

TBEA

ELTEC
GREEN ENERGY

特变电工

电气装备集团有限公司

TBEA ELECTRICAL EQUIPMENT GROUP CO.,LTD.

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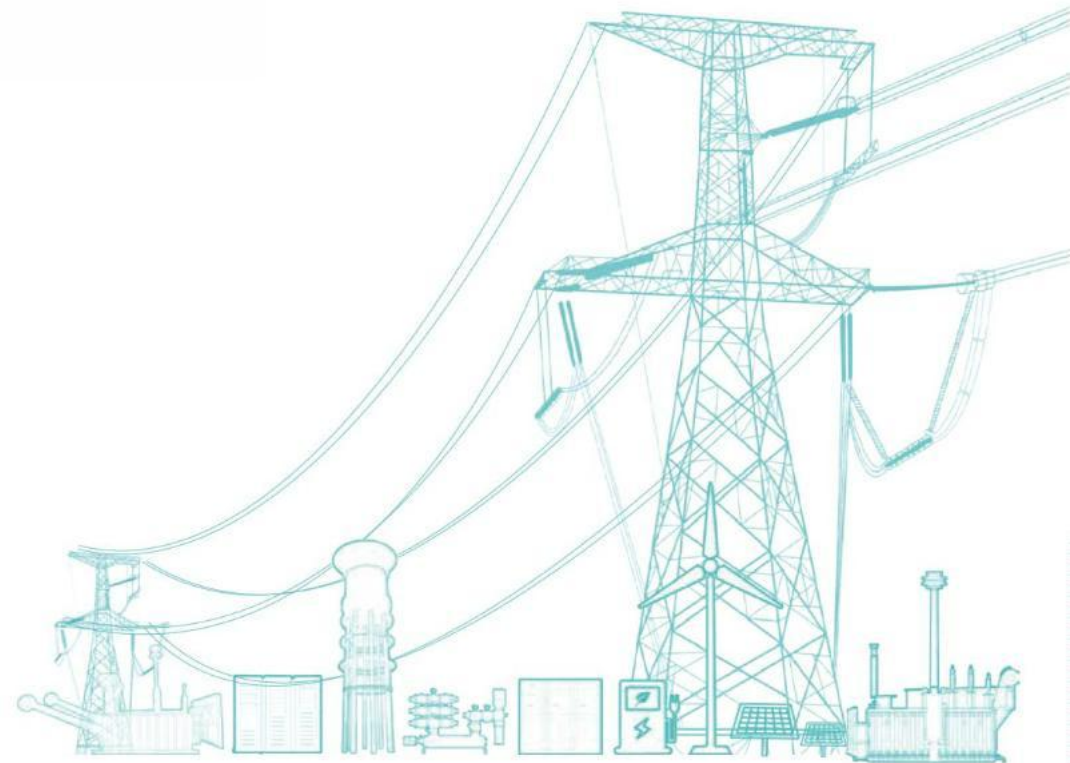
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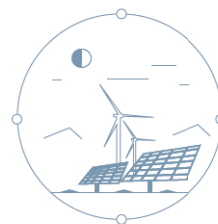
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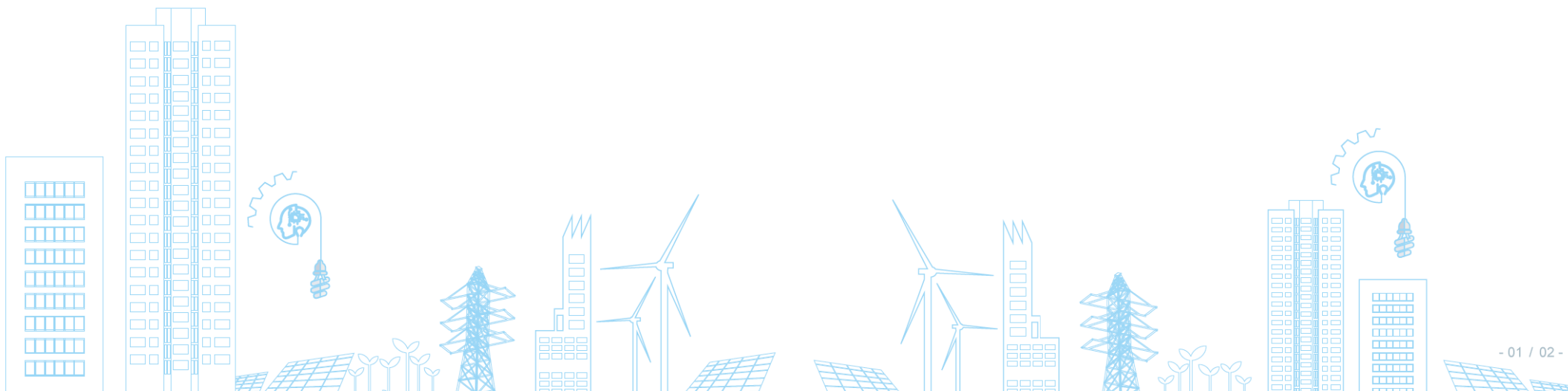
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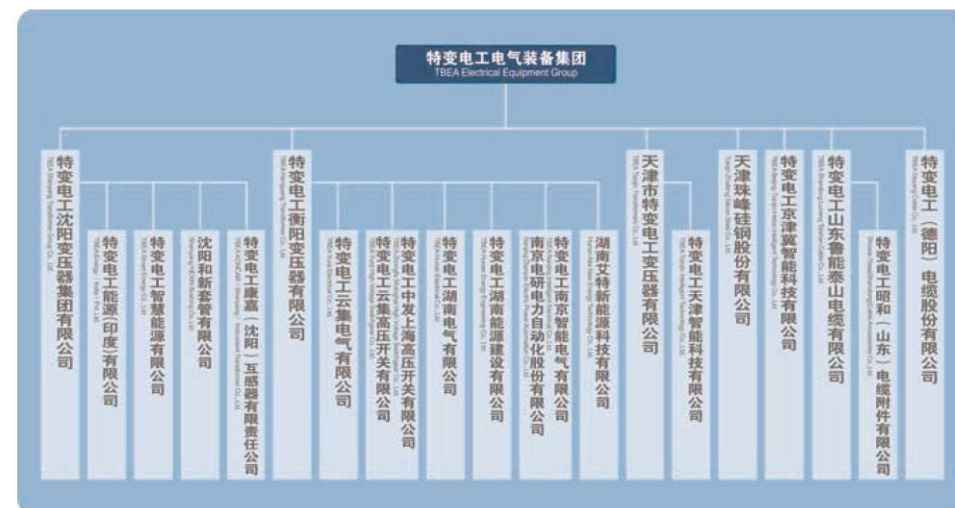
About TBEA Electrical Equipment Group Co., Ltd.

TBEA Electrical Equipment Group Co., Ltd. (hereinafter referred to as "Electrical Equipment Group") is a service provider that provides system solutions for the global energy industry, and is a large energy equipment manufacturing enterprise group in China. It has formed a development pattern of "one body and two wings" with the manufacturing industry as the main body and the domestic manufacturing service industry and the international manufacturing service industry as the two wings. Adhering to the independent innovation of science and technology, the Group has won 2 "National Science and Technology Progress Awards", 4 "National Science and Technology Progress Awards" and 3 "China Machinery Industry Science and Technology Progress Awards", has applied for more than 1,200 patents and software Copyrights, and participated in the formulation and revision of more than 210 national and industry standards.

Electrical Equipment Group has more than 80 years of transformer and more than 70 years of cable development history, successfully built transformers, cables, switches, bushings, transformers, power secondary, offshore boost station integration, substation operation and maintenance, energy storage power station and new energy charging station

investment, construction and operation and maintenance services in the field of power transmission and transformation industry chain integration services. It has fully participated in the construction of a number of national strategic UHV projects and major national energy projects such as "West power transmission to the East", "Anhui power transmission to the East", "QingTibet Networking", "Xinjiang power transmission to the outside world", and "Three Gorges Project".

Electrical Equipment Group has built 11 domestic digital industrial parks as well as overseas R&D and manufacturing bases such as India. It has set up more than 100 offices around the world, providing green technology, intelligent environmental protection, reliable and efficient energy equipment to more than 90 countries and regions, and providing turnkey projects from survey, design, construction, installation and commissioning to training, operation and maintenance for more than 30 countries along the "Belt and Road", including Tajikistan, Angola, Bangladesh and Mongolia. It has promoted the construction of green and efficient power grids and made positive contributions to the construction of the core area of the Silk Road Economic Belt.





National Award for Science and Technology Progress / China Machinery Industry Science and Technology Award

Scientific and Technological Innovation

Adhering to scientific and technological innovation as the primary driving force for development, the Group achieved 111 major breakthroughs in independent technologies, 59 of which were the first in the world and 52 were the first in China; It has a total of 1,168 authorized and valid patents; Participated in the formulation and revision of more than 210 domestic and foreign industry standards. It has three national-level major innovation platforms, including the National and local Joint Engineering Laboratory for UHV transmission and transformation Equipment Manufacturing Technology and the National Industrial Product Quality Control and Technology Evaluation Laboratory. It has 14 provincial-level science and technology innovation platforms and 23 national high-tech enterprises. It has won 8 national science and technology Progress awards, 67 industry level science and technology awards, 10 China Patent Awards, and 97 provincial major science and technology and patent awards.



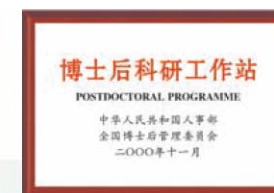
Talent management



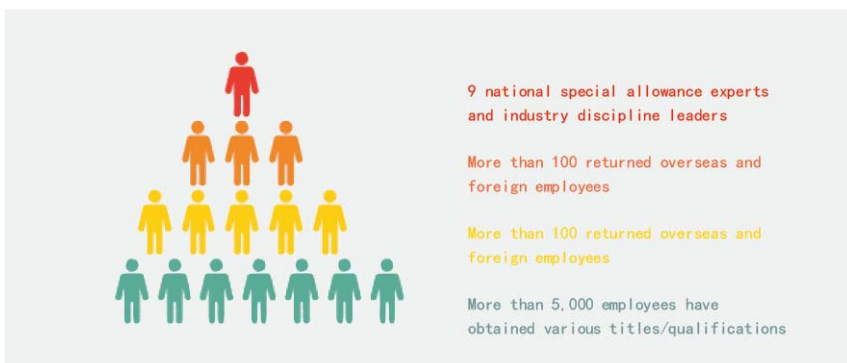
Signing Ceremony of Special Agreement on Industry-University-Research Collaboration between TBEA and Tsinghua University



TBEA and North China Electric Power University jointly build an integrated industry-university practice center on July 27 2018.



The group has always adhered to the strategy of talent development and built a talent team with global competitiveness. With the long-term in-depth cooperation with 6 academicians of the two institutes, there are 9 experts and industry leaders who enjoy the subsidies of The State Council, more than 900 people with master and doctor degrees, and more than 85% of employees with college degrees or above. Five provincial-level skill master studios have been built, and one national artisan, one national technical expert and 15 provincial-level artisans have been cultivated and incubated.



"One body, two wings" development strategy

"Two wings"——

International Manufacturing Services

- TBEA Energy (India) Ltd
- Power equipment integrated export
- International power project general contracting

"One body"——

High-end Equipment Manufacturing Industry Chain

- Transformer industry**
 - UHV field, nuclear power field, hydropower field, thermal power field, new energy field, distribution network field, dry transformer, bushing, transformer, core components
- High and low voltage switch industry**
 - GIS, Circuit breaker, isolation switch, GIL, low and medium switch complete sets of equipment (AIS and C-GIS), primary and secondary fusion column circuit breaker, ring cage, polysilicon reduction furnace, electrolytic water hydrogen power supply, medium voltage flexible interconnection equipment, low voltage power quality device, transformer supporting end control products
- Wire and cable industry**
 - Overhead transmission wire, high voltage, ultra high voltage cable, medium and low voltage power cable, high-end equipment cable, high-end home decoration cloth wire, cable accessories
- Electric power secondary industry**
 - Substation integrated automation and relay protection, distribution network automation, monitoring system and integrated energy management, new generation camera system, new energy booster station secondary system
- System integration**
 - Offshore wind power system integration, pre-installed, mobile substations, distributed photovoltaic power stations, charging stations, industrial and commercial energy storage power stations, intelligent household light storage systems

"Two wings"——

Domestic Manufacturing Service Industry

- Engineering business: Power transmission and transformation project general contracting, high voltage cable system integration integration business, new energy project general contracting
- Repair and operation maintenance
- Electric power research training
- Charging station construction and operation
- Remanufacturing center
- 物流业务

The transformer manufacturing of the Group began in 1938, and it is the leader of the technology development of China's transformer industry, the standard-setter and the cradle of industry talent training. The product range covers 10k~1000kV transformers and reactors, $\pm 200\text{kV}$ ~ $\pm 100\text{kV}$ converter transformers, And successfully developed China's first 110kV, 220kV, 330kV, 500kV, 750kV, 1000 AC and $\pm 200\text{kV}$, $\pm 500\text{kV}$, $\pm 800\text{kV}$, $\pm 1100\text{kV}$ converter transformers.

Shenyang high-end equipment intelligent factory



Centering on the national dual-carbon strategy and the new power system development plan, the Group undertook the research and development of major national power transmission and transformation engineering equipment. It has undertaken a series of major national energy projects and key scientific and technological research tasks, including the world's first 1000kV UHV AC test demonstration project, $\pm 100\text{kV}$ UHV direct current transmission project, 1 million kW of large-scale hydropower, 1 million kW of supercritical and ultra-supercritical large-scale thermal power, and 150,000 kW of large-scale nuclear power. It provides a strong guarantee for the implementation of the strategy of "coal from the air and electricity to the whole of China" and the sustainable development of both eastern and western regions of China.

Hengyang high-end equipment intelligent factory



Advanced manufacturing and testing equipment

The group has 14 sets of automatic lamination robots, 11 sets of digital insulation processing centers, 34 sets of intelligent vapor phase drying system, 25 sets of core transverse cutting lines, 8 sets of core longitudinal cutting lines and a large number of advanced performance of transformers, reactors special production equipment. It has 19 test halls: 4 UHV test halls, 4 UHV test halls, 3 distribution transformer test halls, 5 dry transformer test halls, 2 UHV bushing test halls, and 1 transformer test hall, all of which are equipped with the world's most advanced test equipment and instruments. Among them, the Earth 1100kV UHV test hall is one of the largest and most advanced test halls in China's transformer industry. It adopts a 6-side double shield "Faraday cage" (electromagnetic shielding and noise shielding) structure, and the background amplifier can be as low as 5pC. With AC 1000kV, DC ± 1100 kV and below voltage grade products test capability.



Automatic lamination robots



CNC pad punching line



Welding robot

 ± 1100 kV UHV test hall

The Group has the world largest and highest-level full-enclosed, air conditioned and dust-free modern workshops. It also has the world's most advanced tank workshop that operates fully with automatic welding robot. The Group has the capability of manufacturing products with voltage level from 10kV to 1000kV and its annual production capacity for transformer reaches 120 million kVA.



1000kV/1500MVA single-phase auto-transformer with the highest voltage class and the largest capacity in the world

Industry's first set of products

- 1800kV 720MVA power frequency testing transformer with the world's highest voltage level and maximum capacity
- 1700kV 630MVA Single-phase air-cooled testing transformer with the world's highest voltage level and maximum capacity
- ± 1100 kV 607.5MVA converter transformer with the world's highest voltage level and maximum capacity
- 1100kV 320MVA single-phase parallel reactor with the world's highest voltage level and maximum capacity
- 1000kV 1500MVA on-site assembly of UHV transformer with the world's highest voltage level and maximum capacity
- 1000kV 3×1000 MVA single-phase autotransformer with the world's highest voltage level and maximum capacity
- 1000kV 3×400 MVA world first single-phase generator booster transformer with the world's highest voltage level and maximum capacity
- 800kV 1140MVA first three-phase integrated transport transformer with the maximum capacity in China
- 800kV 140MVar single-phase shunt reactor with the world's maximum capacity
- ± 800 kV 5000A dry flat wave reactor with the world's highest voltage level and maximum current
- ± 800 kV 5000A dry hollow bridge arm reactor with the world's highest voltage level and maximum current
- 750kV 3×700 MVA single-phase autotransformer with the world's maximum capacity
- 750kV 1230MVA three-phase field assembly generator transformer with the world's maximum capacity
- 750kV 110MVar magnetically controlled shunt reactor with the world's maximum capacity
- 500kV 240MVar three phase integrated reactor with the world's maximum capacity
- 500kV 70MVar single-phase shunt reactor with the world's maximum capacity
- 500kV 860MVA three-phase combined transformer with the world's maximum capacity
- 500kV 3×500 MVA single-phase autotransformer with the world's maximum capacity
- 500kV 700MVA world first single phase nuclear power main transformer with the world's maximum capacity
- 500kV 480MVA three-phase pumped storage transformer with the world's maximum capacity
- 500kV 334MVA single-phase vegetable oil transformer with the world's maximum capacity
- 220kV 360MVA three-phase integrated transformer with the maximum capacity for domestic transmission
- 110kV 50MVA intelligent on-load voltage regulating dry transformer for outdoor precast cabin with the world's maximum capacity
- 66kV 12.5MVA first offshore wind power tower special natural vegetable oil environmental protection transformer with the maximum capacity in China
- 35kV 298MVA first deicing transformer with the maximum capacity in China
- 10kV world first combined type transformer for on-load capacitor-voltage regulation photovoltaic

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UHV field

DC product

Converter transformer is the key equipment in DC transmission project, which represents the development direction of green energy saving power transmission in the world. Taizhou, Yazhong - Nanchang, Baihetan - Jiangsu, Jinshang - Hubei, Northwest Yunnan - Guangdong, Guanyinyan DC and other major UHV DC power transmission project product development tasks, $\pm 800\text{kV}$, $\pm 1100\text{kV}$ high-end rheoconverters market share of more than 30%.



ZZDFPZ-607500/875-1100 converter transformer, used in Changji-Guquan UHVDC transmission project



ZZDFPSZ-404000/500-100 converter transformer, used in Minyue network DC project



ZZDFPZ-415000/500-800 converter transformer, used in Baihetan - Zhejiang $\pm 800\text{kV}$ UHV DC transmission project



DFPSZ-RZ-460000-500 on-load voltage regulating flexible DC transformer, used in Chongqing and Hubei DC back-to-back flexible DC networking project

AC products

The group is the core supplier of national UHV AC project main equipment, Has undertaken the southeast of Shanxi - Nanyang - Jingmen experimental demonstration project, Anhui power transmission to the east, Northern Zhejiang - Fuzhou, Ximeng - Shandong, Beijing west - Shijiazhuang, Mengxi - Tianjin South, Yuheng - Weifang, Ximeng - Shengli, Shandong Ring network, Chuan-Chongqing Network, Zhangbei - Xiong 'an, Nanchang - Changsha, Huangshi 1000kV It is the main supplier of UHV AC transmission equipment for the two networks, and the market share of 1000kV UHV transformer products reaches 35%.



ODEPS-1000000/1000 transformer, applied to the world's first commercial operation of southeast Shanxi - Nanyang - Jingmen 1000kV UHV AC test demonstration project Hubei Jingmen station



ODEPS-JT-1500000/1000 The world's highest voltage grade, maximum capacity single-phase autotransformer

As one of the key equipment in the power transmission and transformation system, the reactor provides inductance for the system, plays the role of reactive power compensation, limiting short circuit current, suppressing harmonics and so on. As the largest reactor production R & D manufacturing base in China, the Group has participated in the construction of many UHV lines, and the R&D and manufacturing level of 500kV, 750kV and 1000kV reactors is leading in the world.

1000kV reactor



BKD-320000/1100 Is the world's first single-phase single-column shunt reactor with the highest voltage class and the largest capacity, which is applied to Ximeng Station of Ximeng-Shengli UHV AC power transmission and transformation project.

1000kV transformer



PKDGKL-800-5000-75 The world's highest voltage level, the highest current dry wave reactor, used in Baihetan - Zhejiang ± 800 kV UHV DC transmission project.



RKDGKL-800-1472-40 The world's first ± 800 kV dry hollow bridge arm reactor, used in Wudongde power station to transmit power to Guangdong and Guangxi UHV multi-terminal DC demonstration project



Nuclear power field

Nuclear power is an important measure to meet the sustainable development of China's economy and society, optimize the energy structure and ensure energy security. The Group is one of the three enterprises in China with the qualification of nuclear power transformer design and manufacturing, and has undertaken projects including CGNPC Hongyan Nuclear Power Plant, CGNPC Taishan Nuclear Power Plant, Huaneng Shidaowan Nuclear Power Plant, Shanghai Nuclear Engineering Institute Guangdong Lianjiang Nuclear Power Plant, CGNPC Xudabu Nuclear Power Plant, Jiangsu Nuclear Power Tianwan Nuclear Power Plant and Hainan Changjiang Nuclear Power Plant. As well as Pakistan's Karachi nuclear power plant, Chashma nuclear power plant, "Hualong One" demonstration project and other nuclear power projects, the market share of nuclear power main transformer exceeds 50%.



DFP-450000/500 transformer, used in Karachi nuclear power project in Pakistan



SSP-H-860000/500 combined transformer is used in Xiluodu hydropower Station

Technological · Believable · Eco-friendly · Advanced

Hydropower field

Hydropower is an important clean and renewable energy. It plays an important role in improving the energy structure, ensuring energy security, reducing greenhouse gases, protecting the ecological environment, and promoting high-quality economic and social development. The group can provide transformer, GIS, transformer, secondary relay protection system and other power transmission and transformation products for the hydropower field. In recent years, it has participated in the supply and service of power transmission and transformation products for all large hydropower stations in China, and has successively provided main transformer products and services for hydropower projects in the Yangtze River, Yellow River, Wujiang River, Beipanjiang River, Lancang River, Jinsha River, Yalong River, Dadu River and other river basins. The market share exceeds 50%.



DFP-260000/220 变压器, transformer, used in Hainan Changjiang Nuclear Power Plant



SSP-840000/500 transformer, used in the world's largest hydropower station - Three Gorges hydropower Station

The pumped storage power station has flexible start and stop, rapid response, and has many functions such as peak load and valley filling, frequency regulation, phase regulation, emergency backup, etc. The group provides products and services for Wuling Company's Heifengfeng, Anhui Xiangshuijian, Jiangxi Hongping, Jiangsu Liyang, Anhui Jixi, Jilin Dunhua, Heilongjiang Huanggou, Liaoning Qingyuan, Fujian Yongtai, Zhejiang Ninghai, Zhejiang Jinyun, Nanwang Qingyuan, Shenzhen, Hainan Qiongzong, Guangdong Yangjiang, Guangdong Meizhou pumped storage power stations, with a market share of more than 50%. It has made important contributions to the development of national hydropower resources and the comprehensive development of ecological environment.



SSP-420000/500 pumped storage transformer is applied to Pingjiang pumped storage power station in Hunan Province



SSP-480000/500 pumped storage transformer is used in Yangjiang pumped storage power station in Guangdong Province

Thermal power field

Through technological upgrading, thermal power generation is moving forward in a more efficient and cleaner direction. The Group has undertaken the supply task of more than 30% of the main transformer of mega thermal power plants of National Energy Group, Huaneng, Huadian, Datang, SDIC Power, China Resources, Shenhua, Jingneng, Sichuan Energy Investment and other companies, providing equipment support for sub-critical, supercritical and ultra-supercritical power generation.



SFP-JT-1230000/750 The world's largest capacity 750kV field assembly generator transformer, used in Ningxia Fangjiazhuang power plant



DFP-400000/1000 The world's first 1000kV generator transformer put into commercial operation, applied to Anhui Huainan Pingwei power plant



The group has built intelligent dry-type transformer manufacturing bases in Tianjin, Shenyang, Hengyang and other places, with a series of advanced equipment such as CNC winding machine, low-voltage foil winding equipment, epoxy pouring equipment, curing furnace, and assembly table, and has jointly developed dozens of the industry's first set of equipment with domestic equipment manufacturers. The maximum lifting weight of the vehicle is 100 tons. The system integrates CRM, SCM, PLM, ERP, MES, SCADA, WMS, LIMS, OA and BI using the industry's first CNC winding machine, high-frequency induction welding technology and AI-based visual quality inspection. It has a research and development capability of 63000kVA/110kV dry-type transformer, dry-type transformer for onshore and offshore wind power engine room, traction rectifier dry-type transformer for subway, pumped storage dry-type transformer, dry-type transformer for photovoltaic power generation, amorphous alloy dry-type transformer, and three-dimensional coil core dry-type transformer.



"丰" Type Final Assembly Line



The Industry's First Transformer Pressing Robot



Automatic Pouring Equipment



Tianjin intelligent manufacturing base

TBEA

The factory construction is guided by lean digitalization, adopts the new technology of Industry 4.0 to build a unified enterprise digital platform, open up the end-to-end LTC data flow for contract performance, smooth the transfer logistics from intelligent bank to station, and establish a SCADA management closed loop for quality inspection automation. Build a manufacturing cloud management and control platform based on the cloud edge technology architecture, realize order allocation, advanced scheduling, cost analysis and quality consistency control based on data drive, create a new model of "unified standard, centralized control, local production, collaborative operation" in the dry transformation industry, and support the management reform of "unified market, unified technology, unified supply chain and unified production" in the dry transformation industry. Help to achieve the goal of world-class dry transformation research base. The factory has been identified as the national dry-type transformer intelligent manufacturing demonstration factory unit, the national 2023 industrial Internet factory pilot demonstration, the national green factory, Tianjin Smart Factory, Tianjin 5G fully connected factory, etc.

装备中国 装备世界

TBEA 科技创新推动高质量发展绿色电力助力美丽中国

Tianjin smart factory workshop

Core Products

The first commercial operation 50000kVA/110kV outdoor intelligent on-load voltage regulation dry-type transformer with the largest capacity

The product has high insulation level, strong overload capacity, high mechanical strength, maintenance-free structure, low loss, low temperature rise, low noise, low partial discharge, high flame retardancy, weather resistance, etc. The product equips with a comprehensive intelligent operation status warning system, which can further improve the reliability of the product. The product has been witnessed on-site by the National Transformer Quality Supervision and Inspection Center, and its performance parameters fully meet and exceed the relevant standards, reaching the international leading level.



High-Capacity Pumped Energy Storage SFC Input and Output Dry-Type Transformer

SFC Input/Output Dry-Type Transformers are core equipment for power generation and startup of power units in pumped hydro energy storage power stations. Currently, the company's largest product capacity reaches 30,700kVA, successfully providing multiple capacity products for Pumped Energy Storage Stations of 22,136kVA, 25,000kVA, 26,248kVA, 28,000kVA, 30,200kVA, 30,700kVA, etc.



Wind Turbine Nacelle-Mounted Dry-Type Transformer

The product is developed through serialization, with a capacity ranging from 3MW to 20MW, and has been widely used in wind power projects at domestic and overseas. The product is installed inside wind turbine nacelles at heights ranging from tens of meters to over a hundred meters above the ground, capable of operating in high-altitude environments, and has passed comprehensive type tests including short-circuit and vibration tests, representing the industry's most advanced design and manufacturing level.



24-Pulse Traction Rectifier Dry-Type Transformer for Rail Transit

Adopting a double-winding double-split structure, the product has strong overload capacity, meeting the requirements for heavy traction Class VI overload, and good safety performance. It is widely used in city metro projects in Tianjin, Hangzhou, Nanjing, Dalian, Shenzhen, Shenyang, Luoyang, Jinan, etc.



Energy-efficient Class 1 Dry-Type Transformer

The company took the lead in completing the certification of class 1 and class 2 energy efficiency products in accordance with the National Standard GB20052, with capacities ranging from 100kVA to 2,500kVA. The energy consumption during operation of the products is significantly reduced, and the operational economy is significantly improved.



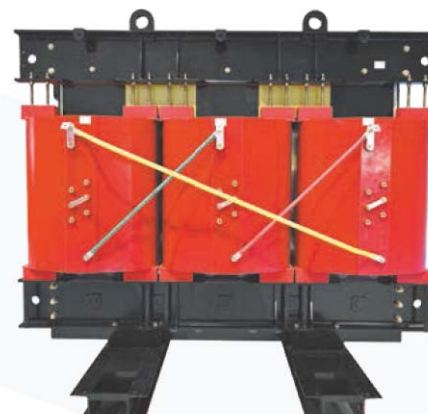
Digital Dry-type Distribution Transformer

This product has online monitoring functions for temperature rise, voltage, current, power and power factor, partial discharge, realizing the full life cycle management of the product. It can quickly detect and handle faults, improve power supply reliability, and enhance the intelligence level of the product.



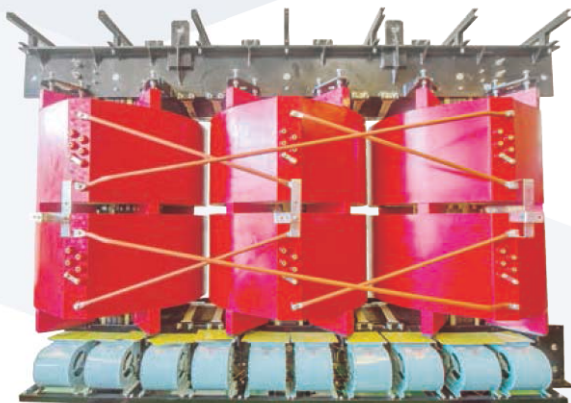
Amorphous Alloy Dry-type Transformer

This product meets the GB20052 Energy Efficiency Standard, with low no-load loss, significant energy saving effects, low operating noise, and is used in projects such as China Mobile, China Unicom and data centers.



Polycrystalline Silicon Reduction Furnace Rectifier Dry-type Transformer

This product is used in the field of polycrystalline silicon production with a complex structure and high technical requirements. It is a very critical equipment in the polycrystalline silicon production process providing power to the reduction furnace.



Water-Cooled Transformer for Offshore Wind Power Tower

This product is built-in for offshore wind power towers, with an outer shell and water-cooled radiator, suitable for the special operating environment of offshore wind power towers.



The group has 6 production lines for three-dimensional core and stacked core distribution transformers, American-style and European-style box transformers, equipped with 53 advanced winding machines, 10 vacuum drying tanks, 9 intelligent warehouses, 5 online detection oil injection ports, 3 intelligent oil injection systems, 3 fully automatic busbar processing centers, 2 heavy-load plate chain lines, as well as several world-leading production and testing equipment such as automatic transformer oil detection, online oil system detection, component testing, AI visual appearance testing, intelligent testing, etc., realizing the automation of manufacturing equipment, intelligent warehousing logistics, and digitalization of production processes. It has the research and development and manufacturing capabilities of 110kV electric furnace transformers, ice melting rectifiers, 35kV reactors, 66kV offshore wind power special transformers, vehicle-mounted mobile substations, prefabricated substations (prefabricated cabins), 35kV renewable energy American-style box transformers, 35kV renewable energy European-style box transformers, 35kV new energy Chinese-style box transformers, amorphous alloy three-dimensional wound core box transformers, 9240kVA string-type intelligent photovoltaic box transformers, overseas photovoltaic container box transformers, offshore floating box transformers, distribution-type European-style box transformers, photovoltaic box integrated inverter, transformer-substation energy storage converter integrated unit, European-style Centralized Energy Storage Integrated System, 5250kVA Chinese-style series-string integrated system, and R&D and manufacturing capabilities of other product.



Copper Busbar Composite Processing
Center Production Line



Box Transformer Coil Machine
Vision Inspection System



Distribution Transformer
Intelligent Test Station

Hunan / Tianjin Electric Distribution Transformer Intelligent Factory





The factory adopts a tree-like, island-type layout, simplifying logistics and transportation, improving production flexibility, and using the industry's first pipelined process layout including material management, production, drying and testing to ensure the smooth sharing of material flow, equipment flow, production flow, and data flow, equipped with a series of world-leading production and testing equipment such as Tuboly automatic winding machine, THz drying technology, ICT intelligent machine vision inspection system, copper busbar composite processing center, intelligent test station, etc., to achieve manufacturing equipment automation, warehousing and logistics automation, and digitalization of production processes.

Renewable Energy Field

Box Transformer

Box-type substation is a compact, prefabricated indoor or outdoor distribution equipment that integrates high-voltage switchgear, distribution transformers, and low-voltage distribution devices according to a specific wiring scheme. It has the advantages of compact structure, good heat dissipation, strong weather resistance, convenient maintenance, reliable operation, and safe and environmentally friendly features. The product is widely used in new energy fields such as wind power and solar power generation, and is also extensively applied in industrial parks, residential areas, commercial centers, and high-rise buildings.



Combined Transformer
(American-type Transformer)



High and Low Voltage Preinstalled Substation
(Chinese-type Transformer)



High and Low Voltage Preinstalled Substation
(European-type Transformer)

Box-type Integrated Machine

Photovoltaic Box Inverter Step-Up Integrated Machine

The group relies on strong energy equipment manufacturing capabilities, integrates 10kV/35kV efficient oil-immersed (dry-type) medium-voltage transformers, inverters, independently develops photovoltaic box inverter and transformer, and provides customers with megawatt-level turnkey solutions. The product has the advantages of high integration, small volume, multiple visible breakpoints protection, deep integration of auxiliary functions, convenient and safe intelligent maintenance, short construction period, high investment cost performance, etc.



Box-type Energy Storage Converter Integrated Machine

The group integrates box transformers, PCS energy storage converters, communication power cabinets, power supply auxiliary transformers, and bases, independently develops box-type energy storage converter integrated machine. The product adopts modular design, plays a role in peak shaving and valley filling of energy storage systems, effectively shortens on-site construction time, maximally reduces construction period and cost, is environmentally friendly, energy-saving, and efficient.



》 Distribution Network Field

Distribution Transformer

The group has the most advanced production line for distribution transformers, transformer physical and chemical laboratories, and intelligent transformer test stations in the industry, capable of mass producing over 80 specifications of S18, S20, S22, SH25 series distribution transformers. The products have low losses, low noise, coreless design, low temperature rise, compact structure, high short-circuit resistance, and aesthetic appearance, widely used in urban and rural power grid new construction and renovation projects, and exported to multiple countries in Europe, Asia, Africa, and other regions.



SBH25-M-200/10 Amorphous Alloy Transformer



SZBH21-M · RL-200/10 New Energy Efficient Amorphous Alloy Three-dimensional Wound Core Wideband Load Regulating Distribution Transformer



S22-M-630/10 Stacked Core Distribution Transformer



S22-M.RL-200/10 Three-dimensional Wound Core Distribution Transformer



SBH25-M-RL-200/10 Amorphous Alloy Three-dimensional Wound Core Transformer

》 Other Fields

Ice-melting Rectifier Transformer

The ice-melting rectifier transformer can be manufactured as movable and fixed according to the usage characteristics. Different design schemes can be reasonably selected according to user requirements, effectively controlling the voltage difference on both valve sides, which can be controlled to a minimum of less than 0.25%. The adjustment range of the wide side voltage can reach more than 3 times, and the maximum number of pulses can reach 12 pulses. The ice-melting rectifier transformer independently developed by the group has won the first prize of national scientific and technological progress.



Traction Transformer

The traction transformer independently developed by the group has the characteristics of high overload capacity, strong resistance to frequent short circuits, small size, low loss, high capacity utilization, etc. The world's first batch of 330kV AT power supply traction transformers developed for Zhengzhou-Xi'an High-speed Railway, Shenzhen Metro, and Xiamen Metro fill the gap in the domestic market for this type of product and its sudden short-circuit test, providing solid power equipment support for the rapid development of China's railway construction.



Electric Furnace Transformer

The group can produce a variety of electric furnace transformers, including 10kV to 220kV arc furnace transformers, mineral heat furnace transformers, electric slag furnace transformers, power frequency induction furnace transformers, and ladle refining furnace transformers. The products have the characteristics of strong overvoltage resistance, high mechanical strength, good path resistance capability, large insulation safety redundancy, low temperature rise, strong overload capacity, flexible product design, long service life, and good performance.



The group owns the largest industry scale of transformer components, the highest degree of automation, and the most complete product line in the intelligent manufacturing research and development base. It focuses on the three major areas of new energy, ultra-high voltage, and distribution network, and can provide core products such as iron cores, oil tanks, valves, radiators, corrugated oil tanks, new energy box transformer casings, oil storage tanks, rubber seals, intelligent components, etc. These products are widely used in many national key demonstration projects such as the Three Gorges Power Station, Qinghai-Tibet Railway, Lanzhou to Guanting 750kV, Jindongnan 1000kV, Wudongde ± 800 kV ultra-high voltage transmission and transformation projects. It is a stable supplier for more than 100 large state-owned enterprises, joint ventures such as CRRC, Shandong Electrical Engineering & Equipment Group Co., Ltd., Hitachi Energy, Siemens, Xiaoxing, and others. The products are exported to international markets such as the United States, South Korea, Japan, Egypt, India, Vietnam, Indonesia, Saudi Arabia, UAE, Brazil, Thailand, Myanmar, Colombia, and other countries.



Automatic Welding Robot for Fuel Tank



Automated Flexible Production Line for Corrugated Fuel Tank



Automated Production Line for Fixtures

Hengyang High-end Component Intelligent Factory



The Group promotes the strong chain, supplementary chain and extended chain of transformer components, invests 1.5 billion yuan to build a high-end intelligent manufacturing base of transformer components, and enters the ranks of domestic and international advanced intelligent manufacturing factories. Among them, the 10kV corrugated tank production line is the world's first self-developed production line, which realizes production automation, intelligence, product standardization, uniformity and consistency of the manufacturing process, with one tank coming off the production line every 6 minutes. Every year, the company provides 300,000 sets of valves to domestic and international customers, occupying 70% of the domestic market, and running 3.3 million sets of products.



Core Products

The product has excellent heat dissipation performance and oil saving characteristics, good structural strength and reliable sealing. Through the fully automated heat sink molding and welding production line, oil collector processing line, sheet and tube welding production line, inner wall cleaning and painting line and exterior painting line and other advanced automated production equipment, and the heat sink using stamping and molding and pre-oil removal, medium-frequency welding power supply and other advanced technology, oil collector tube application of the shot peening process, cleaning line is equipped with automatic on-line detection and compensation device and other key process control, to ensure the precision of the size of the radiator, the quality of the welding, the quality of the internal cleanliness. The cleaning line is equipped with automatic online inspection and compensation device and other key process control to ensure the precision of radiator size, welding quality and internal cleanliness.



Chip Radiator

Transformer Oil Tank

The main products are 35kV, 110kV, 220kV, 300kV, 500kV, 750kV, 1000kV transformer and reactor tanks, ± 200 , ± 400 , ± 600 , ± 800 converter tanks, special products such as the tanks of nuclear transformers, furnace transformers, vehicle-mounted transformers, base station transformers, tower transformers, nacelle transformers, offshore wind turbines and so on. The products are coated with anticorrosive grade C3, C4, C5, CX, UV resistant, and can be used in high salt spray and marine climate.



Corrugated Oil Tanks for Transformer

The products are subjected to high-frequency aging and vibration to eliminate stress, and gas-liquid double sealing type testing to realize zero leakage in the whole life process; the corrugated tanks have applied advanced coating technology in the industry, such as frame shot blasting pretreatment process, excellent pretreatment process (degreasing, rust removal, salinization), inner wall paint filling process, and outer wall robotic automatic spraying process, and the coating, the film thickness is uniform and can be up to 80-160 μm , and the adhesion can reach ISO2409-1992 standard 0-I level, and meet the environmental requirements in ISO12944 standard C3 level and above.



Renewable Energy Box Transformer Oil Tank

The Group introduces key automation equipment and fulfills the production requirements of advanced production, reliability and scale with new technologies and processes. The main production including Chinese-type oil tanks and American-type oil tanks, and special products such as vehicle-movable transformers, tower transformers, nacelle transformers and offshore wind power fuel tanks. The products are coated with anticorrosive grade C3, C4, C5, CX, and the products are UV-resistant and can be used in high salt spray and oceanic climate environments.



Corrugated Metal Oil Storage Cabinet

The product has the advantages of reliable structure, accurate oil level display, full sealing, long life, lifelong maintenance-free. Adopting stainless steel core body for volume compensation, completely isolated from air, to ensure that the transformer oil is not contaminated by deterioration, the core body can choose 304 and 316L material, life expectancy of up to 30 years. Corrugated core can withstand 13Pa full vacuum without deformation, with life of more than 15,000 times without damage, can simultaneously output 4-20mA, RS485 and other intelligent signals. The oil conservator has passed the appraisal of Hunan Electricity Academy Inspection Group, Shenyang Transformer Research Institute and other organizations, with stable performance and reliable operation.



Valve Product

Specializing in the production of transformer butterfly valves, ball valves, gate valves, check valves, globe valves, welding valves, intelligent electric ball valves and other types of valves, with the smallest diameter of 25mm, the largest diameter of 350mm. The production of intelligent electric ball valves, new check valves, low-temperature valves, high temperature and high pressure valves has formed a number of series of products, with nominal pressure of 0.5MPa-6.4MPa; the lowest temperature can reach -60°C , the highest temperature can reach 200°C . According to different environmental conditions, there are steel, brass, bronze, stainless steel materials for choice.



Rubber Product

The Group has specialized in the production of various rubber sealing products for power transmission and transformation industry for more than 30 years. The materials include nitrile rubber, acrylate rubber, fluorine rubber, fluorosilicone rubber, hydrogenated nitrile rubber, silicone rubber, EPDM rubber, etc. The performance of the materials meets JB/T8441-2018. The performance of the material is in accordance with JB/T8448.1-2018. The rubber products can also be produced according to customers' special requirements. The products have stable sealing performance, long service life and complete specifications.



Component Product



Pressure Relief Device
(GCRD)



Intelligent Maintenance-Free
Moisture Absorption



Intelligent Gas Relay



Forged Double Float Gas
Relay



Resin Product
Relay

The Group can provide processing and production of high-end silicon steel sizing strips, core post materials, transformer cores, amorphous coiled cores and other products. It has a production capacity of 200,000 tons per year. Through the advanced longitudinal shear, transverse shear, strip vertical storage and other equipment cooperate with MES, SCADA, set cutting and other software, it can achieve first-class quality, first-class efficiency of information technology, digitalization, intelligent silicon steel processing service goals, and provide customers with green energy-saving iron core products.



Fully Automatic Slitting Line



Jörg Robot Palletizing and Cutting Line



Core Intelligent Test System

Tianjin High-end Component Intelligent Factory

天津高端装备制造产业园
TIANJIN HIG-END EQUIPMENT MANUFACTURING INDUSTRIAL PARK

The constant temperature, constant humidity and dust-free digital workshop planned and constructed by the factory according to the concept of Industry 4.0 and based on the characteristics of the segmented industry, realizes the fully automatic, floor-to-ceiling and assembly line production of iron cores from raw materials to finished products, and ensures excellent and stable quality of iron cores through careful crafting of the products, precise processing, and automatic on-line inspection.

Core Products

10kV Distribution Transformer Core

High quality cold rolled silicon steel such as Baowu and Shougang are selected, and advanced shear line is adopted to minimize the shear stress. Sheets are transferred by fully automatic stacking machine and stacked automatically by robots, which reduces the impact of sheet transfer and stacking process on the sheets and realizes uniform and consistent seams. Small no-load loss, low no-load current and low noise ensure the consistency of product performance.



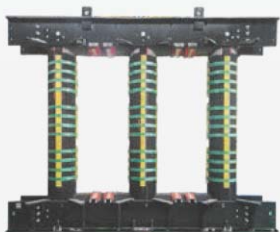
35kV American-type Transformer Core

Selecting high-quality cold-rolled silicon steel such as Baowu and Shougang, adopting the advanced technology of continuous cutting and stacking, supporting no hole-punching, multi-step, full-series shearing, fully automatic stacking, etc., realizing the minimization of shearing and stacking stresses and robotic control of stacking seams. With low no-load loss, low no-load current and reliable quality, the products bring customers green energy saving and stable and reliable product value experience.



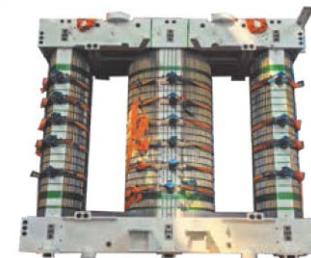
Dry-type Transformer Core

Selecting high-quality cold-rolled silicon steel such as Baowu and Shougang, going through a number of robotic automatic stacking production lines, using self-leveling brushing process, in order to achieve the product no-load loss is small, low no-load current, low noise and other performance based on the core products to greatly enhance the aesthetics and weather resistance, to bring customers green energy-saving, stable and reliable and more durable life of the product value of the experience.



Power Transformer / Specialty Transformer Core

By monitoring the key performance of silicon steel, online size monitoring to ensure shear accuracy, a full series of shearing 12 pieces of material at a time to reduce the sheet deviation, scientific quantification of the core clamping and column lashing force to play the conductive magnetic properties of silicon steel, the core flip up using a rigid hydraulic flip platform to ensure that the finished core product original optimal performance, to ensure that the size of the core of electric power transformers and the performance of the high degree of reliability.



Amorphous Three-Dimensional Coiled Core

Amorphous three-dimensional coiled core no-load loss up to "GB 20052-2020" in the 1 level energy efficiency standards, reduced by 50% -70% of the required value, the core noise 100% to meet the transformer noise requirements.



Sheet Material Column (10kV-110kV)

Sheet material output can reach 30,000 tons on the production line, with the full range of cutting to ensure the consistency of the thickness of each level of sheet, automatic measuring instrument to avoid the sheet more than one piece of less than one piece of the situation, high-precision shear to ensure that the processing accuracy of the sheet for customers to maximize the advantages of the performance of the silicon steel to lay a solid foundation for the cutting and processing.



Cut-to-length Silicon Steel (30-1250mm)

The maximum output of strips can be up to 75,000 tons, supporting high-precision shearing of 0.15mm ultra-thin sheets with burrs less than 0.01mm, and online performance and dimensional measurements of each strip through the shearing process, laying a digital foundation for customers to build digital models of the iron core and guarantee product quality transparency.



The Group has an industry-leading R&D and manufacturing base for extra-high voltage bushing, equipped with the industry's only fully-automatic robot assembly line, and a test hall with a background PD value less than 1pC. The Group is capable of producing and testing various types of bushings, including $\pm 1100\text{kV}$ and below through-wall bushing, $\pm 1100\text{kV}$ and below dry-type DC valve-side bushing, and oil-type bushing with a voltage of 1100kV and below.



Bushing Automatic Assembly Line



Ultra-High Voltage Bushing Testing Hall



7.5 m Bushing Core Winding Machine

Shenyang Ultra-High Voltage Bushing R&D and Manufacturing Base



Bushing

The high-voltage and ultra-high-voltage AC and DC bushing developed by the Group has been firstly used in many major projects, such as Baihetan-Zhejiang, Jiuquan-Hunan, Shanbei-Hubei, Qinghai-Henan, Fujian-Yueyue Networking, Yuhang-Weifang, Mengxi-South Tianjin, Zhangbei-Xiong'an, Nanchang-Changsha, Jingmen-Wuhan, etc., and its comprehensive strengths of technology research and development and market share are at the leading level in the industry.



High-tech Enterprise Certificate Specialized and New "Small Giant" Enterprise "Specialized and New" Small and Medium-sized Enterprise



Invention Patent Certificate



Environmental Management System Certificate Occupational Health and Safety Management System Certification Quality Management System Certificate China Machinery Industry Science and Technology Award Certificate Third Prize China Machinery Industry Science and Technology Award Certificate First Prize

Bushing Performance Demonstration



±800kV Dry DC Bushing

Qinghai-Henan
±800kV UHV DC
Transmission Project



1100kV Dry AC Bushing

Fuzhou-Xiamen
1000kV UHVAC
Transmission Project

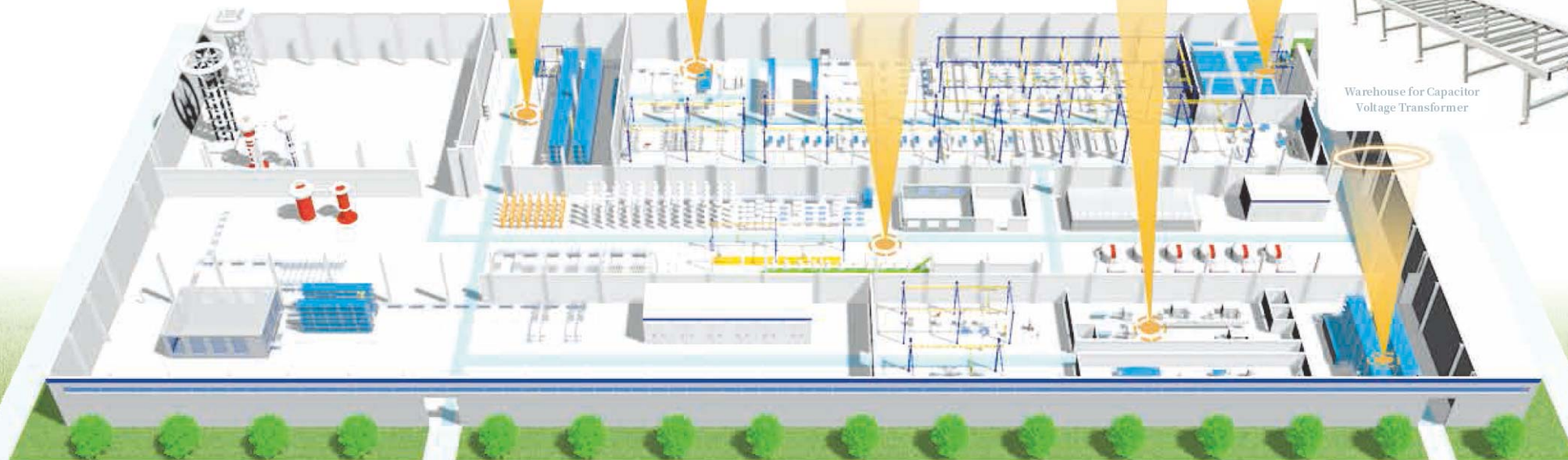


1100kV Oil Paper Capacitor Bushing

Ximeng-Shandong
1000kV UHVAC
Transmission Project

Instrument Transformer Digital factory in Shenyang

The group has a leading digital instrument transformer factory in the industry, equipped with more than 20 sets of industry-leading or innovative intelligent equipment. The level of intelligent manufacturing has reached the forefront of the industry, significantly improved the ability of R&D and manufacturing of instrument transformer products, and achieved industrial upgrading.



Instrument Transformers

The group is committed to the high voltage instrument transformers technology research and product development, providing design, manufacturing, sales, and services for oil immersed current transformers, inductive voltage transformers, combination transformers, SF6 gas insulated current transformers, and capacitor voltage transformers. The product voltage range covers 35kV-1000kV, and the total annual production capacity of various voltage level products can reach 6000 units.



Certificate of High tech Enterprise



Specialized, refined, and innovative "little giant" enterprise



Specialized, refined, and innovative small and medium-sized enterprise

Patent certificate



ISO Certificates



Outstanding achievement



500kV Combined Transformer

800kV Oil immersed inverted type Current Transformer

1000kV Capacitor Voltage Transformer



Shanxi Beiyue 1000kV Substation Project



Baihetan - Jiangsu ± 800 kV ultra-high voltage DC transmission project



Baihetan - Zhejiang ± 800 kV ultra-high voltage DC transmission project



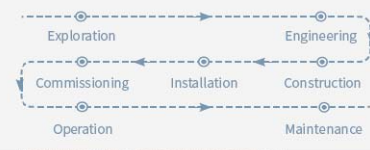
Qinghai - Henan ± 800 kV ultra-high voltage DC transmission project

The Group has two major sections: GIS and MV&LV complete sets. It has built two GIS R&D and manufacturing bases in Shanghai and Hengyang, which is one of the few enterprises that have the R&D ability for 1,100kV UHV switchgears in the industry. It has realized the full coverage of the whole series of HV switchgear products. The products are widely used in national strategic energy field such as large-scale hydropower, large-scale thermal power, and large-scale renewable energy power generation. The Group is also a main HV switchgear supplier that has the most project performance and the longest operation time in the field of offshore wind power in domestic market, providing turnkey and integrated system solutions including exploration, design, construction, installation, commissioning, operation and maintenance for many countries along the "The Belt and Road". The Group has the most advanced digital factory for the MV&LV complete sets of equipment in the industry, and it has the automatic production line with an annual output of more than 60,000 switchgears, which are widely used in important national economic fields and national key projects such as power supply, power grid, petroleum and petrochemical, rail transit, data centers, new energy, and urban construction. It is also a recommended manufacturer and service provider of complete electrical equipment for the construction and renovation of urban and rural smart grids in China.

Yunji Switchgear Intelligent Factory

The factory takes full-process standardization and modular distribution as the core, integrates the concept of lean manufacturing and MRP driven procurement & production, and vigorously promotes the standardization of supply chain procurement; it uses smart logistics and takes final assembly One Piece Flow as the core to promote the "factory on wheels", driving the formation of a logistics layout for three core materials: insulation parts, interior parts, and shells. More than ten sets of intelligent inspection configurations corresponding to digital system have been integrated to further optimize product quality, and the data-driven technology improves the factory's full-process digital governance capabilities.

Integrated Turnkey Project and System Solution



HV Switchgear

The Largest R&D and Manufacturing Base for HV Switchgear in the South of the Yangtze River

1100kV

Enterprises with the R&D Ability for 1,100kV UHV Switchgears

Yunji HV Switchgear R&D and Manufacturing Base

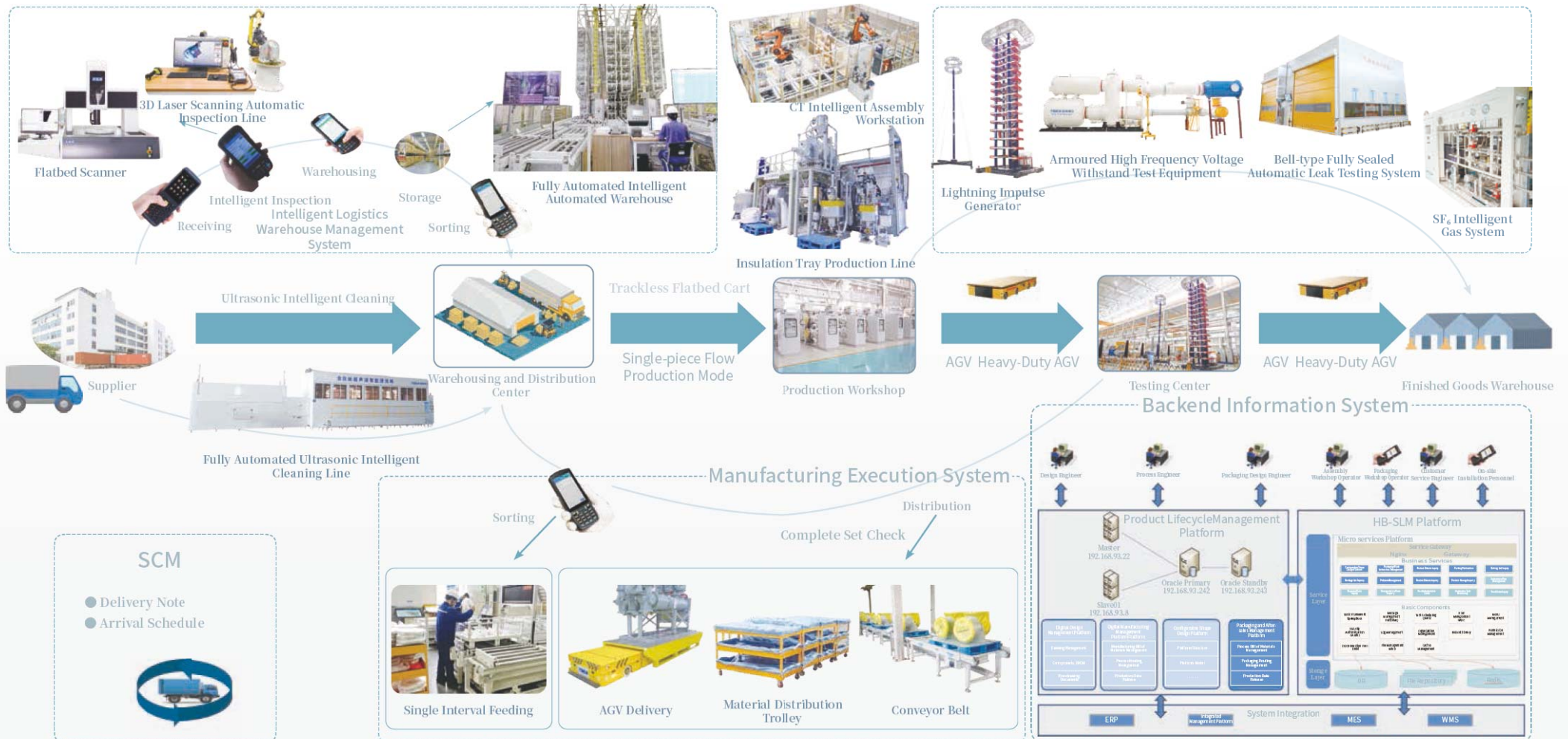


Shanghai HV GIS Switchgear R&D Base

Advanced Manufacturing and Testing Equipment

The Group has a first-class fully-enclosed, fully air-conditioned, dust-proof modern production workshop in the GIS industry, with the capacity of manufacturing 1,100kV and below voltage products. The factory is equipped with more than ten sets of automatic equipment production lines representing the highest level in the industry, such as intelligent CT assembly island, intelligent automatic ultrasonic cleaning line, automatic storage & retrieval system, intelligent SF₆ gas station, intelligent AGV vehicle, flexible KPK assembly crane, etc., which have comprehensively improved its assembly and process support capabilities. The single-piece flow layout adopted is an innovation in GIS factory construction, and integrated collaboration of whole-process digital logistics and production resources enhance the ability to provide differentiated services to customers.

The Group has an industry-leading GIS raw material physical and chemical testing base known as the GIS Intelligent Factory Physical and Chemical Testing Center, equipped with more than 20 sets of intelligent inspection and testing equipment and integrated testing management systems, such as automatic three-dimensional imaging detection line, the bell jar type integral seal leakage test systems, on-line X-ray nondestructive detection system, armored power frequency withstand voltage test system, lightning surge generator, helium mass spectrum insulator sealed test system, hot and humid testing device for high and low temperature alternating, automatic gantry image measuring instrument, etc. The inspection and test capability is at the leading level in the industry.



Core Product

Based on the introduction and absorption of foreign advanced technology, the Group has designed and developed a new generation of high voltage switchgear products, including 126kV, 145kV, 252kV (50Hz/60Hz/ gas mixture), 363kV and 550kV GIS, 145kV porcelain column circuit breaker, 550kV, and 800kV tank circuit breaker; 40.5kV, 126kV, 145kV and 252kV disconnecter, etc. The performance of the products fully meets the IEC/GB/DL standards, reaching the international advanced and domestic leading level of similar products, and has a good operating performance.



T-GCB

800kV T-GCB



126kV Vacuum cut-off environment friendly GIS



420kV GIS



550kV GIS



363kV GIS



126kV HGIS



72.5kV HGIS



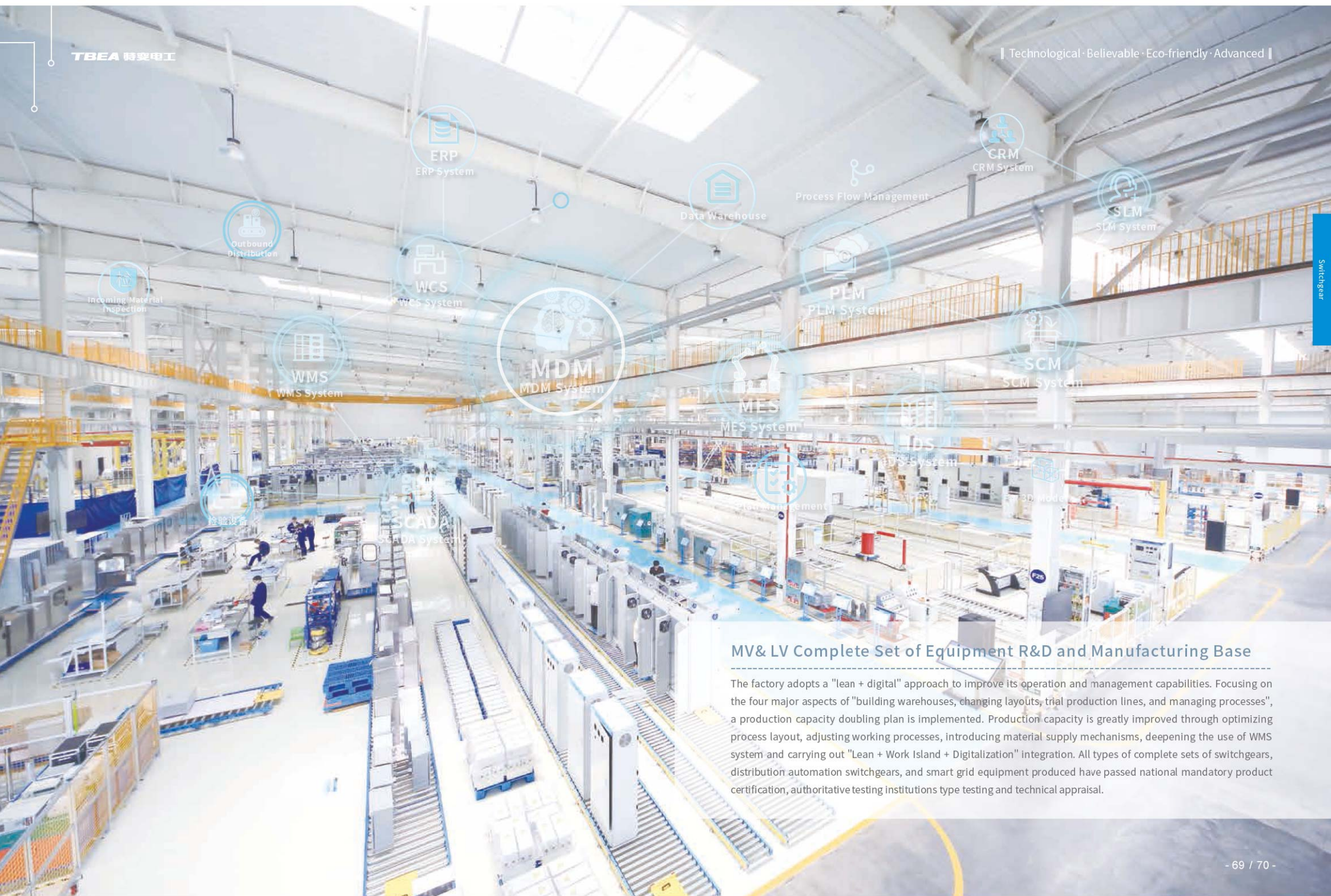
40.5kV HGIS



252kV gas mixture GIS



145kV GIS(50Hz/60Hz)



MV& LV Complete Set of Equipment R&D and Manufacturing Base

The factory adopts a "lean + digital" approach to improve its operation and management capabilities. Focusing on the four major aspects of "building warehouses, changing layouts, trial production lines, and managing processes", a production capacity doubling plan is implemented. Production capacity is greatly improved through optimizing process layout, adjusting working processes, introducing material supply mechanisms, deepening the use of WMS system and carrying out "Lean + Work Island + Digitalization" integration. All types of complete sets of switchgears, distribution automation switchgears, and smart grid equipment produced have passed national mandatory product certification, authoritative testing institutions type testing and technical appraisal.

Advanced Manufacturing and Testing Equipment



Automatic Welding Production Line



Automatic Flexible Sheet Metal Production Line



Automatic Spraying Production Line



Fully Automatic Intelligent Stereoscopic Storehouse



Automatic Production Line of Ring Main Unit



Automatic Copper Bar Production Line



Integrated Control Center

The factory follows the principle of "shortest production distance with no backtracking or crossing routes" and combines uniformity with the flexibility for future scale growth in its scientific layout, and has a series of automated production lines, such as automatic flexible sheet metal production line, automatic spraying production line, automatic welding production line, automatic copper row production line, automatic off-line machine, automatic logistics production line, automatic ring network cabinet production line, HV and LV complete switchgear production line, pole-mounted switchgear production line, etc. According to different voltage grades, the factory has built four functional inspection and testing halls as per different product voltages and one shielded test hall for voltage resistance test and partial discharge test, equipped with more than 30 sets of intelligent inspection and test equipment, such as automatic SF6 integral sealed leakage test system with helium detection, partial discharge frequency voltage withstand test system, etc. The factory has applied 5G communication technology, adopting eight industrial information systems, which are ERP, SCM, MES, PLM, WMS, OMS, SCADA and MDM, to realize equipment interconnection and intelligent production, leading smart manufacturing with advanced inspection and testing ability in the industry.

Core Products



▲ Active Power Filter / Static Var Generator

TBAPF Series Active Power Filters significantly reduce component procurement costs for LV system integrators while ensuring high-quality harmonic mitigation, enhancing business competitiveness. TBSVG Series Static Var Generators offer real-time reactive power compensation by tracking and providing fast dynamic reactive power compensation for the power grid or load side.



▲ MV Flexible Interconnect Equipment

The Group has successfully developed the world's first set of lightweight MV flexible interconnect equipment, enabling flexible interconnections between two distribution network lines. It has the functions of load transfer and flow control and the advantages of cost-effectiveness, compact size, low loss, and low failure rate.



▲ Polysilicon Reduction Furnace Power Supply System

The Group independently developed a polysilicon reduction furnace power supply system, integrating microelectronics technology, power electronics technology, electromagnetic compatibility technology, communication technology, and automatic control technology. The product is of industry-leading core performance parameters and has the advantages of high efficiency, low loss, safety, reliability, and land saving.

▲ 40.5kV High Current SF₆ Inflatable Cabinet

The product solves the issue of high current temperature rise control, occupying a small area and exhibiting strong environmental adaptability. It is maintenance-free for its entire operational lifespan and easy to installation on site, widely used in projects with limited space and high reliability requirements.

72.5kV Inflatable Cabinet for Offshore Wind Power

The new generation of HV switchgear cabinet adopts a 0.04MPa micro-positive pressure N₂+SF₆ mixed gas as the insulation gas medium, utilizes 72.5kV vacuum interrupter technology, and significantly reduces the use and decomposition of SF₆, meeting the requirements of miniaturization, intelligence, and environmental friendliness.

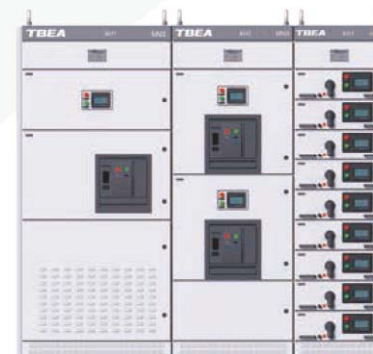


Pole-mounted Circuit Breaker
Integrating with Primary and
Secondary Fusion

10kV Environment Friendly
Gas Ring Main Unit



Primary and Secondary Fusion Gas Ring Main Unit



LV Switchgear



12kV MV Metal Enclosed Switchgear



40.5kV MV Metal Enclosed Switchgear

The Group mainly produces prefabricated substation, mobile substation, switchgear station, ring main unit, cable distribution box, HV and LV switchgear, pole-mounted switch, LV integrated distribution box; and primary system auxiliary equipment including terminal box, control cabinet, neutral point protection equipment, neutral point resistance cabinet, etc; and intelligent instrument and meter products including measure and control devices for compact transformer, temperature and humidity controller, intelligent switch control device, digital display instrument, three-phase multi-function instrument, etc.

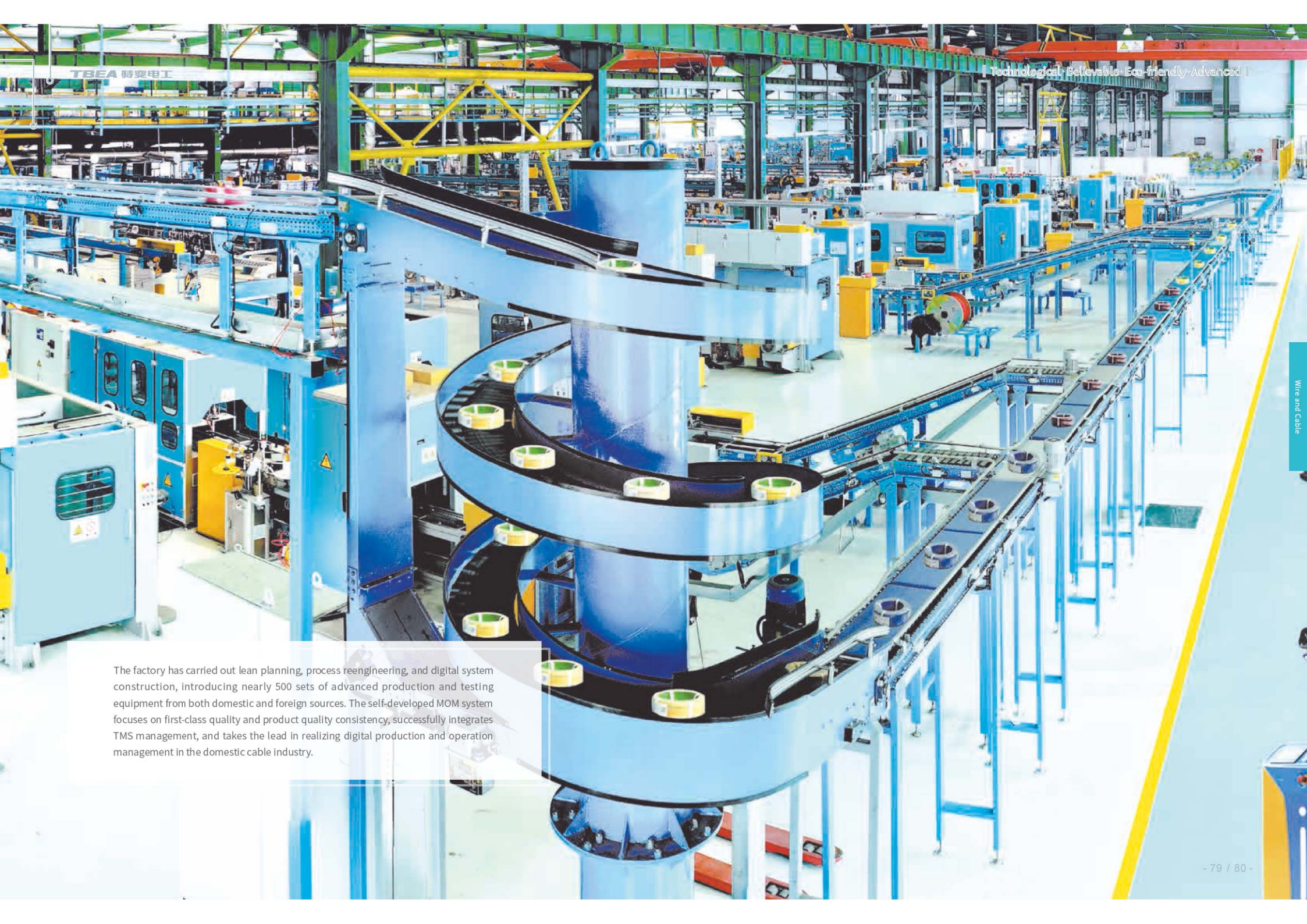
The Group is a national demonstration enterprise champion in the manufacturing industry, a national high-tech enterprise, and an integrated enterprise of ultra-high voltage cable systems. It possesses the capability for R&D, manufacturing, and testing of a full range of wires and cables, including but not limited to 750 kV and below power cables, cable accessories, special cables, building wires, $\pm 1,100$ kV UHV AC and DC large-section wires, as well as the installation, commissioning test, operation, maintenance, and inspection capabilities for EHV cable systems. Equipped with the industry's highest 180-meter tower and the world's leading "one tower and nine lines" process layout, it can produce high voltage cables with the highest voltage level and the largest current-carrying capacity. It is currently the enterprise with the strongest integration capability of UHV cable systems in China. It is committed to providing global customers with energy-saving, environmentally friendly, green, and low-carbon premium products and reliable power system integration solutions.

Shandong Wire and Cable Intelligent Factory

The Group has inherited more than 70 years of experience in wire and cable manufacturing and service and serves the green development of new power system sources, networks, loads, and storage. Products are widely used in Beijing Olympic Stadiums, State Grid, Beijing-Shanghai High-speed Railway, Capital International Airport, Three Gorges Project, China-Laos Railway, and other major projects and key projects, providing products and services for more than 40 countries and regions such as the Netherlands, Australia, Ethiopia, and Brazil. It successively completed domestic 500 kV system integration projects such as Shandong Chiping Xinyuan Aluminum 700 MW Unit Project, Lancang River Lidi Hydropower Station, Hebei Fengning Pumped Storage Hydropower Station, Shanghai Jing'an Substation Expansion Project, and Guangzhou Chuting (Suixi) Power Transmission and Transmission Project, and has served more than 30 UHV AC and DC projects including Changji-Guquan $\pm 1,100$ kV DC project, contributing to the construction of the world's largest power transmission capacity and widest coverage UHV grid.

Sichuan Wire and Cable Intelligent Factory





The factory has carried out lean planning, process reengineering, and digital system construction, introducing nearly 500 sets of advanced production and testing equipment from both domestic and foreign sources. The self-developed MOM system focuses on first-class quality and product quality consistency, successfully integrates TMS management, and takes the lead in realizing digital production and operation management in the domestic cable industry.

High Voltage and Ultra-High Voltage Cables

The Group's high voltage cable annual production exceeds 3,000 km, backed by a world-class three-dimensional "one tower and nine lines" process layout. Equipped with a digital twin platform, it comprehensively collects and integrates quality data, equipment operation data, and production data, enabling online monitoring and storage of the entire cross-linking cable production process. It serves as the world's largest high voltage cable production base in terms of capacity. With the capability to manufacture high voltage cables at the leading global level 750 kV AC and 535 kV DC, milliken conductors up to 3,500 mm², and shaped wire conductors up to 4,000 mm². It provides a full suite of technical services encompassing high voltage cables, cable accessories, system design, installation, and maintenance. As the first domestic enterprise to localize 500 kV cables and accessories, it is pioneering an integrated service model in China.



Hebei Fengning 3,600 MW pumped storage power station, the world's largest pumped storage power station, a key project for Beijing 2022 Winter Olympics



3,000 MW Sichuan Yalong River Lianghekou Hydropower Station, the project with the highest shaft height of the Group (254 m)



Chipping Xinyuan Aluminum 700 MW unit, the first 500 kV integrated and first thermal power project of the Group



Shanghai Jing'an Substation Expansion Project, the first 500 kV urban power grid project of the Group



290/500 kV 1x2500mm² copper conductor, XLPE insulated, corrugated aluminum sheathed, polyethylene outer sheathed power cable



290/500 kV 1x2500mm² copper conductor, XLPE insulated, smooth aluminum sheathed, polyethylene outer sheathed Class C flame retardant power cable



230/400 kV 1x2500mm² copper conductor, XLPE insulated, lead sheathed, polyethylene outer sheathed with temperature monitoring power cable



±535 kV 1x3000mm² copper conductor, XLPE insulated, corrugated aluminum sheathed, polyethylene outer sheathed DC power cable



±535 kV copper conductor, XLPE insulated, copper wire shielded, laminated aluminum sealed, polyethylene sheathed DC power cable

Technological · Believable · Eco-friendly · Advanced

上海静安 500kV 变电站扩容工程

Cable Accessories

The annual output of cable accessories of the Group is 6,000 sets, and the production equipment of cable accessories are 136 sets. It has advanced production and test equipment such as EPDM rubber belt extrusion production line, silicone rubber injection machine, EPDM rubber injection molding machine, automatic vacuum injection slot, ±1,600 kV DC generators, 1,000 kV power frequency transformers, etc. It can produce 66 kV — 500 kV AC and DC submarine and land cable accessories.



500kV GIS Termination



500kV Porcelain Outdoor Termination



500kV Polymer Outdoor Termination



500kV One-piece Premoulded Joint



500kV Three-piece Pre-moulded Joint



Zhejiang Zhoushan 500 kV Interconnection Power Transmission and Transformation Project

Overhead Transmission Conductor

The Group's annual production capacity of overhead transmission conductors exceeds 150,000 tonnes. It possesses more than 20 sets of fully automatic large aluminum drawing machines and dual-head wire drawing machines, as well as over 30 sets of fully automatic stranding equipment and aging treatment facilities. It is capable of researching and developing, as well as manufacturing, a wide range of conventional wires of various specifications, along with a series of energy-saving wires high in strength and conductivity. Additionally, it produces specialized wires designed for large-span, high-capacity applications, featuring low sag, low wind pressure, ice and snow prevention, and corrosion resistance.



Steel core high conductivity aluminum stranded wire
ACAR-1250/100-84/19



High conductivity aluminum alloy core aluminum stranded wire
ACAR-465/210-42/19



Expansion bus (expansion type heat-resistant aluminum alloy stranded wire)
JNRLH1K-1600-70



Carbon fiber composite core wire
ACCC-500/50-275



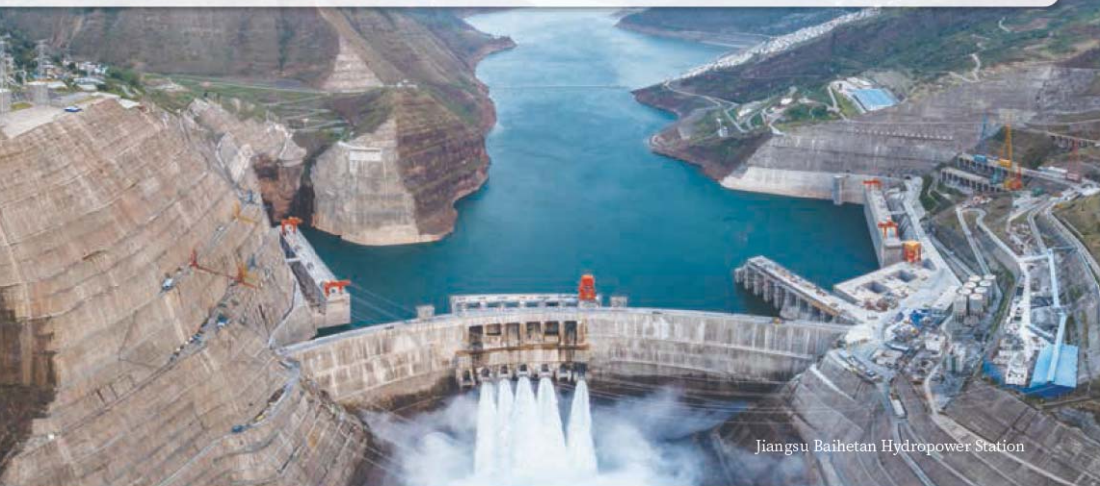
Nanchang-Changsha 1,000 kV UHV AC Transmission Project



Changji-Guquan ±1,100 kV DC Transmission Project



Baihetan-Zhejiang ±800 kV DC Transmission Project



Jiangsu Baihetan Hydropower Station

Medium and Low Voltage Power Cable

The Group's annual production of medium and low voltage power cables exceeds 30,000 km. It is equipped with more than 200 sets of advanced production machines, including a Maillefer (Finland) 35 kV suspension cross-linking line, Niehoff (Germany) double-ended copper wire drawing machines, SKET concentric stranding machines, Al-driven automatic extruders, among other sophisticated equipment. Complemented by high voltage test and inspection devices from Haefely (Switzerland) for up to 110 kV partial discharge withstand tests, the facility is capable of researching and manufacturing a range of products such as 35 kV and below power cables, aluminum alloy cables, variable frequency cables, high-life 70-year building power cables, mining power cables, flame-retardant, and fire-resistant cables, as well as halogen-free, low-smoke environmentally friendly cables, and fireproof cables.



26/35 kV and below XLPE insulated galvanized steel tape armored PVC sheathed medium voltage power cable



0.6/1 kV halogen-free low smoke flame retardant grade B1 XLPE insulated galvanized steel tape armored polyolefin sheathed power cable



1 kV XLPE insulated steel tape armored polyethylene sheathed low voltage power cable



Copper conductor polypropylene insulated steel tape armored PVC sheathed power cable



10 kV XLPE insulated steel tape armored polyethylene sheathed flame retardant class A medium voltage aluminum alloy power cable



0.6/1 kV copper conductor mineral insulated aluminum sheathed flexible fireproof cable



1 kV XLPE insulated steel tape armored polyethylene sheathed low voltage power cable



1 kV XLPE insulated PVC sheathed low voltage aluminum alloy power cable



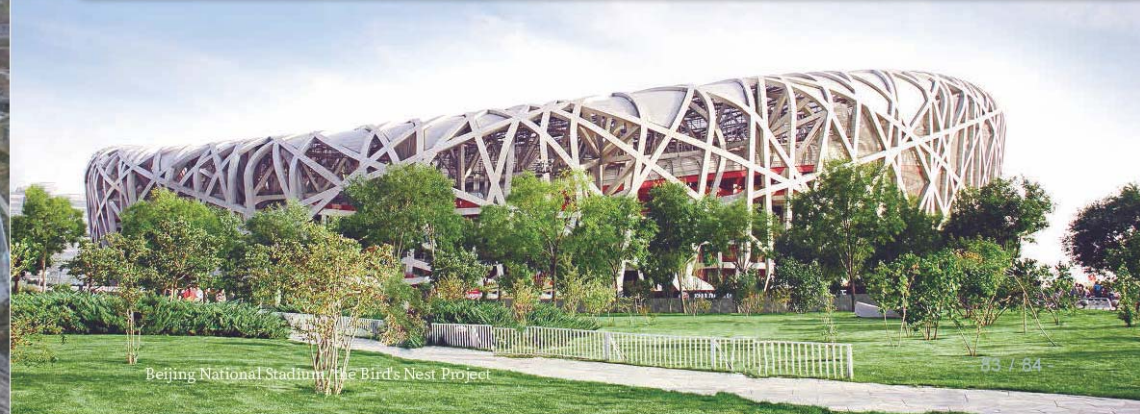
Tianfu International Airport Project



Chengdu Metro Project



Shenzhen World Exhibition & Convention Center Project



Beijing National Stadium 'The Bird's Nest' Project

250 V and up to 400 Hz intermediate frequency super flexible cables for avionics systems

Aircraft charging cable



Cables for charging electric vehicles with rated voltages AC 450/750 V and below, DC 1.0 kV and below

Car charging cable



High-end Equipment Cable

The Group's annual output of high-end equipment cables surpasses 150,000 km, backed by more than 100 sets of advanced production machines. Equipped with advanced facilities including 35 kV continuous vulcanization equipment from TROESTER (Germany), integrated photovoltaic machines, metal braiding machines, fully automatic rubber mixing units, cantilever single-twist machines, and others, the Group is capable of researching and manufacturing a variety of premium cables for high-end equipment applications, including cables for wind power below 66 kV, photovoltaic cables, energy storage cables, mining cables, control cables, computer cables, aircraft charging cables, new energy vehicle charging cables, drag chain cables, with product specifications ranging from 0.5 mm² to 630 mm².

Battery connection cables for power storage systems with rated voltages DC 900 V and DC 1,500 V



Energy storage cable



Copper core thermoplastic elastomer insulated thermoplastic elastomer sheathed medium voltage power cable for shield machine with rated voltage of 18/30 kV or less

Shield machine cable

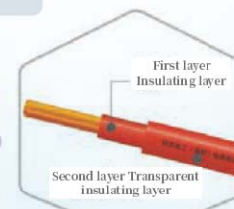


Coal winning machine

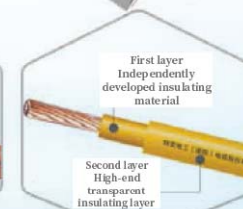
Rated voltage 1.9/3.3 kV coal winning machine metal shielded rubber sheathed flexible cable

High-end Household Decorative Flexible Wire

The Group's annual production of high-end household decorative flexible wires exceeds 500,000 km. It has built an industry-leading green 5G digital factory, equipped with more than 100 sets of advanced production and online testing equipment such as Niehoff and SIKORA, and equipped with independent research and development Information-based production management systems such as PLM and MOM. The Group can develop and produce a full range of household decorative wire products such as 70-year life halogen-free low-smoke flame-retardant wires, flame-retardant B1/B2 grade wires, energy-saving and environmentally friendly double-insulated flame-retardant wires, and low-smoke halogen-free environmental protection wires.



JHSZ-BV



JHSZ-BVR



The Group has two R&D and production bases in Hengyang and Nanjing, providing high-tech services such as research, development, manufacturing, and system integration of automation system in power systems and industrial fields. The products cover comprehensive substation automation system, smart substation system, distribution network automation system, and energy efficiency management system, online monitoring system, modular substation, mobile substation, relay protection and automation device, charging station (pile), condenser system, energy storage EMS system, power electronic equipment, etc., widely used in power, new energy, water conservancy, petroleum, chemical industry, metallurgy, coal, transportation, municipal administration and other industries.

Secondary System

Advanced R&D and Manufacturing Capabilities

The Group has advanced RTDS laboratories and EMC laboratories, including system platform, embedded platform, relay protection and control, intelligent equipment and communications, factory automation, power control, test verification and other R&D departments. It has a number of well-known experts and academic leaders in power industry and has achieved a series of advanced technological achievements in smart grid through scientific research, technological innovation and industrialization development, based on the core concept of "technological leadership and independent innovation". The products are widely used in power generation, transmission, distribution, and consumption. Its software R&D management has passed CMMI level 5 international certification.



R&D and Manufacturing Equipment

Nanjing Dianyuan
Secondary Intelligent Factory

Based on lean analysis of the whole process, the factory integrates automation equipment, intelligent logistics and digital platforms, and configures intelligent production lines such as intelligent warehousing, single board test lines, single device automatic test lines, patch lines, and wave soldering to improve production efficiency, reduce inventory and ensure product quality consistency.



Core Products

Online Monitoring Device for
Gas in Transformer OilOnline Monitoring Device for
Core Ground CurrentData Communication
Gateway MachineMeasurement and
Control DeviceTransformer Photoacoustic
Spectrometry Online
Monitoring DeviceBusbar Protection
DeviceIntegrated Device for
Protection and TestingHV Relay Protection
Device

AC and DC Power Systems



FTU



DTU

60-240kW DC
Integrated MachineWall Mounted
AC Stake

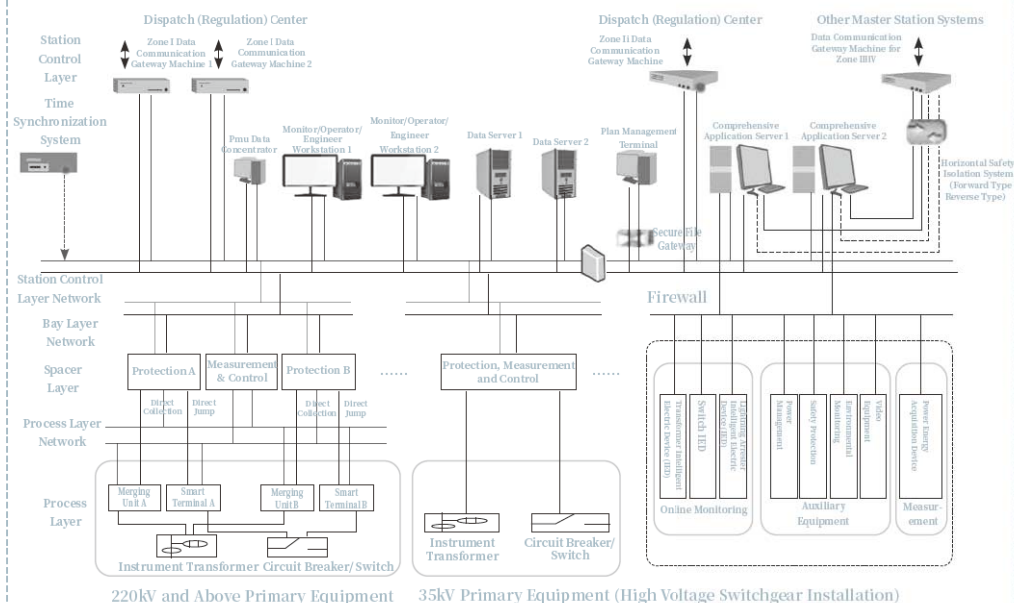
New Generation Compensator System

Intelligent Substation Secondary System

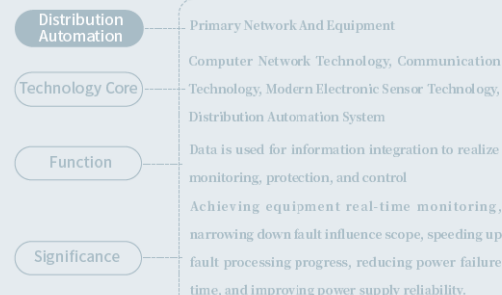
Intelligent substation conforms to IEC 61850 standard, with a three-layer and two-network architecture, adopting advanced, reliable, integrated, low-carbon, and environmentally friendly intelligent equipment, has the basic functions of information automatic collection, measurement, control, protection, measurement, and monitoring through information digitized, communication platform networked and information sharing standardized. It is of advanced functions such as real-time automatic control of power grid, intelligent adjustment, online analysis and decision-making, and collaborative interaction.



Intelligent Substation Secondary System Solutions

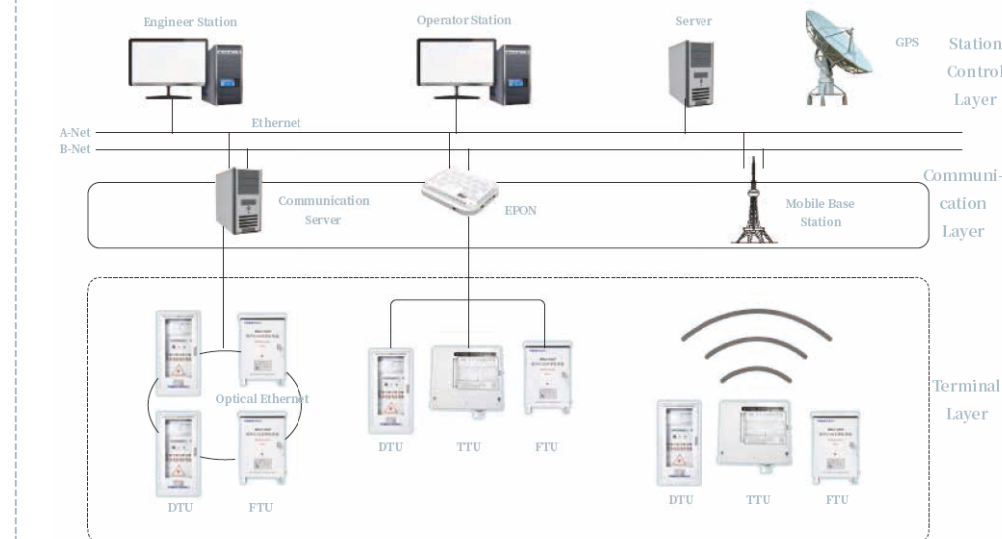


Distribution Automation System



Distribution automation is based on primary network and equipment, using the computer and its network technology, communication technology, modern electronic sensor technology, taking the distribution automation system as the core, integrating the real-time, quasi-real-time, and non-real-time data of distribution network equipment to realize the monitoring, protection, and control of distribution network during both normal and fault condition. Through the implementation of distribution network equipment can be realized, providing strong technetwork automation, the real-time monitoring of operation status and power flow of al support for the intensive and standardized management of distribution network dispatching. By quickly locating/isolating the distribution network fault and restoring the power supply in the non-fault section, the fault influence is decreased, processing speed is accelerated, the time of power failure is reduced, and the power supply reliability is further improved.

Distribution Automation Solutions



Secondary system of new energy step-up station

Device	New Generation Distributed Compensator.
Problem solving	Effectively addressing the strong uncertainty and vulnerability problems of the system under high proportion of new energy access in the construction process of new power system.
Equipment status	Key equipment supporting large-scale development of new energy and promoting energy transformation.

New Generation Compensator System Solution

The diagram illustrates the New Generation Compensator System Solution, showing the integration of various control and monitoring systems.

Main Control Room: Includes Unit Operator Station 1, Unit Operator Station 2, Public Part Operator Station, Dual Color Printer, Dual Color Printer, and Color printer.

Local Operation Station: Includes Unit Operator Station 1, Unit Operator Station 2, Public Part Operator Station, and Engineer Station.

DCS System (91): The central control system, connected to the Main Control Room via an Optical Transceiver (91). It interfaces with the following systems:

- Unit Excitation System
- SFC (Static Frequency Converter)
- Unit Body (Including Detection System And Turning Gear)
- Unit Oil System
- Unit Protection System
- Unit Synchronization Device
- Unit PMU Device
- Unit Auxiliary External Cooling System
- Unit Public Electrical Control System
- 10kV System

External Systems and Connections:

- Grid Dispatch Remote Control Gateway (91):** Connected to the DCS System and the Local Operation Station.
- 380V Auxiliary Power:** Connected to the Local Operation Station.
- Lightning Arrester:** Connected to the 380V Auxiliary Power.
- Converter Station Monitoring System:** Connected to the Grid Dispatch Remote Control Gateway.
- GPS Timing (91):** Connected to the 10kV System.
- Unit Data Status Monitoring System:** Connected to the GPS Timing system.
- Fault Recorder:** Connected to the Unit Data Status Monitoring System.

System Name	Secondary System of New Energy Step-up Station.
System architecture	Adopting a two-layer and two network system architecture.
Basic functions	Information collection, protection, measurement and control, metering, etc.
Advanced functions	Supporting the power grid to achieve active power automatic regulation, reactive power compensation, power prediction, etc.

New energy is non-fossil fuels including solar energy, biomass energy, and wind energy. The new energy step-up station system solution adopts a two-layer and two network system architecture, has basic functions of information collection, protection, measurement and control, and metering, and supports advanced application functions such as active power automatic regulation, reactive power compensation, and power prediction in the power grid.

Secondary System Solution of New Energy Step-up Station

Offshore Wind Power

The Group established a technical R&D center for offshore wind power transmission and transformation equipment in 2014, specializing in the development of key technologies for offshore step-up platform transmission and transformation equipment, flexible DC transmission system, island prefabricated substation, vegetable oil environmentally-friendly transformers and switchgear embedded in wind turbine towers, and other offshore transmission and transformation technologies. The overall technical level has reached an international leading level, and a lot of achievements have been made by focusing on research and development of "power transmission and distribution core technology for deep-sea wind power", which is one of the top ten "bottleneck" technologies proposed in the Hunan Provincial Government Report. The Group has supplied 50 sets of integrated primary equipment and systems to many customers including China Three Gorges Renewables (Group) Co., Ltd., China General Nuclear Power Group, China Huaneng Group, State Grid Investment Corporation and China State Construction Engineering Corporation. It is the first enterprise group in China having supply references in offshore wind power step-up station platforms, and the enterprise group with the highest supply performance for offshore wind power projects (offshore + onshore).

Integrated Automation Protection and Intelligent Operation and Maintenance System for Offshore Step-up Station

Integrated Automation Protection and Intelligent Operation and Maintenance System

Wind Turbine Transmission System

Converter, 35kV Tower Transformer, 35kV Engine Room Transformer, 66kV Tower Transformer, 66kV Engine Room Transformer, 72.5kV C-GIS, 72.5kV H-GIS

Device Integration

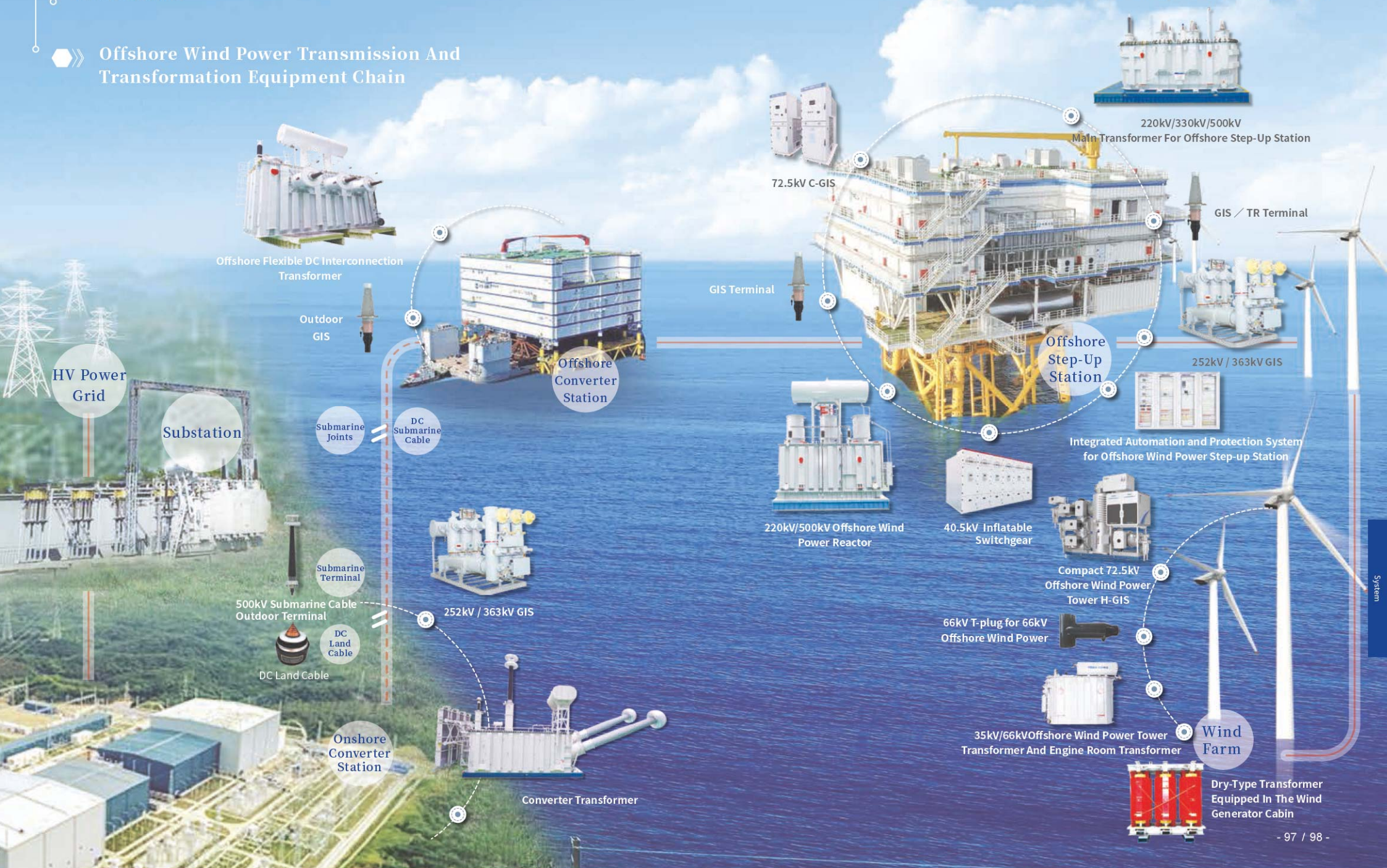
Flexible Dc System Of Offshore Converter Station

Flexible DC Transformer
Converter Valve
HV, Ultra HV DC Cable Accessories

Offshore Step-up Station AC System

220kV/330kV/500kV Offshore Step-up Station Main Transformer, 220kV/500kV Offshore Wind Power Reactor, 252kV/363kV GIS, 40.5kV Inflatable Switchgear, Integrated Automation And Protection System For Offshore Wind Power Step-Up Station

Offshore Wind Power Transmission And Transformation Equipment Chain



» Prefabricated Substation

In order to meet the higher requirements of rapidity and flexibility for global power construction, the Group has timely launched the compact prefabricated modular substation solution, made a breakthrough in the traditional substation construction concept, integrated the primary and secondary intelligent equipment modules, and realized the rapid construction of substation with the new concept of standardized design, factory prefabrication, and prefabricated modular construction.

The prefabricated substation is mainly composed of a HV GIS module, transformer module, MV switchgear module, capacitor module, secondary intelligent cabin module, and LV switch module. The Group has a full range of products from 10kv to 220kv voltage level (the highest voltage level of prefabricated substation in China), and the products are widely applied in scenarios from plain areas to high altitude areas; from inland rain and snow environment to coastal high corrosion environment, and then to wind and sand environment in the western region.



Vehicle-mounted Mobile Substation



The vehicle-mounted mobile substation is a new type of substation that integrates primary and secondary electrical equipment on the semi-trailer. It is mainly composed of modules such as HV switch, main transformer, MV switch, comprehensive automation protection and transportation vehicle body. It has the advantages of high integration, low investment cost, short construction period, flexible mobility, and simple installation and operation and maintenance. It is widely

used in substation maintenance or renovation without power outage, power peak load transfer, planned temporary power supply beyond expectations, emergency power supply for natural disasters, and power supply for major events. The Group has the ability to independently develop, assemble and test all products of 220kV and below vehicle-mounted mobile substation.



Energy Storage Power Station

Energy storage, as a high-quality flexible regulation resource for the power grid in new power system, has the dual attributes of power supply and power load, and is a key technical mean to support high proportion of renewable energy access and consumption. It enhances the flexibility of power system and ensures the safety and stability of power grid. The Group has a leading 3D design platform and excellent simulation computing capabilities, mastering centralized and distributed modular electrochemical energy storage power station technology and is capable of providing flexible and advanced system solutions for energy storage power stations as per customers' requirements.



Centralized Energy Storage System Solution

Overall Plan

The centralized energy storage system adopts an integrated container configuration, consisting of a battery compartment and an integrated inverter step-up transformer. The battery compartment integrates battery clusters, battery management systems, combiner cabinets, and fire protection systems in the prefabricated compartment; compact transformer with power storage inverter integrates PCS, transformer and switches in prefabricated cabins or platforms.

Technical Characteristic

- Prefabricated integrated energy storage system with industrial design concept, easy to transportation, installation and maintenance.
- Adapting to harsh operating environments, intelligent temperature control at the cell level, improving system efficiency and battery cycle life.
- Modular design, automatic balancing management, easy system expansion and control.
- Multiple monitoring of status, hierarchical interconnection, comprehensively ensuring the safety of the battery system.
- PACK level fire protection design, timely warning in the early stage of thermal runaway of battery cells, precise positioning, long-term suppression, and continuous cooling.
- Integrating multiple energy management strategies and a millisecond level power coordination control system, it enables 60 PCS to communicate quickly in millisecond level, and can simultaneously connect 1-2 million real-time data and signals, meeting the needs of massive information management for energy storage batteries.



Energy Storage Battery Compartment



Compact Transformer With Power Storage Inverter



Distributed Energy Storage System Solution

Overall Plan

The distributed energy storage system adopts a modular energy storage cabinet solution, consisting of multiple standardized energy storage cabinets. The various energy cabinets integrate long-life battery cells, active balanced battery management systems, PCS, active fire protection systems thermal management systems, and intelligent distribution systems into a single standardized outdoor cabinet.

Technical Characteristics

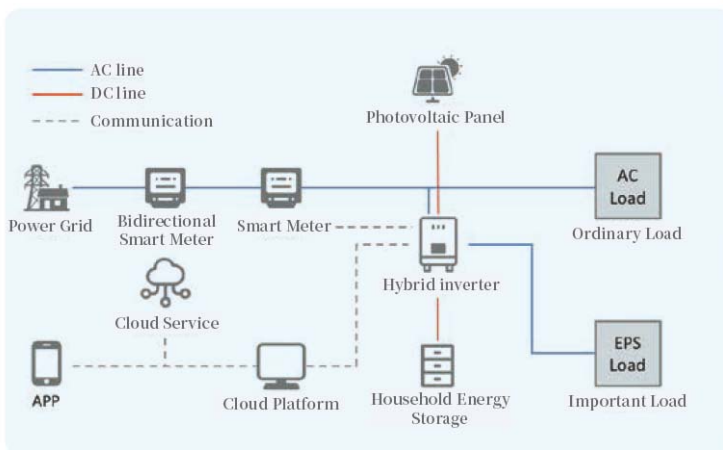
- Integrate long-life battery cells, actively balanced BMS, high-performance PCS, active safety systems, thermal management systems, and intelligent distribution systems into a single standardized outdoor cabinet.
- The cabinet adopts an IP55 protection design, while the PCS adopts an IP65 protection design, meeting the needs of outdoor applications and suitable for various complex environments.
- Modular high energy density design, modular standard product with unlimited parallel connection, flexible capacity configuration, safer and more convenient design, installation, and operation and maintenance.
- After the battery cluster passes through DC-AC, the risk of DC arcing is reduced to 0 due to AC convergence; no battery cluster parallel connection, battery parallel matching loss of 0, high battery capacity utilization rate.
- Safe isolation between modules in zones, using perfluoro hexane(aerosol)+water fire extinguishing technology, and controllable fire protection.



372kWh 1500V Industrial And Commercial Energy Storage Unit

Intelligent Household Energy Storage System

Intelligent household PV storage system is an intelligent household energy management system that combines solar power generation system, power grid, and energy storage equipment. Its main purpose is to manage and optimize the use of energy in households achieve spontaneous self use, energy independence, and connect surplus electricity to the grid, reduce household electricity bills, and also serve as a backup power source to ensure the safety of household electricity consumption.



Product Features

1. Home PV storage system, self-use, achieving energy independence, and reducing household electricity bills.
2. Home emergency power supply and backup power supply to ensure the safety of household electricity consumption.

Applications

- Whole house smart photovoltaic energy storage system solution; Creating a green life with energy independence.



Technological · Believable · Eco-friendly · Advanced

LV 1.0 LV Household Power Storage Cabinet (up to 15 modules in parallel)



3.6 kWh

A single module can provide up to 3.6kWh of power and can be used with a single module 5kW inverter.



5 kWh

A single module can provide up to 5kWh of power and can be used with a single module 7.5 kW inverter



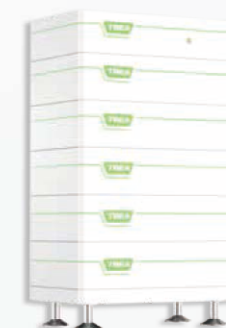
6 kWh

A single module can provide up to 6kwh of power and can be used with a single module 9kW inverter

LV 2.0 LV Household Power Storage Cabinet HV 1.0 HV Household Power Storage Cabinet



5kWh | Wall-mounted | Outdoor



7.68-25.6kWh | Floor-standing | Outdoor

Domestic manufacturing service industry

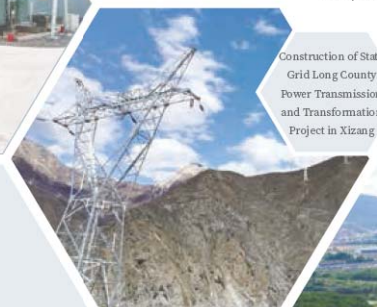


Engineering business

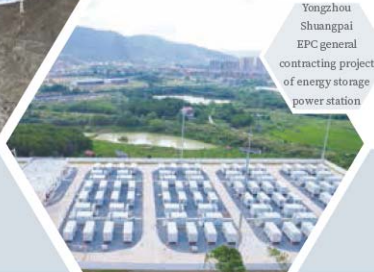
The Group has the one-stop integrated service capacity of engineering design, integrated supply, construction, installation, commissioning, operation and maintenance, and has the qualifications of general contracting of electric power construction (level II), specialized contracting of electronic and intelligent engineering (level II), specialized contracting of firefighting facilities engineering (level II), loading (repairing and testing) (level III), general contracting of construction engineering, specialized contracting of construction mechanical and electrical installation engineering, specialized contracting of power transmission and transformation engineering, safety production license, etc., and has passed the new version of ISO three-system certification.



Wulingwuhai
PC general
contracting
project of booster
station



Construction of State
Grid Long County
Power Transmission
and Transformation
Project in Xizang



Yongzhou
Shuangpai
EPC general
contracting project
of energy storage
power station

Technological · Believable · Eco-friendly · Advanced

General Contracting of Power Transmission and Transformation Project



Through the talent cultivation method of external introduction and internal training, the Group has built a professional talent team that combines technical and practical skills, and established a scientific and standardized project management system for the entire process of "controlling risks, rushing progress, ensuring quality, and ensuring safety". Meanwhile, it has a reserve of contracting teams with strong construction capabilities and excellent control levels, fully equipped with one-stop power transmission and transformation engineering general contracting services such as power engineering design, power equipment technology research and development, integrated supply, construction, installation, and commissioning, mainly engaged in general contracting of substation construction, transmission line construction, energy-saving and consumption reduction renovation, general contracting of distribution engineering, general contracting of financing leasing project, and charging (swapping) station construction and operation.

In recent years, the Group has mainly undertaken 110kV Maotan power transmission and transformation project of Guangzhou Bureau, EPC general contracting of 110kV and 35kV substation reconstruction of State Grid Hunan Financial Leasing, Motodamu and Gedang power transmission and transformation project of State Grid Xizang Electric Power Company in Linzhi area, Lang County Jindong power transmission and transformation project, Shigatse District Renbu, Dingri, Meibachele power transmission and transformation project, State Grid Xizang Naqu District Nima County power transmission and transformation project, China Nuclear Corporation Hunan co-associated uranium resources (monazite) comprehensive utilization project PC general contracting, State Grid Hebei, Fujian, Hunan and Shougang Luannan 110kV substation equipment integrated supply project, etc. The performance quality has been highly recognized by users.

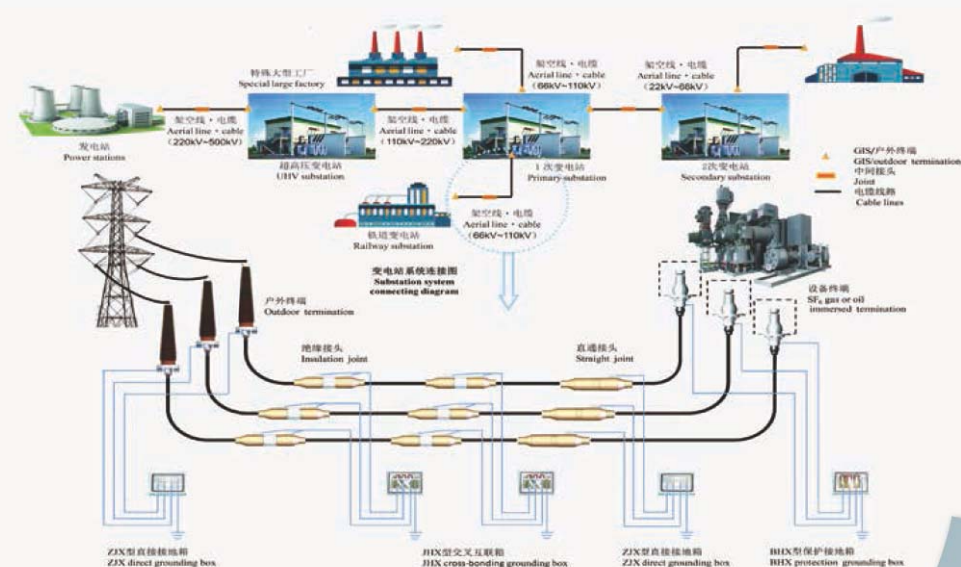


General contracting of new energy engineering



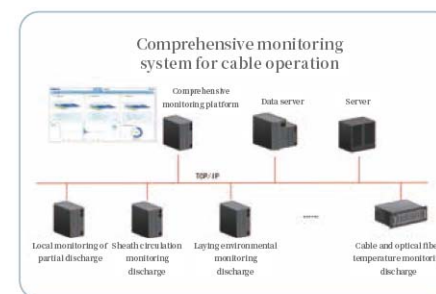
The Group has a complete solar energy industry chain, independently researched, developed and manufactured leading products such as inverters, combiner boxes, high and low voltage cables, secondary monitoring and protection devices, HV and LV switch cabinets, GIS and box-type transformers, and has Grade A and new energy engineering design qualifications in the power industry. It has formed a system integration service integrating power engineering financing, research and development and production of core components, general contracting of energy storage power station, general contracting of photovoltaic power station, general contracting of wind farm, integrated supply, operation and maintenance of primary and secondary equipment of power transmission and transformation, providing wind/solar storage and charging integrated system solution.

In recent years, the Group has focused on undertaking the general contracting of Changzhou Yijing Phase I, Phase II, and Phase III 100MW Fishery Photovoltaic Complementary Power Station, Shengrenshan Wind Farm 110KV Booster Station PC General Contracting, Taihexian Wind Farm Booster Station PC General Contracting, Sheziyuan Wind Farm Booster Station Construction and Installation Engineering Contracting, Qingdao Changsheng 20MW Agricultural Photovoltaic Complementary Poverty Alleviation Project PC General Contracting, Huanghua 30MW, Haixing 20MW Photovoltaic Project PC General Contracting, Huadian Yunnan Qiansuo and Lanping Booster Station PC General Contracting, EPC General Contracting of Wuling Shuangpai 100MW/200MWh Energy Storage Power Station Project, Tianrun Xinjiang Tacheng 220kV Wind Power Booster Gathering Station PC General Contracting Project (supporting energy storage) and other key engineering projects. Changzhou Yijing photovoltaic power generation project has created the record of photovoltaic power station project with the largest single unit, shortest construction period and one-time grid-connected power generation procurement in China. It took 78 days for Wuling Shuangpai energy storage power station project to pass the acceptance, creating the fastest and best record for the construction of energy storage power stations with the same capacity and scale in China.



Integrated service of HV cable system

The Group can provide mature integrated full-industry-chain technical services of "cable + accessories + design + construction + testing + operation and maintenance", and is the first domestic enterprise to realize 500kV cable + accessories in China. It has successively provided system integration services for more than 40 domestic and foreign engineering projects such as Chiping Xinfu Thermal Power Plant, Hebei Fengning Pumped Storage Power Station, Shanghai Jing'an Substation, Uganda Karuma Hydropower Station and Pakistan Karachi Nuclear Power Station, with a market share of nearly 50%.



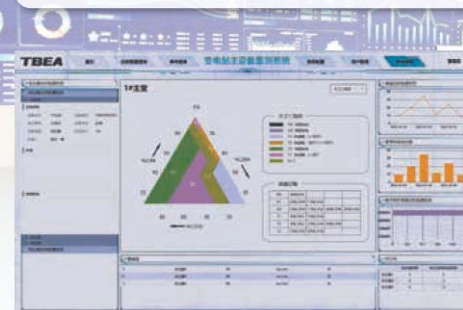


Repairing, operation and maintenance

Relying on the brand advantages of TBEA and the market advantages of State Grid, Southern Power Grid and the five major power generation groups, the operation and maintenance service of the Group has achieved comprehensive development, from the initial single transformer maintenance to UHV maintenance, whole station maintenance, basin maintenance, substation operation and maintenance, live detection, remote intelligent diagnosis, intelligent substation transformation, fire protection system transformation, oil drainage system transformation and wind power station periodic verification and test, etc. The business scope covers Central China, East China, North China, Southwest and Northwest China, and the voltage class covers 10kV-1000kV. The Group has advanced operation inspection equipment, professional technical advantages, mature talent team, and standardized operation process to guarantee the stable operation of substation equipment.



Intelligent energy system solution



Monitoring system for main equipment of transformer substation

It realizes the status data display and query, health status evaluation, fault information early warning, operation report generation and other functions of the transformer, GIS, lightning arrester and switch cabinet in the substation, and has the characteristics of state data visualization, intelligent diagnosis and analysis, diversified early warning modes and the like.

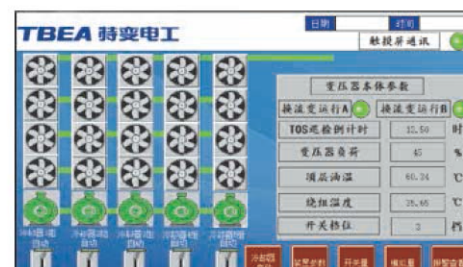
Critical care system for oil-filled equipment

With the large transformer (reactor) and other oil-filled power equipment as the monitoring object, when the concentration of dissolved gas in the oil exceeds the attention value and other abnormal phenomena of the substation equipment, the comprehensive monitoring and active early warning of critical care system for the health state of the substation equipment are realized by rapidly adding a plurality of monitoring means such as a partial discharge sensor, a vibration sensor, an iron core grounding current sensor and the like.



Intelligent monitoring system for converter transformer

With the large transformer (reactor) and other oil-filled power equipment as the monitoring object, when the concentration of dissolved gas in the oil exceeds the attention value and other abnormal phenomena of the substation equipment, the comprehensive monitoring and active early warning of critical care system for the health state of the substation equipment are realized by rapidly adding a plurality of monitoring means such as a partial discharge sensor, a vibration sensor, an iron core grounding current sensor and the like.



TTOS transformer intelligent monitoring system

The invention can realize full-state monitoring and fault diagnosis analysis of gas in transformer oil, gas relay gas, single hydrogen in oil, oil pressure, grounding current, partial discharge, bushing dielectric loss and tap changer motor current, and has the characteristics of high integration degree, strong expandability, comprehensive diagnosis analysis and the like.

Transformer emergency oil drainage system

It is composed of on-site oil drainage module and remote control panel. In case of fire and other accidents, the oil in transformer oil tank can be discharged to the accident oil pool through remote control, automatic control and other modes, so as to effectively reduce the risk of fire spreading, reduce the loss during accident and ensure the safety of personnel and property.

Re-manufacturing Center

The Group has invested RMB 1 billion to build a full-life cycle operation and maintenance platform-power transmission and transformation equipment re-manufacturing center. It is a domestically initiated and world-leading power transmission and transformation equipment re-manufacturing base and a full-life cycle operation and maintenance and management center for power transmission and transformation products. It is committed to solving various problems existing in different stages of the product life cycle and has the capability of remote monitoring and remote diagnosis of substations and power equipment.

Relying on "Internet+", artificial intelligence, industrial 4.0 technology and 5G application technology, the Remanufacturing Center establishes a complete information system architecture, with information system driving production and great production flexibility. It can provide customers with personalized maintenance services such as research and production of transformers of 220kV and below, fault finding and diagnosis of transformers/reactors of 1000kV and below, iron core repair, transformer disassembly, coil repair and upgrading of products of various voltage levels.





Construction and operation
of charging station



Electric power scientific research and training

The Group has built TBEA Electric Power Scientific Research and Training Center, covering an area of 7,500m², Integrating production, education and research, and building the first electric power scientific research and training base in Hunan Province centering on global electric power operation, maintenance and maintenance technical composite talents. Taking 220kV substation as a model, the base has built electric power scientific research training building, 220kV operation and maintenance training bay and 110kV operation and maintenance training bay. It is equipped with scientific research platform, multiple operation and maintenance and maintenance training stations and VR demonstration room. It provides a learning platform for technical research, analysis of design structure of primary and secondary equipment of power transmission and transformation, physical operation and simulation of common fault handling, and provides three-in-one training of technology teaching + station practical operation and question answering for trainees. Meanwhile, it can provide the general contracting scope of training center construction, practical operation station and training course development for customers at home and abroad.

The Group has the capacity of charging station investment, construction and operation, and can provide charging station system solutions. It has invested and operated dozens of large-scale public transportation charging stations and social public charging stations in Hunan, Hubei, Guangxi, Jiangsu, Zhejiang, Anhui, Sichuan and other places. It has presided over and mainly participated in many national and local electric vehicle charging facility design and construction projects, and accumulated rich experience in facility manufacturing and station construction. The charging pile has the national charging pile appraisal certificate and charging facility management system certification, and has excellent performance in the evaluation of electric vehicle charging system of China Automotive Technology Center, and can perfectly match all electric vehicles on the market.



Global Supply Chain Logistics Service

International and domestic logistics service

Relying on TBEA's good network platform, product advantages and brand influence in the world, the Group integrates transportation resources from China to Africa, Europe, ASEAN and Central Asia under the "Belt and Road" initiative, and provides customers with safe, convenient, efficient and professional global international logistics transportation services and solutions.

Power transmission and transformation supply chain service

With nearly a hundred years of transformer, wire and cable manufacturing history, the company integrates high-end product manufacturing resources and supply chain advantage resources in TBEA power transmission and transformation field, and provides customers with full-chain, high-quality and multi-mode power transmission and transformation supply chain services.



Overseas service platform

Integrated (sea, land and air) transportation, customs clearance, warehousing, installation, maintenance and other one-stop service platform, to provide global customers with electric power transportation, storage, loading, inspection one-stop service



International logistics

Specializing in industrial manufacturing enterprises and international EPC projects such as LCL, full container, batch full container, bulk cargo and other international logistics services



Domestic logistics

Integrate Internet + freight resources, and build a "TBEA Intelligent Transportation" network freight integrated logistics service platform, so as to standardize the transportation process for enterprises and realize cost reduction and efficiency increase.



Warehousing and distribution services

With 18,000 mm² of modern warehouse area, the Group can provide customers with specialized logistics warehousing and distribution services.



Import and export trade

Relying on the global sales network service platform of TBEA and the cooperative relationship established in more than 100 countries, TBEA integrates the advantages of national resources to carry out domestic and international import and export trade services.



Power transmission and transformation raw material service

Provide distribution and supply service of bulk raw materials for power transmission and transformation products, including electrical silicon steel sheet, electromagnetic wire copper rod, various kinds of steel, transformer oil, insulating paperboard, etc.



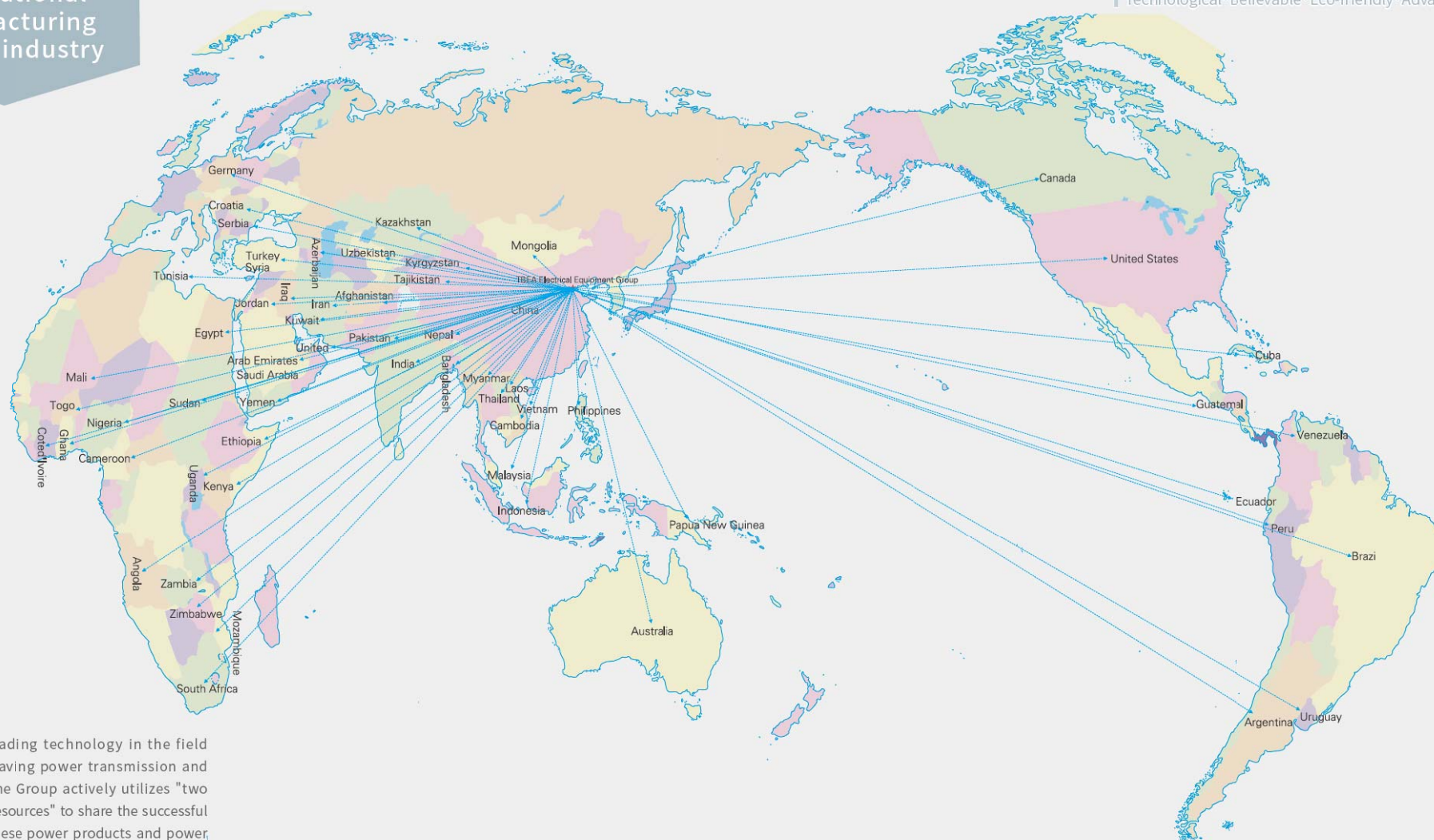
Power transmission and transformation production service

It provides customers (power industry) with transformer oil distribution and silicon steel processing services. It has eight oil distribution service centers in Foshan, Wuhan, Shijiazhuang, Jinan, Karamay, Hengyang, Shenyang and Changzhou.



Power transmission and transformation related group component service

Provide customers with power transmission and transformation product component service, mainly comprising a valve, a radiator, bushing, insulation molding parts, intelligent components, etc.



Relying on the leading technology in the field of green energy-saving power transmission and transformation, the Group actively utilizes "two markets and two resources" to share the successful experience of Chinese power products and power construction with the world.



Survey



Design



Purchase



Construction



Installation



Commissioning



Training



Operation



Maintenance

Integrated Turnkey
Engineering and
System Solution

TBEA Energy (India) Co Ltd.

TBEA Energy (India) Co., Ltd. is a wholly-owned subsidiary of the Group established in India. Founded in 2010, the total area of the park is more than 433,000 m², including the factory floor area of 27,000 m² and 353 sets of advanced production and test equipment. The test hall of the Company has passed the certification of Indian National Testing and Calibration Committee. The test capacity of UHV test room meets the requirements of Chinese national standards, Indian national standards, IEC standards and IEEE standards, in which all routine tests, type tests and special tests of UHV transformer, shunt reactor, converter transformer and other products except the sudden short circuit withstand capacity test can be carried out. After more than ten years of development, the Company has developed into a leading transformer manufacturer in India, with the annual output of a single factory ranking the first in the Indian transformer industry.



UHV laboratory certified
by National Testing and
Calibration Board of India



The Company donated to build water tower for the local area, and solve 3000 draft problem of remaining households



Advanced test hall

The Company has the R&D and production capacity of transformer and reactor products in various fields: it has the R&D capacity of 765kV autotransformer and 765kV reactor with the highest voltage level in India, and the main transformer of 800kV generator with the highest voltage level of Indian thermal power. All performance indexes are superior to the standard requirements. It has the capability of developing converter transformers in the field of DC transmission, and has provided batch converter transformers for State Grid Corporation of India. The main transformer for new energy power generation has been developed in the field of new energy power generation, which is the largest double split transformer in India. In the field of electrified railway, it has the research and development capability of Indian full series of traction transformers, and all the supplied products are in good operation at present. In that application field of new material, 132kV voltage grade natural ester oil transformer has been developed. In the field of improving transmission quality and providing solutions for users, 300MVar/500kV switching graded capacitance regulating reactor has been developed for Turkmenistan, which is the switching graded capacitance regulating reactor with the largest capacity and highest voltage class in the world.



In June 2014, the first product was off the production line



UHV laboratory certified by National Testing and Calibration Board of India
The 765kV product was operated in Phase II Lelpu power station of State Grid Corporation of India



The first natural ester oil project passed the test.

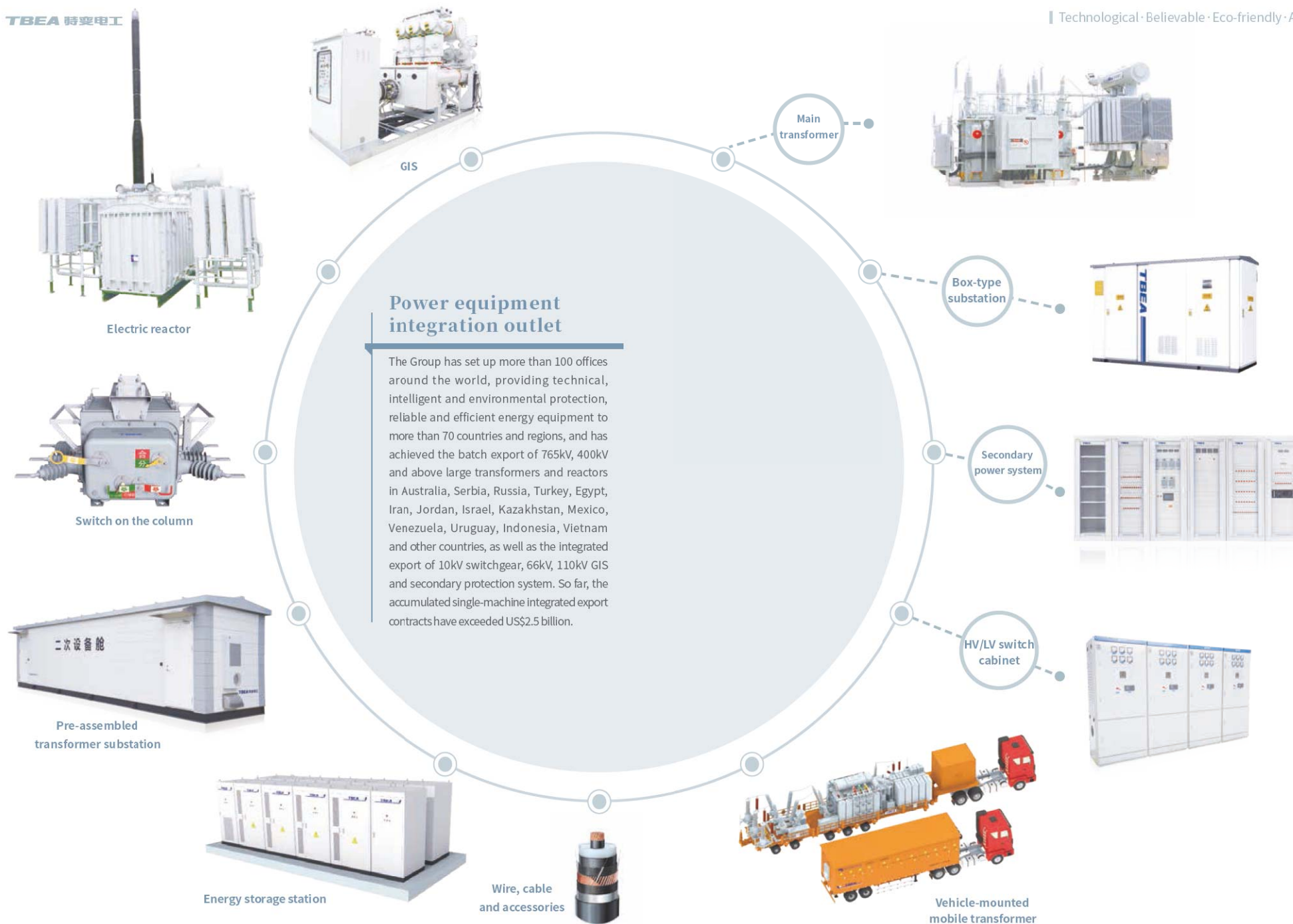


DC products of State Grid Corporation of India

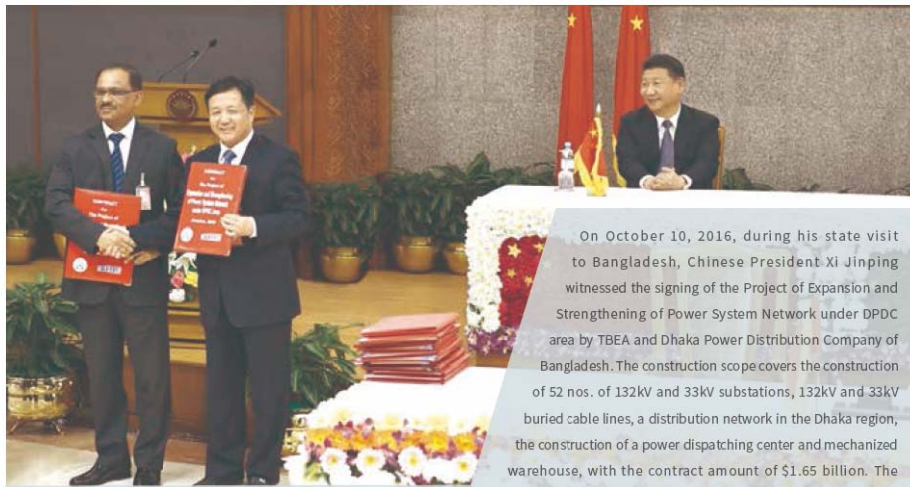


The world's largest adjustable reactor passed the test





General contracting of international electric power project



Project of Expansion and Strengthening of Power System Network under DPDC area in Dhaka, Bangladesh

On October 10, 2016, during his state visit to Bangladesh, Chinese President Xi Jinping witnessed the signing of the Project of Expansion and Strengthening of Power System Network under DPDC area by TBEA and Dhaka Power Distribution Company of Bangladesh. The construction scope covers the construction of 52 nos. of 132kV and 33kV substations, 132kV and 33kV buried cable lines, a distribution network in the Dhaka region, the construction of a power dispatching center and mechanized warehouse, with the contract amount of \$1.65 billion. The completion of the project will greatly improve the comprehensive management level and response speed of the power grid system in the Dhaka region, improve the power shortage of nearly 2 million local residents and enterprises, and provide a reliable, clean, and efficient power supply guarantee for the economic development and people's life of Dhaka and its surrounding areas.



Complete Project in India(765kV)

TBEA is the main contractor for the construction of the highest voltage level 765kV national power grid in India. It has undertaken the construction of 8 765kV projects, including the development, civil engineering installation, commissioning and operation of 73 765kV parallel reactors, neutral point reactors, and other equipment.



Datka 500kV Substation in Kyrgyzstan

Complete Project in Kyrgyzstan (500kV)

In Kyrgyzstan, TBEA undertook a 260km double-circuit line project. Upon completion of the project, an independent power grid was formed in the southern part of the country, greatly improving the local power transmission and distribution capacity



400kV Soyo-Kapary Complete Project Phase I in

Complete Project in Angola(400kV)

In Angola, TBEA undertook the construction of the northern power grid Soyo-Kapary 400kV power transmission and transformation. After the completion of the project, the power grid structure in northern Angola and Luanda was strengthened and the local power supply situation was relieved.



Complete Project in Zambia (330kV)

In Zambia, TBEA contracted to construct two 330kV Central Africa interconnection lines, namely Pensulo-Kasama and Pensulo-Msoro-Chipata. After the completion of the project, the power supply conditions in Northern Province and Eastern Province of Zambia was greatly improved.

The Group has participated in the power planning and power grid construction of dozens of countries, including Egypt, Ethiopia, Zambia, Côte d'Ivoire, Uganda, Mozambique, Togo, Nigeria, Angola, Cameroon, Kenya, Niger, Sudan, Zimbabwe, Ghana, Lesotho, Iraq, Kuwait, Kazakhstan, Tajikistan, Kyrgyzstan, Uzbekistan, India, Pakistan, Bangladesh, Vietnam, Laos, Cambodia, Mongolia, Indonesia, Malaysia, Thailand, the Philippines, Papua New Guinea, Chile, etc. It provides turnkey engineering and system solutions from exploration to design, construction, installation, commissioning, training, operation, and maintenance, providing clean, efficient, safe, and reliable energy security for the people of the project countries, letting the world share the power civilization of the 21st century.



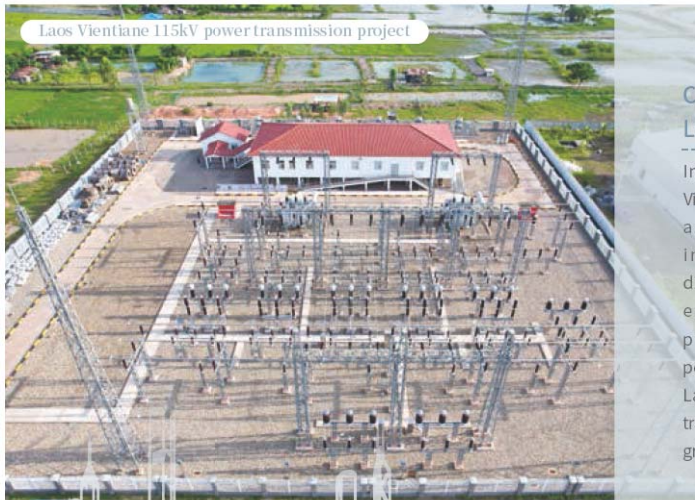
161/66/20kV Substation and Transmission Line in Sokoti, Togo



Complete Project in Togo (161kV)

In Togo, the Group contracted to construct 161kV Sokode substation, which is equipped with advanced automation system, microcomputer protection and measurement and control device to realize unattended substation and become the substation with the highest degree of intelligence in Togo.

Laos Vientiane 115kV power transmission project



Complete Project in Laos (115kV)

In Laos, the Group undertook Vientiane 115kV power transmission and transformation project, including substation, line, distribution network and other engineering construction. The project further optimized the power grid structure in Vientiane, Laos, and improved the power transmission efficiency and power grid stability.

Complete Project in Egypt (66kV)

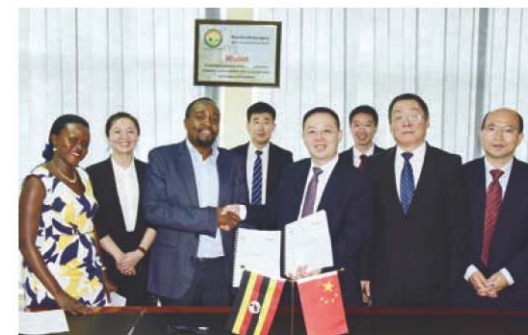
In Egypt, the Group undertook Damietta East 66kV GIS substation project. The successful construction of the project ensures the long-term stable power consumption of Damietta City and surrounding areas.



Egypt DAMIETTA EAST 66kV GIS substation

Complete Project in Uganda (33kV)

In Uganda, the Group undertook the project of accelerating rural electrification to meet the balance of power supply and demand in Uganda, including rural electrification network covering 51 regions of the country and serving about 170,000 users. The construction of the project has solved the problems of insufficient power generation capacity and severe mismatch in power consumption.



On October 31, 2017, TBEA and Uganda Rural Electrification Bureau signed the project contract for accelerating rural electrification to meet the balance of power supply and demand in Uganda.

Kyrgyzstan Thermal Power Plant Project

In Kyrgyzstan, the Group undertook the reconstruction and expansion project of 2×150MW Bishkek Thermal Power Plant. The completion of the project effectively solved the problem of power shortage in Bishkek in winter, improved the overall heat supply capacity in Kyrgyzstan and benefited the people of Kyrgyzstan.



Bishkek 2×150MW Thermal Power Plant in Kyrgyzstan

Tajikistan Thermal Power Station Project

In Tajikistan, the Group undertook the construction of Dushanbe No. 2 thermal power station. After the project was put into operation for power generation, the Government of Tajikistan officially canceled the power limit order of Dushanbe, and the power consumption of ordinary people in winter was guaranteed and the history of power limitation in Dushanbe in winter was over.

Phase II Unit Project of Dushanbe 2 Thermal Power Station in Tajikistan



Embracing and Equipping the Future with Green & Low-carbon Technology

Facing the future, the Group will give full play to the advantages of integration of the whole industrial chain, accelerate the formation of new quality productivity, serve the "carbon peaking and carbon neutrality" goal and build a new power system, take advanced energy technology innovation as the driving force, clean and low-carbon energy supply as the guarantee, and digitalization, intelligentization and informationization as the grasp, unswervingly promote green development and low-carbon development, and make greater contribution to the global energy cause and human civilization progress.

Philippines 168MWp Subic PV Project



Philippines PV Project

In the Philippines, the Group undertook the construction of 168MWp Subic PV project. After the completion of the project, the regional power shortage problem and the imbalance between power supply and demand in dry and rainy seasons have been effectively alleviated, and the diversified and low-carbon power supply has been realized.

