operations are carried out. The station is also the basic production unit of railway transportation. In addition to passengers and freight transport, the train operations such as: the reception, departure crossing and overtaking of trains; the disintegration and marshalling of train sets; replacement and preparation of locomotives; inspection and repair of cars, are carried out in stations.

The station business includes the following three categories. For freight transportation business, the station shall accept, ship, load, unload, keep and deliver the goods handled by the shipper. For passenger transport business, the station shall be the general name of all kinds of work such as ticket selling, waiting, ticket checking, boarding, getting off, outbound checking, visa, refund, etc. For running business, it includes train operation and shunting. The general term of shunting consists of disintegration, grouping, uncouple, coupled and other operations.

Stations are divided into marshalling station, district station and intermediate station by technical operation, and operating station and non-operating station by nature of service. Operating stations include passenger station, freight station and passenger-freight station. Passenger station is the station located in the railway hub, which dedicated to the passenger transport business.

3. Signal and Communication Equipment

Railway signal, in a broad sense, is the general name of automatic



轨道电路

control and remote control technology to ensure the safety of driving, to improve the traffic capacity between sections and stations and the marshalling station. It consists of railway signal infrastructure equipment and railway communication signal system. Railway signal basic equipment includes signal device, track circuit, switch machine, relay and so on, which forms the basis of the signal system. Railway signal is the specific application of computer technology, modern communication technology and control technology in railway transportation production process.

With the advance of information technology and network technology, railway signal and communication has become the "central nerve" of railway from the "eyes" and "ears" of railway transportation in the past, playing an increasingly important role.

The station interlocking equipment is used to ensure the train and shunting operation safety and improve the carrying capacity of the station. Section blocking equipment is used to ensure the safety of the interval traffic and improve the capacity of the interval. Centralized scheduling and dispatching supervision is used for automatic and remote control equipment. Hump signal equipment: equipment for improving the capacity of the solution at marshalling station.

Railway signal is classified as follows: Auditory signal includes horn, whistle, locomotive whistle, sound by sound intensity, frequency and duration difference. Visual signals are divided into fixed signals, mobile signals and hand signals. Railway signaling equipment is installed at fixed points displays signals called fixed signals. Fixed signal is an important part of railway communication signal. According to operation requirements, stop signal is the signal for the train to stop. Allow signal is the signal that requires operation to be slowed down or permits operation at a specified speed

Visual signal includes hand signal, mobile signal, and fixed signal. With color, shape, position, display number, lighting status, such as signal flags, signal lights, signal cards, signal machines, signal indicator, etc.

Part 2: Vocabulary

roadbed	路基
steel rail	钢轨
sleeper	轨枕
ballast	道砟
anti-climbing equipment	防爬设备
turnout	道岔

outbound checking	出站检查
visa	改签
refund	退票
shunt	调车
Auditory signal	听觉信号
locomotive whistle	机车信号
hand signal	手信号
mobile signal	移动信号
communication system	通信系统

Part 3: Commentaries for Long Difficult Sentences

1. The track plays the role of guiding locomotive vehicles, directly bears the enormous pressure from the wheel, and passes it to the roadbed, bridge. The track is composed of steel rail, sleeper, ballast, connection parts, anti-climbing equipment and turnout.

轨道起着引导机车车辆的作用，直接承受来自车轮的巨大压力，并将力传递给路基桥梁。轨道由钢轨、轨枕、道砟、连接部件、防爬设备和道岔组成。

2. The station business includes the following three categories. For freight transportation business, the station shall accept, ship, load, unload, keep and deliver the goods handled by the shipper. For passenger transport business, the station shall be the general name of all kinds of work such as ticket selling, waiting, ticket checking, boarding, getting off, outbound checking, visa, refund, etc.

车站业务包括以下三类。货运业务，车站应当对托运人办理的货物进行接受、运输、装卸、保管、交付业务。客运业务，车站应负责售票、等候、检票、登机、下车、出境检查、签证、退款等各类工作。

3. Railway signal, in a broad sense, is the general name of automatic control and remote control technology to ensure the safety of driving, to improve the traffic capacity between sections and stations and the marshalling station. It consists of railway signal infrastructure equipment and railway communication signal system.

从广义上讲，铁路信号是保证行车安全、提高路段与编组站之间的通行能力和编组站编组能力的自控和遥控技术的总称。它由铁路信号基础设施设备和铁路通信信号系统组成。

Part 4: Exercise and Activity

1. What is the function of railway line?
2. What is the classification of station?
3. Do you think railway signal is important? Why?
4. Please translate the following sentences into Chinese.

Electrified lines would have lower fuel costs. However, there are enough uncertainties in the area of future costs that the tendency in making electrification studies is to use a conservative approach, i. e., to project escalation of electric power rates at approximately the same rate as petroleum fuel costs. This conservative approach reduces the estimated return on investment to a marginal level. This calculation of return on investment is more sensitive to fluctuation in electric power rates and diesel fuel costs than any other single item.

Part 5: Proverbs

1. A pessimist makes difficulties of his opportunities; an optimist makes opportunities of his difficulties. 悲观者让机会沦为困难；乐观者把困难铸成机会。
2. Success is going from failure to failure without losing your enthusiasm. 成功就是经历一次又一次失败后，热情依旧。
3. Books and friends should be few but good. 读书如交友，应求少而精。

Unit 4 Electric Railways

Part 1: Reading Material

The main difference between diesel locomotives and electric locomotives is that the diesel locomotive has to carry around its own power plant (the diesel engine) and the fuel (diesel oil) to operate the plant in order to provide power to drive the locomotive. The electric locomotive is, on the other hand, supplied with power in the form of electricity and generated from many miles away in the generating stations of the normal public electricity grid system.

Electric locomotives can only be used where the railway system has been "electrified" They receive power in two ways-through an overhead wire system, a hinged steel framework on top of the train connects it with the catenary. This framework, called a pantograph, conducts electricity from the wire to a propulsion system that includes the traction motors, which are usually near the train's wheels. These motors turn the driving

wheels, which actually make the train move. A train using a third rail has a metal device called a shoe. The shoe slides along the third rail, conducting electricity to the propulsion system. The train operator uses a device called a master controller to adjust the train's speed.

Catenaries supply power to most intercity electric trains. These trains have one or more electric locomotives that pull strings of carriages or goods trucks. Most electric locomotives weigh between 90 and 180 metric tons and provide about 4000 to 5000 kW. They can reach speeds of over 240 km/h.

A third rail delivers electricity to most intra-urban electric trains. Some intra-urban railcars have their own traction motors, which range from 89 to 210 kW. Others are pulled by locomotives or are connected with railcars that have traction motors. Intra-urban railcars reach maximum speeds of about 80 to 120 km/h.

Electric locomotives have a driving cab at each end, and the space between contains certain items of equipment essential to the functioning of the locomotive. There is an electric motor-driven compressor to provide compressed air for the locomotive air brakes, the train vacuum broken and some of the driving control gear. Electric fans are needed to blow cooling air through the hard-working traction motors. Transformers become hot with continually taking high-voltage electricity and stepping it down to pressures that will suit the traction motors; a pump is needed to circulate cooling oil around them. There are rectifiers to convert AC to DC. A generator is required to charge the batteries and provide current for train lighting. A heating system must also be included to keep the train warm in cold weather.

The most important feature of electric locomotives is their ability to build up speed (or accelerate) quickly, which makes them useful for journeys involving stopping and starting at a lot of stations. They are also very good for continuous high speed running on long journeys where there are few stops or none at all.

Part 2: Vocabulary

traction	牵引力
parameter	参数, 变数
voltage	电压
current	电流
stator	定子
rotor	转子

electrify	使电气化
catenary	接触网
hinge	铰链, 用铰链接合
pantograph	受电弓
accelerate	加速
compressor	压缩机
multiple units	动车组
Contact system	接触系统
Standardized Voltage	标准电压
Third rail	第三轨供电
Overhead lines	接触网供电

Part 3: Commentaries for Long Difficult Sentences

1. The electric locomotive is, on the other hand, supplied with power in the form of electricity, generated from many miles away in the generating stations of the normal public electricity grid system.

另一方面, 电力机车以电力的形式提供电力, 由千里之外的正常公共电网系统的发电站供电。

2. This framework, called a pantograph, conducts electricity from the wire to a propulsion system that includes the traction motors, which are usually near the train's wheels. These motors turn the driving wheels, which actually makes the train move.

这个框架被称为受电弓, 将电力从电线传输到包括牵引电机的推进系统, 牵引电机通常位于车辆车轮附近。这些电动机带动驱动轮, 使列车移动。

3. There is an electric motor-driven compressor to provide compressed air for the locomotive air brakes, the train vacuum broken and some of the driving control gear.

有一个电动驱动的压缩机提供压缩空气, 用于机车空气制动器、列车的真空开断和一些驱动控制装置。

4. A generator is required to charge the batteries and provide current for train lighting. A heating system must also be included to keep the train warm in cold weather.

需要一个发电机来给电池充电, 并为列车照明提供电流。为了在寒冷的天气里保持列车的温度, 还必须安装供暖系统。

Part 4: Exercise and Activity

1. Please fill in the following blanks with the words or expressions you have learned in the material.

Electric locomotives have a driving _____ at each end, and the space between contains certain items of equipment essential to the functioning of the locomotive. There is an electric motor-driven _____ to provide compressed air for the locomotive _____, the train vacuum broken and some of the driving _____. Electric fans are needed to blow _____ air through the hard-working _____ motors.

2. Work in groups with 4-5 members and search online about the composition of catenary. Choose one student in the groups to give a presentation.

3. Role play with your partner based on the following dialogue. You can add content and enrich the scene, or you can make your own dialogue based on your own experience.



A: What is the railway electrification system?

B: A railway electrification system supplies electrical energy to railway locomotives and multiple units as well as trams so that they can operate without an on-board prime mover. Railway electrification has many advantages over alternative forms of traction, but it requires significant capital expenditure for installation.

A: Could you tell us the classification of railway electrification systems?

B: Railway electrification systems are classified by three main parameters: voltage, current, contact system.

A: What are the standardized voltages?

B: Six of the most commonly used voltages have been selected for European and international standardization. These are independent of the contact system used, so that, for example, 750 V DC may be used with either third rail or overhead lines. There are many other voltage systems used for railway electrification systems around the world.

A: Please tell us the types of current.

B: There are two types of current in railway electrification system-direct current(DC) and alternating current(AC).

A: What is feature of the DC voltages?

B: The DC system is quite simple but it requires thick cables and short distances between feeder stations because of the high currents required. The most common DC voltages are 600 V and 750 V for trams and metros and 1,500 V. 650/750 V third rail and 3 kV overhead. The lower voltages are often used with third rail systems, whereas voltages above 1 kv are normally limited to overhead wiring for safety reasons.

A: What is feature of the AC voltages?

B: Alternating current is for overhead electrification systems and can be transformed to lower voltages inside the locomotive. This allows much higher voltages and smaller currents along the line, which means smaller energy losses along long railways. Common DC commutating electric motors can also be fed with AC, because reversing the current in both stator and rotor does not change the direction of torque.

A: How to classify the contact system?

B: Contact system can be categorized into two categories—third rail and overhead line.

A: I would appreciate further details.

B: Most electrification systems use overhead wires, but third rail is an option up to about 1200 V. While using of a third rail does not require the usage of DC, in practice, all third-rail systems use DC because it can carry 41% more power than an AC system operating at the same peak voltage. Third rail is more compact than overhead wires and can be used in smaller-diameter tunnels, an important factor for subway systems. In practice, the top speed of trains on third-rail systems is limited to 100 mph(160 km/h).

A: OK. Thank you so much for telling us all about that.

B: It's my pleasure.

Part 5: Proverbs

1. Adversity is a good discipline. 苦难是磨练人的好机会。
2. Adversity leads to prosperity. 逆境迎向昌盛。
3. A lazy youth, a lousy age. 少壮不努力，老大徒伤悲。