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ZHUZHOU CRRC TIMES ELECTRIC CO., LTD.

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VER3.0

GLOBAL POWER MALL

TECHOLOGY
EXPERIENCE
CAPABILITY

ZHUZHOU CRRC TIMES ELECTRIC CO., LTD.

CONTENTS

ABOUT US

Zhuzhou CRRC Times Electric Co., Ltd. (TEC), a subsidiary company under CRRC, is the world's leading propulsion and control systems provider for high speed trains, EMUs, mass transit, electric locomotives and diesel locomotives.

TEC already applied these solutions for about 10,000 mass transit vehicles, 3,000 mainline locomotives and 9,000 high speed train vehicles/EMUs worldwide.

Other than propulsion and control system, TEC provides integrated electrical package including signaling systems, substation power supply systems, platform screen door systems and key components.

Led by Mr. Ding Rongjun, one of the most reputed academicians of Chinese Academy of Engineering, TEC has become a global power mall for railway transportation with over 800 patents. Experiences worldwide allow TEC to come up with customer-orientated solutions with excellent quality and reliability.

VISION

To be the global leader of electric systems for transportation and energy sectors

MISSION

To drive green transportation and energy sustainable development
To provide a safe and convenient core power for society

1959

Zhuzhou Institute was established

2005

TEC was founded from Zhuzhou Institute

2006

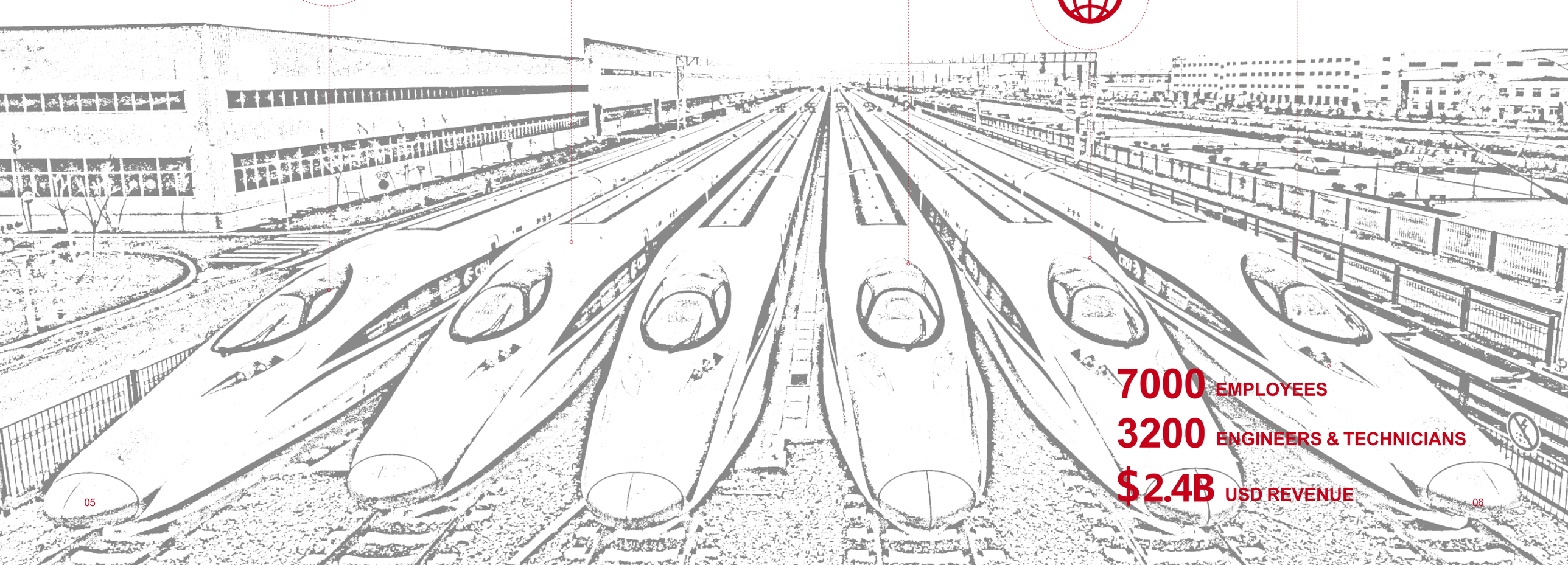
TEC listed in HK Exchange (03898)

2008

TEC acquired UK company Dynex

2015

TEC acquired UK company SMD



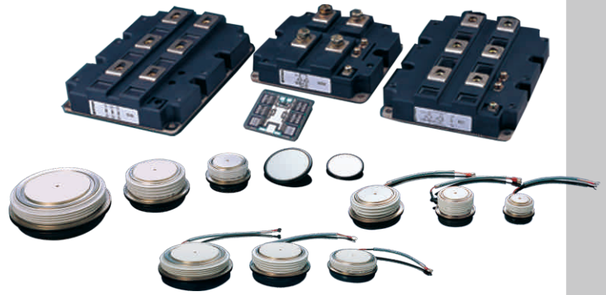
7000 EMPLOYEES

3200 ENGINEERS & TECHNICIANS

$2.4B USD REVENUE

FOCUS
OUTLINE

KEY COMPONENTS



KEY SYSTEMS

FOR

EMU



LOCOMOTIVE





MASS TRANSIT



SIGNALING



POWER SUPPLIER




RAIL MAINTENANCE

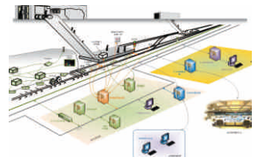
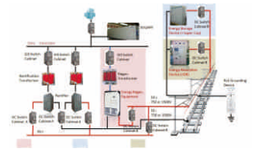


ELECTRIC BUSES AND PASSENGER CARS



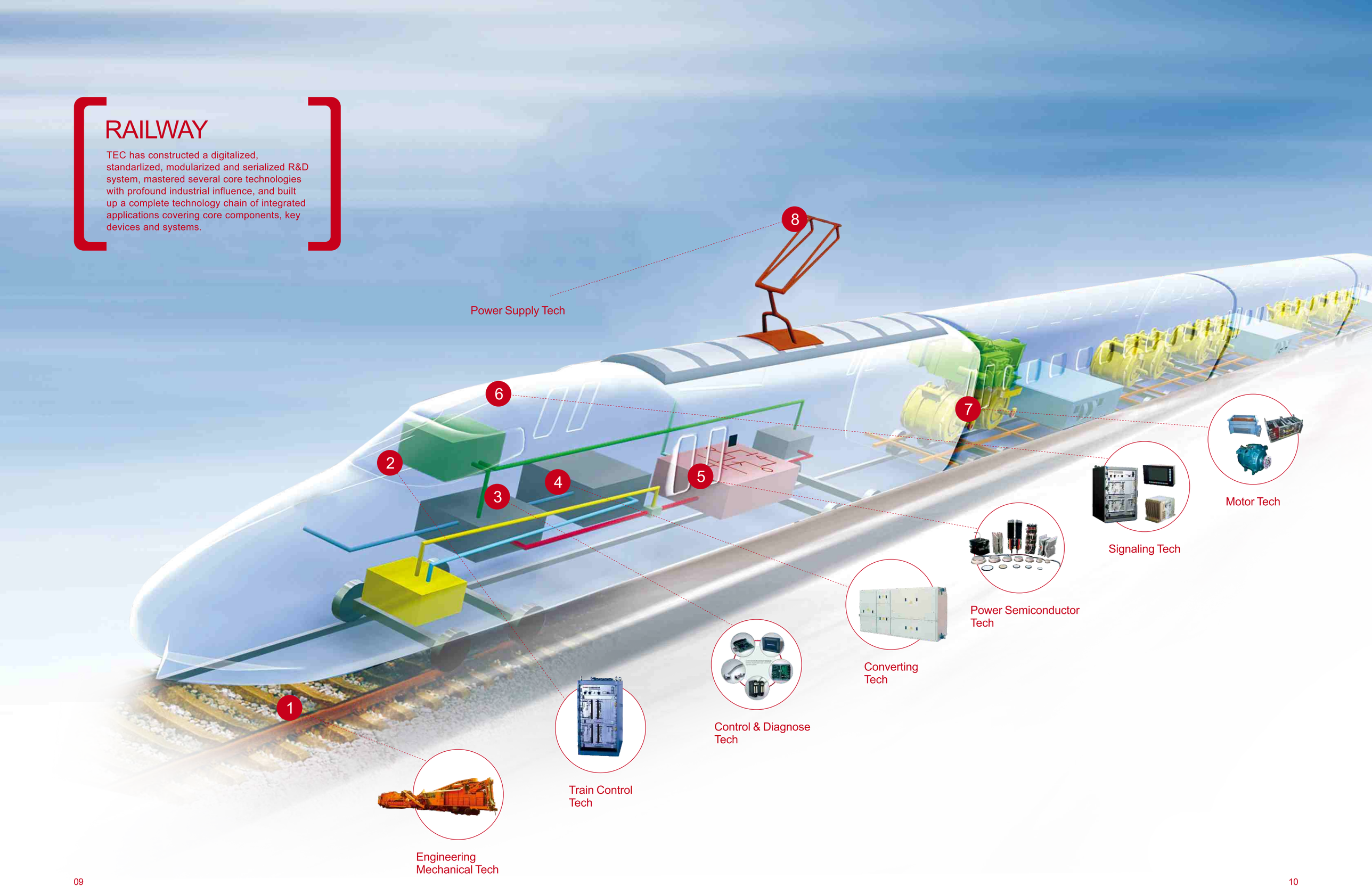
SYSTEM INTEGRATION



RAILWAY

TEC has constructed a digitalized, standarlized, modularized and serialized R&D system, mastered several core technologies with profound industrial influence, and built up a complete technology chain of integrated applications covering core components, key devices and systems.



EMU

TEC has built an electric traction system platform for EMUs at speed of 120-380 km/h.
TEC provides our clients with three main products: EMU traction convertor, auxiliary convertor and network control system;
In addition, TEC has developed train-ground wireless communication devices, axle temperature monitoring devices, water supply and sanitation systems, detection devices, laminated busbar and sensors for bogie instability and other auxiliary products suitable for EMU.

PROPULSION SYSTEM

TEC propulsion systems have been widely used in all series High Speed EMUs such as CRH2、CRH380A、arctic-alpine EMU、CRH380AM inspection van、CRH380AN permanent magnet high-speed EMU. Propulsion systems for intercity EMU have been used in CRH6A、CRH6F、140km/h Dual Voltage EMU, Argentina Roca EMUs.

CONTROL SYSTEM

Control systems can process information control for all parts of EMU through distributed collection, remote diagnosis, network transmission, centralized processing and analyze in real time.

SIGNALING SYSTEM

Train Safety Monitoring Devices (LKJ and related products) have been installed and used in more than 500 high-speed EMUs covering 60% of the domestic market. Moreover, the products have been exported to Central Asia and other countries and regions.

CTCS-2 Train Control System On-Board Equipment (ATP) has been installed and used in more than 200 CRH5 trains and 19 CRH2 trains.

LOCOMOTIVE

TEC has more than 50 years of experience in design, production and service for AC electric drive systems of locomotives;

TEC provides high-performance traction convertors, auxiliary convertors, network control systems and other components for mainline electric locomotives and diesel locomotives.

PROPULSION SYSTEM

TEC can provide traction convertors, auxiliary convertors, network control systems, CMD and 6A information products for 6-axles and 8-axles all series passenger and freight locomotives.

CONTROL SYSTEM

The network control system is developed based on IEC61375 hardware platform and IEC61131-3 software platform.

TRAIN SAFETY MONITORING DEVICES

Our system has been installed and used in more than 20,000 sets of various locomotives. Moreover, the products have been exported to Central Asia and other countries and regions.

MASS TRANSIT

We have mastered core technologies of three key systems, namely "traction system, signal system and braking system" and also have made revolutionary innovation in on-ground power supply system, rail transit door system and other fields.

1 AUTOMATIC TRACTION SYSTEM

Including three on-board electric subsystems: AC electric drive system, train control and diagnostic system and auxiliary convertor system.

2 DOOR SYSTEM

platform screen doors and safety doors are installed to enhance operation safety coefficient, improve passenger waiting environment and reduce operating costs.

3 GROUND POWER SUPPLY SYSTEM

Including the rectifier units, high-voltage switchgears, DC switchgears, braking energy processing units and harmonic control units.

4 SIGNALING SYSTEM

We have independently developed ATS & interlocking subsystem, in which, the ATS System has passed safety certificate of TUV Rhine and acquired SIL2 certification in 2013. The Interlocking System has acquired SIL-4 certification in 2015. These have been installed in Changsha Metro Line 2 in 2014 and Changsha Maglev Line in 2016.

RAIL MAINTENANCE VEHICLE

TEC is engaged in R&D, manufacturing, overhaul, sales, supporting services and import & export businesses of the six-series engineering machinery and electric control systems.

These products are widely used in transport of people, tools and materials, traction & shunting operation, emergency rescue, OCS installation, maintenance and inspection, track internal flaws detection, railway status patrol inspection, railway grinding, clearance detection, environment conditions detection and can be applied to different kinds of track gauge like 1000mm, 1435mm, 1520mm and 1676mm depending on customer's requirements.

HEAVY RAIL CAR SERIES
CATENARY WORK CAR SERIES 2
CRANE RAIL CAR SERIES
TEST TRAIN SERIES 1
LARGE-SCALE TRACK MAINTENANCE MACHINERY SERIES 3
METRO CAR SERIES

1
INSPECTION VEHICLE

Track Patrol Inspection Vehicle for track section detection, track patrol inspection, under track clearance detection.

OCS Inspection Vehicle for OCS geometry parameters detection (by pantograph), video detection of environment conditions, trackside electrical facilities patrol inspection & precise positioning.

The main models include: JX300 and JX600.

2
OVERHEAD CATENARY MAINTENANCE OPERATING CAR

Different types of overhead catenary maintenance operating cars are used for installation, daily inspection& maintenance of overhead catenary system of electrified railway line, also used as traction vehicle.

Model DPT is adopted with triple-platform operation mechanism, levelling mechanism and conductor pulling equipment, the overhead catenary system can be installed if customer needs.

3
RAIL FLAW DETECTION VEHICLE

Used for rail internal flaw and rail profile inspection and rail track status patrol inspection with three major detection systems:
Track internal flaw detection system by using ultrasonic wave to detect the inside of track flaw.
Track profile contour detection system by using laser photographing technology to measure the track profile contour from track bottom to the top surface of track.
Railway status patrol inspection system by using high definition camera to photograph railway status.

NEW
INDUSTRY

DEEP-SEA EQUIPMENT INDUSTRY

In 2015, we acquired the British company Specialist Machine Developments (SMD), the second largest global provider of deep-sea robots, and started to extend core technologies in deep-sea robots and other high-end deep-sea equipment.

ELECTRIC PASSENGER CARS DRIVE SYSTEM

Making the best advantages of rich application experience in IGBT, we set foot in motor drive systems for electric cars in 2002, and we started to develop drive systems for passenger cars in 2011. We are engaged mainly in production of electric drive systems (including power module, motor controller and assembling thereof) for electric passenger cars to meet the needs of different clients.

NEW INDUSTRY

HIGH VOLTAGE SOFT START SERIES PRODUCTS

With our“high voltage start series products”we offer an answer to the starting problems of high power motors. Our products have different voltage classes ranging from 3.3 to 12kV with a maximum power capacity up to 50 megawatts. Those can be found usable in industries such as paper making, petroleum, steel and more.

POWER QUALITY PRODUCTS

Throughout our platform design products, we offer 8 series of power quality products: FC, TSC, TCR, SVG, APF, DVR, RPC and hybrid control devices. There are (1) three-phase SVC designed valve sets with a maximum voltage ranging from 60 to 35kV and (2) single-phase SVC designed valve sets with a maximum voltage of 27.5kV. The maximum designed capacity ranges from 300 kVA to 100 MVA. The control system already establishes a standard, while it also offers direct-66kv-light-triggered valve technology. Our SVC technology offers solutions matching those at an international advanced level.

Our SVG Dynamic Reactive Power Compensation Device series covers a maximum designed voltage range from 3kV to 10kV and a maximum designed power capacity from 200kVA to 15MVA. Our portfolio also includes a 35kV SVG that supports water and wind cooling, an energy fusion based power quality device and an APF + HPF vehicle net resonance suppression device.

PV POWER GENERATION SYSTEM

TEC is committed to provide high quality, high cost performance assembled electrical equipments of PV power generation system, and to provide system integration solutions based on reliable, economical, safe and high efficiency optimum balance system. We are an integrated solution supplier from core components, core electrical equipments to power plant systems.

CONVERTERS FOR MINING TRUCK

Our“high-power AC drive electric wheel traction system”is composed of ACUs, ECUs and traction converters. We offer traction systems for platforms of 60 to 240 tonnes and platforms of 60 to 400 tonnes.

Our products are highly adaptable to the environment and withstand intense vibrations, high altitudes, extreme temperatures and harsh conditions such as dust, rain and snow.

INVERTERS FOR CENTRAL AIR CONDITIONING

We have inverters for conventional and photovoltaic air conditioners. There are 2 product platforms with 16 series products and a power range from 180kW to 1300kW; a power supply of 380/690V. Moreover, our productions also can match 300RT~2000RT centrifugal chillers.

Our production has adopted an advanced control technique for electrical machinery. Compared to a traditional air conditioning unit, we offer a product with an accurate temperature control, effective anti-surge and 40% less energy consumption.

Our smart construction design allows the product to be directly mounted onto a water chilling unit, allowing the user to save on valuable space and cost. With its small body, but high power density, our product is highly energy efficient in its cooling technology. At the same time, it is highly reliable with an operation time of more than 21000 hours. Due to its features, our products find wide application in nuclear power, ships, factories, hospitals, airports and more.

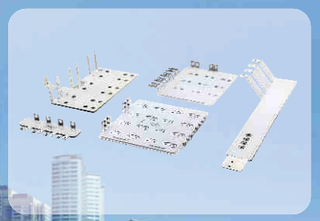
KEY COMPONENTS

SENSOR

We have 12-series products of more than 600 specifications in six major categories: current sensor, voltage sensor, displacement sensor, pressure sensor, speed sensor and temperature sensor, which are widely used in rail transit and industrial fields.

SEMICONDUCTOR

In 2006, TEC successfully developed the world's first 6"thyristor.
In 2014, China’s first 8" IGBT chip production line was put into production.
China's only manufacturer with full set of technologies for thyristor, IGCT, IGBT, GTO and diode, etc.



LAMINATED BUSBAR

With low impedance and inductance, high reliability and safety as well as other advantages, laminated busbar is widely used in rail transit, energy, military, shipbuilding, communications, power transformation and industrial fields.

OIL DAMPER

We have more than 30 years experience in R&D, manufacture, testing of oil dampers for railway rolling stock and maintenance machinery.
We have more than 100 kinds of products which include oil dampers for locomotives, maintenance vehicles, passenger cars, EMUs and pantograph damper, etc.

VEHICLE DOOR

We have mastered core technologies such as EDCU, mechanical drive, structure and locking sealing, etc.
Welding and bonding systems have passed the international certifications EN15085 CL1 and DIN6701 A1.
Electric door controller satisfies all requirements of the SIL2 certification, adopts an advanced vector control algorithm, and offers heath monitoring and wireless debugging functions.

RAILWAY TOILET SYSTEM

We own three key technologies: contaminant collecting system integration technology, containment dumping technology and sewage treatment technology.
These technologies applied in six fields: EMU, passenger car, locomotive, maintenance vehicle, inter-city train and metro.
We have 7 products lines: vacuum dejectas collecting systems for passenger cars, sanitary water supply system for EMUs,integrated bathrooms for locomotives, sanitary water supply systems for maintenance vehicles,sewage discharge systems for mainline platforms,sewage collection systems for inter-city and metro platforms, and MBR integrated post treatment equipments.

MANUFACTURE CAPABILITY

As an enterprise of vision, we have distributed our business in more than 20 cities and regions at home and abroad and have constructed a large-scale modern industrialized manufacturing base of over 300,000 m^2 with various modernized production lines. Moreover, with a specialized manufacturing management system, we are able to provide optimal products and the best solutions to worldwide clients.

Zhuzhou West Riverbank Base

Shenyang Railway Transportation Industrialization Base

Ningbo Sensor Industrialization Base

Hangzhou Railway Transportation Industrialization Base

Kunming Railway Transportation Industrialization Base

Zhuzhou Tianxin Industrial Base

Zhuzhou IGBT Wafer Industrialization Base

Zhuzhou High power Semiconduction Base

Baoji Railway Transportation Industrialization Base

Guangzhou Railway Transportation Industrialization Base

Qingdao Railway Transportation Industrialization Base

Dynex Semiconduction Industrialization Base in UK

Newcastle SMD Deep—sea Equipment Industrialization Base in UK

TESTING CAPABILITY

With a number of national key laboratories and test centers, we ensure high-quality product development and testing.

- Electric Traction System Laboratory
- Passenger-car Electrical System Laboratory
- Motor and Transformer Laboratory
- E-Product Consistency Laboratory
- Large-scale Mechanics Laboratory
- Wireless Information Technology Laboratory
- Electromagnetic Compatibility Laboratory
- TUV CE Collaborative Laboratory
- Electrical Equipment Reliability and Environmental Engineering Laboratory






CERTIFICATION

Spearheading and participating in the formulation of 40% international industry standards issued by the National Technical Committee 278 on Electric Traction Equipment and Systems for Railways of Standardization Administration of China (TC 278)





- ISO certification issued by BSI Pacific Co., Ltd. (BSI)
- EN 15085 CL1 certificate issued by the International Institute of Welding (IIW)
- IRIS Certification approved by UNIFE
- CMMI DEV ML-3 Certification Assessment Certificate
- TUV "Safety Integrity Level 4" Independent Safety Assessment Certificate
- Energy Management System Certification

MARKETING AND SERVICES

Innovating, manufacturing, marketing and servicing globally.

- **4** Overseas Subsidiaries
- **2** Overseas M&A Subsidiaries
- **1** Overseas Manufacturing Base
- **16** Overseas Service Sites
- **8** Overseas R&D Centers

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