NO.39 | 2022 Bilingual bimonthly Shanghai continuous internal data verification (K) no. 0465

SHANGHAI ELECTRIC 上海电气

NEWS

Shanghai Electric successfully developed its first 1300MW nuclear power generator

INTERVIEWS

WANG YONG

Pressing Ahead Towards Technological Innovations

COVER TOPICS

Into a Digital Future via Cloud Revolution

上海电气 SHANGHAI ELECTRIC

Shanghai Electric Group Co., Ltd.
Shanghai Electric Editorial Board

Honorary Director
Leng weiqing
Honorary Deputy Director
Liu Ping Zhu Zhaokai
Director
Xin Jian
Planner
Shen Jin
Editor-in-Chief
Tu Min

Add No.149, Middle Sichuan Road, Huangpu District, Shanghai, China
Zip 200002
Tel 8621-23196488
Fax 8621-63216017
printing Shanghai haojie computer printing Co., Ltd

2022. 6 NO. 39
Bilingual Bimonthly Journal

Shanghai Continuous Interior Materials Printing Permit (K) No.0465

Free Material Only for Internal Use
Print the number of 2000

www.shanghai-electric.com

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EMBRACING DIGITAL TRANSFORMATION

According to experts, China's high-quality digital economy has offered feasible solutions to the common challenges of mankind. The epidemic has sped up the spread of the digital lifestyle and the adaptation of different people to it, which accelerates the development and increases the work efficiency of society as a whole, allowing easier work and profounder changes. Indeed, QR codes for nucleic acid tests, venue codes and digital sentinels have now become an integral part of life; telecommuting and online learning have been made easy and convenient; many smart factories and devices have seen their work efficiency improved and human contact reduced.

In fact, as the Internet continues to play a supporting and leading role, digital technology will keep transforming people's lives at an ever-increasing speed for the foreseeable future. The convergence of the physical world and the digital world will become a major trend, thanks to technologies such as virtual and augmented reality, telemedicine, remote education, intelligent unmanned life services, intelligent domestic robots and intelligent government services, which are bound to profoundly impact all stages of human life.

The convenience provided by digitalization and intellectualization also means that people will have more time at their disposal to explore more areas with creativity and build a better vision for quality of life and inner world of all people, which will no longer be affected by the epidemic.

The year 2022 marks an important period of strategic opportunities for Shanghai Electric during China's 14th Five-Year Plan period (2021-2025). It is also a crucial year for vigorously promoting industrial restructuring, replacing old drivers of growth with new ones and promoting technological innovation and management reform. As required by the Group, Shanghai Electric should focus on "safeguarding safety, stabilizing the economy and seizing opportunities" while implementing scientific epidemic prevention and control, all of which are impossible without digital technology.

Therefore, as we adopt regular prevention and control measures, we have become more attuned to and grateful for our digital life in the information age, integrating digital intelligence into the development of Shanghai Electric and making greater contributions to the sustainable development of the Group.

ELECTRIC 上海电气

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ELECTRIC NEWS

BRIEF NEWS

Shanghai Electric has been listed among Grade-A Enterprises Contracting Foreign Projects for three consecutive years

The period during which the list of 2022 Grade A Enterprises Contracting Foreign Projects was disclosed to the public by China International Contractors Association (CHINCA) came to an end. And Shanghai Electric has made it into the list for 3 years in a row thanks to achievements of its power plant projects in Dubai, Pakistan, Serbia, Vietnam, Greece, Iraq and other overseas markets contracted by Shanghai Electric Power Generation Engineering Co., Ltd. The list of Grade A enterprises contracting foreign projects was allegedly determined by CHINCA according to industrial standards, comprehensively considering the member enterprises' performance, strength, qualification and industrial credit, etc. and was then reviewed by the unit members of the trade rules committee. A total of 74 companies were shortlisted this year. CHINCA will recommend Grade A contractors to relevant government departments, financial institutions, project owners, etc., and refer to the list when recommending enterprises to China-funded projects.

BAW has won two awards at the 2022 JEC Composites Innovation Awards

The JEC Group in France announced recently the ten winners of the 2022 JEC Composites Innovation Awards, and BAW of Shanghai Electric received two innovation awards in rail transit – structural and aerospace – process categories. Among them, the IRIS Lower Wing Cover Project, which BAW developed in collaboration with Spirit AeroSystems, won the aerospace – process innovation award. TUCANA, the other project, was granted the rail transit –structural innovation award.

Shanghai Electric ranked first in newly installed offshore wind power capacity in China for another year

On April 22, the Chinese Wind Energy Association (CWEA) released the Statistical Briefing on China's Wind Power Hoisting Capacity in 2021, announcing the ranking of China's wind turbine manufacturers of the year. Shanghai Electric Wind Power Group Co., Ltd. ("Shanghai Electric Wind Power"), with 4.204 million kW of newly installed capacity and a market share of 29%, ranked first among Chinese wind turbine manufacturers in terms of newly installed offshore wind capacity in 2021 for the second straight time. Combined with onshore data, the total newly installed capacity of Shanghai Electric Wind Power in 2021 amounted to 5.55 million kW, ranking among the top five wind turbine manufacturers in the country.

Highly* plans to build a second factory with joint investment in India

An online signing ceremony was held between Shanghai Highly (Group) Co., Ltd.* ("Highly") and VOLTAS LIMITED, a leading air conditioning company in the Indian market, to establish a joint venture AC compressor factory in India with Highly Hong Kong* as the main investor, so as to meet the demand of the booming Indian air conditioning market and consolidate and improve the market share of products in the country. Upon completion, the new factory will effectively enhance the quality of the Indian air conditioning industry chain, drive Highly* forward in becoming the global leader in rotary compressors, and continue to contribute to the global double carbon energy conservation and emission reduction development.

Shanghai Boiler Works once again won the CSP steam generator system contract

Shanghai Boiler Works Co., Ltd. ("Shanghai Boiler Works") won the bidding for the 1×110MW molten salt steam generator system complete set supply project of Shandong HuiDong New Energy Co., Ltd. in Kazak Autonomous County of Aksay. This is another major project for Shanghai Boiler Works in the field of solar thermal power generation, following design and manufacturing projects of the Qinghai Gonghe 50MW molten salt CT steam generator system, the Dubai 100MW molten salt CT thermal absorber, the Dubai 600MW PT steam generator system main equipment and the Dubai 600MW thermal oil overflow tank. It has played a positive role in developing the solar thermal power generation market and the application system of heat storage technology for Shanghai Boiler Works.

The Japan Yakai photovoltaic power plant project undertaken by Shanghai Electric was successfully connected to the grid at full capacity

With strong support from local subcontractors and cooperation from the local power company, the full capacity grid connection of the Yakai photovoltaic power plant project in Japan, undertaken by Shanghai Electric New Energy Company, was successfully completed recently. During the construction of the project, the project department and installation subcontractors made concerted efforts to overcome the 7th wave of local COVID-19 epidemic and the impact of March 16 Fukushima earthquake in Japan on construction and commissioning of the project through reasonable dispatching of human resources, and achieved full capacity grid connection in the end.

Unit 5 of Changlongshan pumped storage plant, co-built by VHS*, was put into operation

On May 4, Unit 5 of Zhejiang Changlongshan pumped storage plant, a super “power bank” in East China supplied by Voith Hydro Shanghai Limited*(VHS), a subsidiary of Shanghai Electric, was connected to the grid and put into commercial operation after successfully completing 15-day test operation. The Changlongshan pumped storage plant is located in Anji County, Zhejiang Province, the birthplace of the idea that “lucid waters and lush mountains are invaluable assets”. With a rated head of 710 meters, the power plant is the highest among all pumped storage plants in operation in China. It is also another key project invested and developed by China Three Gorges Corporation in the field of pumped storage after the Three Gorges Dam, Xiluodu, Wudongde and other large hydropower plants. Units 5 and 6, provided by VHS for the project, contain the world’s most difficult unit design and manufacture and world-leading technology. The project is another important milestone in the cooperation between VHS* and China Three Gorges Corporation, which have gone through nearly 30 years of win-win cooperation since construction of the Three Gorges Dam hydropower station in the 1990s and established a long-term partnership in the fields of research and development, manufacturing, installation, operation and monitoring of hydropower equipment.

Shanghai Electric Power Generation Group won the biddings for two more power generation projects

Recently, Shanghai Electric Power Generation Group won the biddings for Aksay Huidong New Energy "CSP+PV" pilot project and the steam turbine generator unit in Gongzhuling municipal household waste incineration power generation (phase II expansion) project. The Aksay project covers approximately 20.6 square kilometers and plans to build a 110MW CSP generator set (with 8h thermal energy storage), a 640MW PV generator set, and a 330kV collection station, which will realize an average annual on-grid electricity of 1.7 billion kWh and an annual output value of 457 million yuan. It will help establish new energy as a local growth driver and boost high-quality economic development of the county. The Gongzhuling phase II project treats 400 tons of household waste per day on average (500 tons at maximum), and is equipped with a 6MW (maximum output 9MW) condensing steam turbine generator set. The bid-winning unit adopts the TN1 model, a mature and advanced model from Shanghai Electric, with a full three-dimensional reaction design for the flow, and applies state-of-the-art high-speed power generation technology to the low-power and low-parameter waste-to-energy steam turbine generator set.

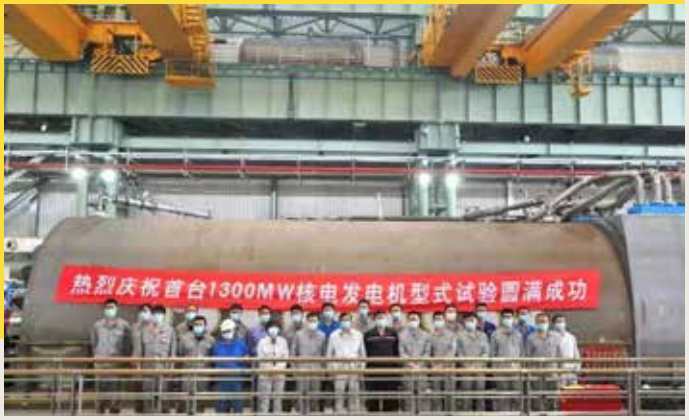
The Abaga Banner sandy land green ecological governance Solar PV power plant project, co-built by Shanghai Electric, was connected to the grid

On May 20, Shanghai Electric New Energy Company successfully connected the Abaga Banner sandy land green ecological governance 100MW Solar PV power plant to the grid, with all parameters shown to be normal and all electric equipment in good condition. Located 23 kilometers north of Bieligutai Town, Abaga Banner, Xilin Gol League, Inner Mongolia, the project boasts strong solar radiation, long hours of sunlight and rich solar energy resources. The average annual temperature is 2.6 degrees Celsius, and the lowest temperature is about minus 39.9 degrees Celsius. Located in the grassland desertification zone, the project serves to optimize the energy structure and facilitate the development of a green economy, while also helping to achieve the green ecological governance of sandy areas in the grassland regions.

The water conservancy project in Uzbekistan co-built by Shanghai Electric Power Generation Group was inspected and approved

The Uzbekistan Water Pumping Station, co-built by Shanghai Electric Power Generation Group, was successfully commissioned and put into operation, and passed the on-site inspection of the Ministry of Agriculture and Water Resources of the Republic of Uzbekistan. Shanghai Electric Power Generation Group provided all 26 2MW synchronous motors for the project, drawing praise from the Ministry of Water Resources of the Republic of Uzbekistan, the supervision company and the general contractor for its excellent products and services. Uzbekistan is a key breakthrough market among countries along the Belt and Road. As one of the key projects undertaken by Shanghai Electric Power Generation Group in the Uzbek water conservancy market in recent years, the project will act as an important performance benchmark for further increasing market share.

Shanghai Electric successfully developed its first 1300MW nuclear power generator



Shanghai Electric successfully developed its first 1300MW nuclear power generator, making a remarkable achievement as Shanghai was resuming work and production in a special period, demonstrating the special responsibility shouldered by key enterprises in Shanghai's municipal state-owned assets system. The generator has high efficiency, low vibration, low hydrogen leakage and low noise. Its various performance indicators surpass requirements set by domestic and foreign standards including GB/T 7064 and IEC 60034, and its comprehensive performance is world-class. In the process of development, the project team compared a large amount of different solutions in every link, from electromagnetic solution and cooling method to specific installation, final assembly, stator and rotor structure, insulation system design, brushless exciter design and auxiliary system design, in order to optimize performance step by step. The team also ensured rationality of the design and reliability of products from multiple perspectives, including electromagnetics, temperature rise, mechanics, mode and safety. Besides, an advanced structure was also adopted to ensure that the generator is highly reliable.

Shanghai Electric Makes Its Debut in the Global Large-scale Coking Market

On May 7, a 2.6 million t/y coke project in Tsingshan Industrial Park, Indonesia, constructed by Nanjing Nangang Iron & Steel United (Nangang) and contracted by Shanghai Electric Guokong Global Engineering (Global Engineering), yielded its first batch of coke after 527 days of construction.

It is a major project of Shanghai Electric to follow the national "Dual Circulation" strategy and promote its global strategy. As the first project launched by the Group in the international coke market, it has far-reaching significance for the implementation of the Group's 14th Five-Year Plan and the development of its overseas businesses.

Since the commencement of the project on November 26, 2020, Global Engineering has been working with the owner and stakeholders to overcome various difficulties and push forward all tasks as scheduled. Due to the COVID-19 pandemic, Indonesia suffered three national lockdowns lasting for nearly 100 days during the construction period, resulting in the impossibility for project personnel to carry out their tasks and deliver materials as planned, posing great challenges for the construction. Workforce supply was also a top priority in addition to material supply. Global Engineering has sent more than 40 managers for the project, most of whom arrived at the construction site at the very beginning and stayed there for more than a year. With the joint efforts of all staff, milestones such as the completion of No.2 coke oven, No.1 chimney and gas pipeline, and commissioning of coal preparation production line were reached smoothly.

At present, the project team and the owner are exerting their best efforts to promote the follow-up work, aiming to set a new record in the construction of overseas coke projects with top-notch engineering standards.

A HEAD START IN A NEW SECTOR

Shanghai Electric successively got big orders from wind power and automation industries

Shanghai Electric has been unswervingly promoting high-quality development and implementing the 14th Five-Year Plan and is now actively planning for its layout in the "4+2+X" new track. Recently, the Group's wind power and automation segments successively received big orders as it carried out epidemic prevention and control and market expansion at the same time.

In the announced bid-winning candidates of Shantou Lemen (II) offshore wind farm 594MW project wind turbine (including towers) procurement of China Huaneng Group Co., Ltd., Shanghai Electric Wind Power Group Co.Ltd. is the top one candidate for two bidding sections. Since the Covid-19 resurgence in Shanghai, the wind power sales team overcame difficulties brought by the lockdown and put into practice the philosophy of attention to the projects, dedication to biddings and focus on customers. Staff at Shanghai headquarters and those working from outside Shanghai coordinated and leveraged their own strengths to ensure normal sales operation. The project's construction site is in the east of Shantou and near the Lemen Islands in the southern sea area in Nan'ao.

Shanghai Shendiantong Rail Transit Technology Co., Ltd., a subsidiary of Shanghai Electric Automation Group, received the order for the Yangshan phase IV automated terminal rail crane maintenance project. This is the company's first project in the field of automated ports since its establishment, marking a solid step forward in technical specialization and market diversification. As a new company, it is actively exploring new markets and expanding new businesses while making every effort in the comprehensive intelligent maintenance of Shanghai Rail Transit Line 5 to ensure safe and reliable operation. To address real needs of the Yangshan project, the company designed an entire set of technical and construction solutions, including the maintenance system construction, online monitoring and adjustment of roadbed settlement, track flaw detection and polishing, wheel pair repair, and online testing and development of bearings. The comprehensiveness, professionality of the project team, practicality and economical efficiency of the product were acknowledged by customers. By ways of video linking, online meeting and email exchange, the two sides completed communication and demonstration of the solutions, finished purchase, production and submission of the bid, and signed the contract on May 13. D

BOOSTING THE DUAL CARBON GOALS

Shanghai Electric wins the bidding for Xiamen Huaxia International 600MW secondary reheating electromechanical furnace whole-set equipment

Shanghai Electric brought in good news from the thermal power market, winning the bidding for the 1x600MW ultra-supercritical secondary reheating electromechanical furnace whole-set equipment for Xiamen Huaxia International Power Development Co., Ltd. This is the first equal capacity replacement project in Fujian, and the first double reheating project invested by Fujian province and State Development & Investment Corporation. Shanghai Electric's secondary reheating technology and equipment have been widely recognized by major energy customers, and its secondary reheating main equipment has further expanded its presence.

The Huaxia Power Songyu Power Plant project plans to build a 1x600MW ultra-supercritical secondary reheating coal-fired unit to replace 2x300MW sub-critical coal-fired units in Phase I, in order to achieve high capacity, high parameters, high energy efficiency, clean and environmentally friendly power generation while significantly reducing coal consumption for power supply. The three main equipment of the two Phase I units were also supplied by Shanghai Electric, and were put into operation in 1997. The winning bid this time marks renewed cooperation between Shanghai Electric and Xiamen Huaxia International Power.

Adjacent to the national 5A tourist attraction Gulangyu Island, the project is designed according to the "Zero high-polluted energy-wasted factory" concept, with zero new construction land, zero new water intake, zero waste water discharge, zero solid waste discharge and near-zero smoke emission, aiming to create a new-generation digital intelligent power plant and visually attractive energy landscape. When completed, the project will effectively consolidate Xiamen's power grid pattern, enhance the harmony of the urban environment, and help Xiamen become a visually and culturally attractive, modern international city. The project was approved by the National Energy Administration as part of the national power construction plan in August 2021, and approved by the Development and Reform Commission of Fujian Province on December 17 in the same year. When completed, it will contribute to the national strategic goals of carbon peaking and carbon neutrality.

The bidding period coincided with severe epidemic outbreak in Shanghai. To overcome the difficulty and proceed with the bidding, Shanghai Electric Power Generation Group carefully organized and planned the bidding work, and with cooperation from major plants coordinated all parts for in-depth discussion on the bidding plan via video conference. Moreover, the bidding plan and strategy were formulated and optimized precisely according to the specific requirements of the tender documents. While the epidemic blocked face-to-face communication, it did not cast a shadow on Shanghai Electric's reputation for its excellent product technology and high quality. With concerted efforts, the marketing and sales cadres and staff completed clarification and bidding, and won this important project in the thermal power market.

Shanghai Electric

“State-of-the-art Motors”

Shanghai Electric Contributed To Successful Grid Connection of World’s First Non-Staged Combustion Compressed Air Energy Storage Power Plant, a National Demonstration Project

On May 26, China’s first salt cavern compressed air energy storage (CAES) power plant project successfully got connected to the grid, which is a national CAES demonstration project located in Jintan District, Changzhou City, Jiangsu Province. Shanghai Electric provided three 30MW compressor-driven motors that are key facilities of this World’s first CAES power plant using non-staged combustion technologies as they provide continuous compressed dynamics.

As the only national CAES demonstration project in China so far and the first in commercial use, the power plant adopts salt carven-based CAES, a new energy storage technology that compresses air into gigantic cavities created by solution mining for salts during off-peak hours and generates power by releasing air during peak hours for peak-load shifting and enhancing grid adjustment capabilities. It is estimated that the project can cut the use of standard coal by 30,000 tons and CO_2 emission by 60,800 tons every year after it starts operation commercially, which underlines its remarkable efficacy in building a new-type power system and helping to attain goals of “carbon peaking and carbon neutrality”.

Shanghai Electric Machinery MFG Works Co., Ltd., a subsidiary of Shanghai Electric, (hereinafter referred to as “Shanghai Electric Machinery”) collaborated and communicated closely with China National Salt Industry Group Co., Ltd., China Huaneng Energy Group Co., Ltd., Tsinghua University and China Energy Engineering Group Jiangsu Power Design Institute Co., Ltd. A new R&D platform was adopted for comprehensively optimizing large-capacity asynchronous and synchronous motors using in CAES application scenarios to improve their energy efficiency, and furthermore ensured the power-electric energy conversion efficiency of the whole energy storage and power generation unit was well aligned with goals of energy saving, carbon reduction and optimized energy allocation. Meanwhile, the R&D team has performed a series of researches and bespoke designs on the motors to meet the energy storage motor’s practical need of frequent starting and stopping by increasing its reliability, in which way they ensures the safety and stability of the units for the long run.

Dedicated to developing “state-of-the-art motors”, Shanghai Electric Machinery effectively managed both production schedule and product quality by making special plans and enhancing deviation analysis throughout the whole process, and finally produced motors, the key performance indexes of which are much higher than what is stipulated in the contract, showing Shanghai Electric Machinery’s strength in both R&D and manufacturing.

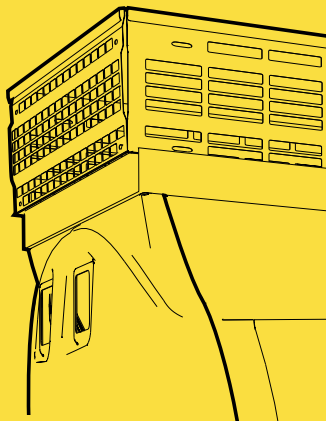
As realizing goals of “carbon peaking and carbon neutrality” has become mainstream, Shanghai Electric Machinery is and will be committed to developing and manufacturing high-quality motors that are safe and efficient with low carbon emission to better support national strategies, green transformation of the society and economy, and goals of "carbon peaking and carbon neutrality". D

Shanghai Electric Wind Power Group

S89

Blades Officially Start Bulk Delivery

The first batch of S89 blades of the Energy China Xinjiang Institute's 50MW wind power project in Wangguan Tun, Yanggao County, Datong City was loaded and shipped in the Shanghai FRP Research Institute Dongtai Factory, kicking off the bulk delivery of the longest blades on land of Shanghai Electric Wind Power Group Co.Ltd. ("Shanghai Electric Wind Power Sector"). This type of blades that rolled off the production line in September, 2021 is designed with digital tools which are specially devised for manufacturing and can provide accurate drawings of tools and tooling used in model-assisted production, significantly reducing adjustment time of pilot production and increasing efficiency.



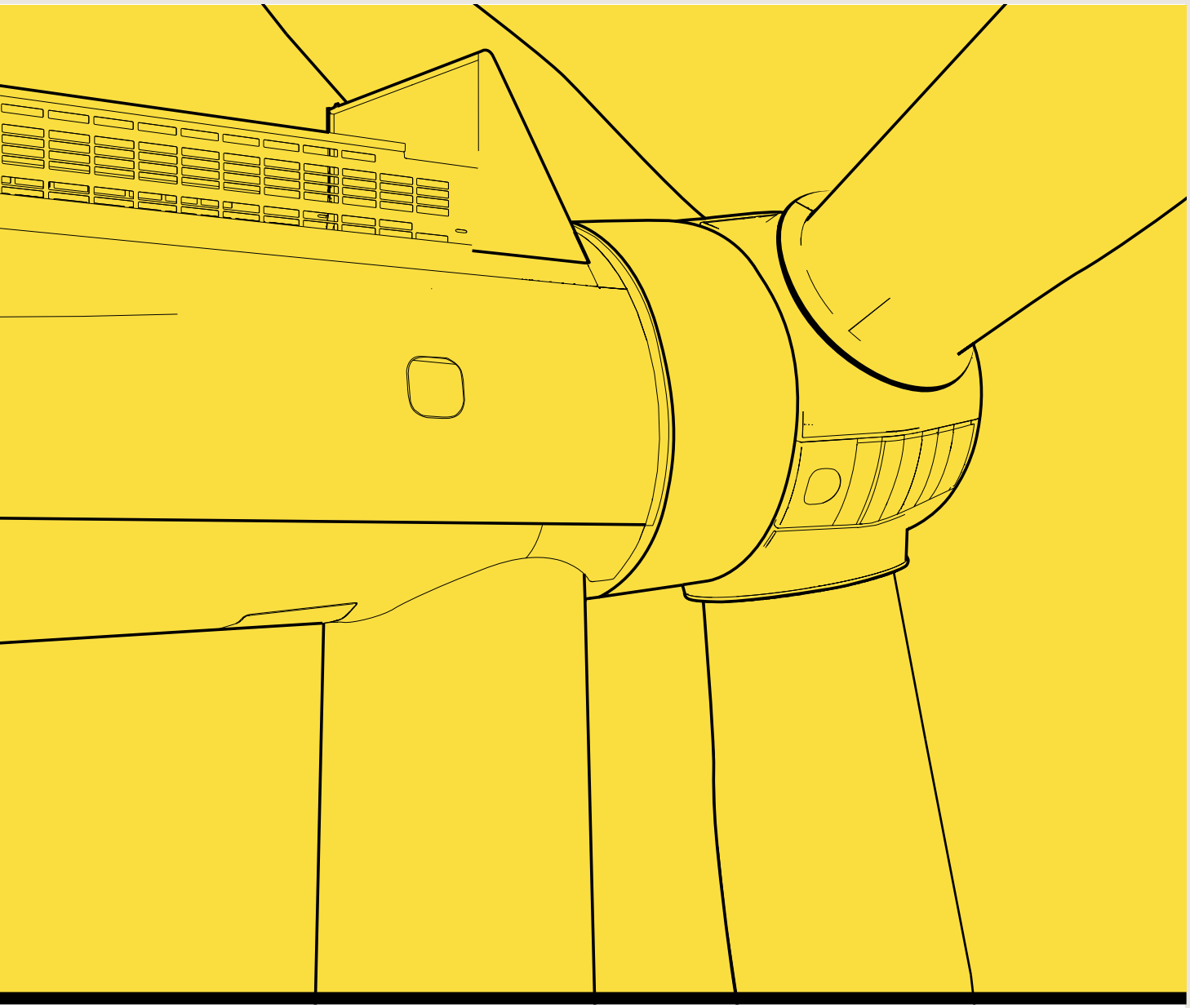
SHANGHAI ELECTRIC

To Start An Era of Big Capacity and Large Rotor Diameter For Onshore Wind Turbines

Shanghai Electric Wind Power Group won the Bid for the 200MW Project of Integrated Wind-Energy Storage Program Phase I in Huarun-Neihuang County

Recently, Shanghai Electric Wind Power Group Co., Ltd. (hereinafter referred to as "Shanghai Electric Wind Power") won the bid for the 200MW Project of Integrated Wind-Energy Storage Program Phase I in Huarun-Neihuang County. Some of the project units will be the type of 7.XMW, which is a next-generation cost-effective onshore turbine unit developed by Shanghai Electric Wind Power. And in all the bid-winning onshore turbine units that have been disclosed to the public so far, it has the largest unit capacity and rotor diameter in the market.

After being certified by a wind power authority in March, this unit won the bid and gained the market recognition thanks to its big capacity, large rotor diameter and high stability.



And Shanghai Electric Wind Power has embarked on a new era of large-capacity big-rotor-diameter onshore wind turbines. The new product can significantly reduce costs because it occupies 30% less positions than those of other types of 5MW turbines when wind farms are of the same size. Shanghai Electric Wind Power independently developed the blades by integrating advanced designs with technologies, such as the coupled integration of the blade and unit, system optimization based on power distribution, and efficient underloaded aerodynamic and structural design, and improves its power generation performance remarkably by increasing its swept area to over 30,000 square meters.

What's more, the new turbine is devised with the help of the Xcaliber, a reliable and mature platform created by Shanghai Electric, and continues to use semi-direct drive technologies that are of high credibility. Compact transmission chains with torsion and decoupling features high rigidity and safety margin, whose mid-speed permanent magnet generator requires less maintenance due to its excellent reliability. The new turbine employs latest digital products and control strategies of Shanghai Electric Wind Power, and was proved by tests in all regards on multiple levels. It can operate more stably with higher availability, and increase the project's ROI by cutting the operating cost throughout its service life. D

SHANGHAI ELECTRIC

Won the Bid For 2×1000MW Double Reheat Power Units at Yiyang City of Hunan

Shanghai Electric brought good news again from the thermal power market, as it won the bid for turbo-generators of the 2×1000MW project of Chang'an Yiyang Power Generation Co., Ltd., which is the first double reheat project involving expansion and upgrading for both Shaanxi Coal and Chemical Industry Group Co., Ltd. and the Hunan Province. Since the COVID-19 resurgence in Shanghai, Shanghai Electric has signed contracts for the manufacturing of generator sets for the first double reheat projects in the provinces of Zhejiang, Fujian and Hunan, while coping with the pandemic with all-out efforts.

Under the guidance of the national carbon peaking and carbon neutrality goals, low-carbon, environmental protection and high-efficiency features have become the key to the revitalization of thermal power generation industry. Shanghai Electric's industry-leading double reheat technology has been well received by major energy companies, and "double reheat" has become another iconic business of the Group.

With an installed capacity of 1960MW, Chang'an Yiyang Power Generation is the second largest thermal power producer and a major power supplier in Hunan. The company's three-phase 2×1000MW expansion project is the first one under the strategic cooperation agreement on energy between Shaanxi Coal and Chemistry Group and the province of Hunan. With existing land, equipment and facilities, the project enjoys advantages in construction period, investment and economic benefits; located in the power load center of Changsha-Zhuzhou-Xiangtan city cluster and the core area of Hunan power grid, it boasts obvious geographical advantages. With the support of Shaanxi Coal and Chemistry Group, the project has outstanding strength in coal resources in Hunan Province, where there is a shortage of primary energy. Upon completion, it will enhance the power supply security by closing the power gap in Hunan during the "14th Five-Year Plan" period. The project was approved on December 30, 2021, and scheduled to be fully put into operation in 2021.

Attaching great importance to the project, Shanghai Electric Power Generation Group mobilized professional and technical personnel many times last year to provide tailored solutions for the customer based on its world-leading double reheat technology as well as the actual conditions of the project and diversified needs of the customer, finally winning the recognition of the power plant. When bidding on the project, Shanghai was amid COVID-19 flare-ups. Unable to conduct on-site bidding, the Power Generation Group coordinated with the Xi'an office staff of its subsidiary Shanghai Electric Machinery to make concerted efforts, finally winning the bidding.

THE "AUXILIARY SOLDIER" of Shenzhou-14 Spaceship

Shanghai Mitsubishi Elevator Fulfills Its Service Responsibilities Again For Shenzhou-14 Space Mission

On June 5th, The Shenzhou-14 manned spacecraft was launched from the Jiuquan Satellite Launch Center in Gansu Province. Throughout the preparation, commissioning and launch phase, Shanghai Mitsubishi Elevator Co., Ltd. (hereinafter referred to as "Shanghai Mitsubishi Elevator"), a subsidiary of Shanghai Electric, ensured stable and safe operation of elevators of the launch center without any fault due to excellent maintenance.

Jiuquan Satellite Launch Center is pivotal to China's space exploration, and consequently it has extremely meticulous and rigorous requirements for each and every task. Being proud of contributing to this great cause and with a strong sense of responsibility and mission, the technical team of Shanghai Mitsubishi Elevator closely examined every part of every elevator, which is a supporting facility for the launch mission, and timely reported potential faults as well as providing scientific solutions in compliance with related regulations to the higher level, solving the problem after being approved to enable all elevators to run safely.

As the spacecraft is being launched, elevators at the center were exposed to tough challenges of super-high temperatures, pressures and humidity. It is a big test for elevators and technicians of Shanghai Mitsubishi Elevator. Based on information exchanges with experts of the launch center, the technical team reinforced facilities through a number of surgical measures including strengthening moving parts and reducing pressure inside the shaft amid the launch, ensuring the mission of all elevators to be accomplished.

It is reported that there have been 9 elevators produced by Shanghai Mitsubishi Elevator that have been in service at the Jiuquan center. Among them 5 were used from 1996 to 2009 at the hoisting workshop, 3 started working from 2010 at the command control center, launch tower (large) and test center respectively, and 1 from 2013 at the launch tower (small). And the latter 4 are still in service now. The 5 elevators at the hoisting workshop of the launch center were used in a string of launching missions from Shenzhou-1 to Shenzhou-11 spacecrafts. And the 3 that began operating at the command control center, launch tower(large) and test center have been fulfilling their duties throughout launches from Shenzhou-8 to Shenzhou-14.

SHANGHAI ELECTRIC

Shanghai Electric's "Best Wind Turbine" for Medium-Low Wind Speed Sea Rolled off

On June 10, the first EW8.X-230 wind turbine developed by Shanghai Electric Wind Power Group Co., Ltd. (hereinafter referred to as "Shanghai Electric Wind Power") on the Poseidon platform rolled off the production line based in Putian City, Fujian Province, opening a new chapter for grid parity of onshore wind power in China.

Targeting at characteristics of onshore wind power in China, low average wind speed and a huge gap between the north and south, Shanghai Electric develops this wind turbine that helps to promote onshore wind farm development and to achieve the "Dual Carbon Goals" in a time when grid parity is pursued as a cost-effective solution for utilizing wind resources in seas with medium-low wind speeds.

In addition to leveraging its expertise accumulated in the past decade, Shanghai Electric Wind Power embeds proven modules for manufacturing, transportation and maintenance into the Poseidon platform, such as the blade design, variable paddle and yaw system, energy-efficient cooling system and electric system defined by the best comprehensive performance, cementing the credibility of Poseidon. The platform adopts the highly integrated new-generation semi-direct drive chain technology that reduces both the construction cost of onshore wind farms and the kilowatt-hour cost across the whole life cycle of wind farms, generating the advantage of "lower cost with advanced technologies as a precondition".

What's more, the turbine adopts 100-meter carbon-fiber blades and the cutting-edge smart technology "Sensor Roller" and performs life-cycle digital design, manufacturing and maintenance management. With the latest version of the LeapX control system of Shanghai Electric Wind Power, the EW8.X-230 reduces its operational load and establishes an intelligent interconnection with the Fengyun system of Shanghai Electric Wind Power to keep improving its availability and yield for clients.

Under the average wind speed of 7.5m/s, the turbine can produce 28 million kWh per year that meet the annual electricity demand of 14,500 households, and cut coal consumption by nearly 10,000 tons and CO_2 emission by 24,000 tons.

Chairman of Bangladesh Power Development Board Visited Rupsha-Based Power Plant

Recently, Engr. Md Mahbubur Rahman, Chairman of Bangladesh Power Development Board (BPDB), visited the 800MW combined cycle power plant built by Shanghai Electric in Rupsha, and communicated with the project team on the progress and virus containment after hearing a detailed introduction from the team.

He asked detailed questions on project progress, equipment procurement, delivery schedule and how Chinese employees lived and worked, and required that both the property owner and the project team proceed with plant construction and carry out pandemic control measures at the same time. After being told that it was the 5th project undertaken by Shanghai Electric in Bangladesh, he said that Shanghai Electric is an old friend of BPDB, and will build the project in Rupsha into another success.

COVER TOPICS

Into a Digital Future via Cloud Revolution

The nearly matured digital technology has contributed significantly to the development of all industries. Available in retail, travel, automotive, Internet, healthcare, education, energy and other sectors, it has become an important driving force for economic growth. Many companies have made digital strategy one of the key decisions for their growth.

The capability of "being digital" has become the primary means by which we weather the COVID-19 crisis. During the lockdowns, we may face more difficulties in pandemic control without online shopping, online ordering of takeout and fresh food, online classes and remote work.

"Through the COVID-19, we have seen the tremendous power of digital technology. From the initial needs inspired by the pandemic to efforts in keeping order, then to recovery and reconstruction, we have a tangible sense that being digital is a universal, industry-wide, all-encompassing social change. It is an experience never before seen in human history." said Chen Long, executive provost of Zhejiang Hupan Entrepreneurship Research Center.

We suddenly find that digital technology not only helps us get out of the shadow of the pandemic faster but also reshapes the way we live and work. We have witnessed how the wave of digital intelligence has swept across all sectors, with business, production and life all caught up in the cloud revolution.

In May this year, KPMG and Alibaba Cloud released the 2021 COO Survey: Consumer & Retail at the Alibaba Cloud Summit 2021, which focused on the need for digital transformation. The data showed that companies with sound digital intelligence not only maintained good performance during the pandemic but also burst into sustained growth after the crisis.

In recent years, Shanghai Electric has been actively improving its digital capabilities and accelerating the digital transformation of its enterprises and businesses with strong momentum, which has not only changed our business model, but also our production methods.

Like air, digital technology cannot be seen, but it is everywhere.

BUILDING COMPETENCIES WITH DIGITAL TRANSFORMATION

DIGITAL INTELLECTUALIZATION

Number of intellectualization

The documentary Cloud Technology in China: A Glimpse of Digital Future, a collaboration between financial writer Wu Xiaobo and Alibaba Cloud, tells how traditional manufacturing companies have solved their problems and created incredible performance through digital intelligence while facing difficulties such as inventory backlogs and the impact of the sudden pandemic.

Data is generated incessantly as technologies evolve so fast. China's industries have made a leap forward in their understanding of "digitalization". Digital transformation has changed from an "optional" to a "must-answer" in business competition. However, we need the support of artificial intelligence technology to find the hidden value of data and realize its full potential.

In recent years, Shanghai Electric has been making progress steadily, insisting on innovation while inheriting the tradition, and firmly pursuing high-quality development with "high-end, green, digital and service-oriented" development as its orientation. The Group continuously improves its capabilities in digital manufacturing, market competitiveness, collaborative innovation, risk control and response in a professional, market-oriented and international manner. In the new era, Shanghai Electric vigorously promotes digital

THE DUAL DRIVE OF INDUSTRIAL DIGITIZATION AND DIGITAL INDUSTRIALIZATION

Digital technology is reshaping our business environment. The digital economy includes two main aspects: industrial digitization and digital industrialization. Industrial digitization refers to promoting the transformation of traditional industries and the real economy with digital technology; digital industrialization refers to the industrialization and development of emerging technologies such as artificial intelligence, big data and cloud computing. In the digital economy, the former represents the strategic depth, and the latter is the fundamental part; both are inseparable for the sound development of the economy.

In 2020, the scale of China's digitized industries reached 31.7 trillion yuan, accounting for 80.9% of the digital economy and 31.2% of GDP. Sensors, robots and CNC machine tools have become more intelligent with a decreasing cost, providing the basis for replacing manual labor and realizing mass application. The cloud-based digital capabilities of enterprises have been constantly improving, strongly promoting the reduction of costs and efficiency improvement in the manufacturing industry.

These changes reflect the ever more important role of digital technology in economic growth. Digital technology has not only enhanced total factor productivity but also driven the comprehensive upgrading of manufacturing, service and agriculture sectors at all stages. This year's government work report also proposes that we should apply 5G technology on a larger scale, advance digitalization of industries, and build smart cities and digital villages.

On May 18, 2018, Shanghai Electric Digital Technology (SEDT), a key entity for digital transformation, digital capability cultivation and digital platform construction of Shanghai Electric Group, was founded. With a focus on sub-sectors, the company is committed to being a leading digital solution provider for industrial players. It serves as a new in-house driver for Shanghai Electric's transformation and development by leveraging its advantages in equipment manufacturing, and it takes the lead in digitally-empowered technological innovation and application in industrial niches. Concentrating on Industrial Internet, enterprise management informatization, smart supply chain, infrastructure and cloud services, the company integrates information and digital technologies to realize the intelligence and digitization of products, production, services and management for manufacturing enterprises.

"Digital capability is the core competitiveness and driving force for the development of enterprises, which is reflected in all aspects covering operations, management, production and supply chain, and will fully influence the development of enterprises. In the era of the digital economy, the stronger the digital capability of an enterprise, the greater its growth potential, and the more it can lead the enterprise to break through bottlenecks, surpass its competitors and achieve sustainable growth." said Cheng Yan, SEDT's Executive Director and General Manager.

The COVID-19 pandemic forced Shanghai Electric to accelerate its digital transformation. "For manufacturing enterprises, the comprehensive cost is always increasing. Rapid price increases in raw materials and rising employment costs year after year have made many senior executives start thinking about the significance of digital transformation and intelligent manufacturing. Intelligent and less humanized production is an inevitable trend." Cheng said that during the pandemic, factories with higher digital intelligence also shows higher efficiency in production resumption.

For enterprises, the digital economy has become a key point for grasping opportunities in the new wave of technological revolution and industrial change. China attaches great importance to the development of the digital economy and has made a series of deployments at the national strategic level. What should Shanghai Electric focus on to make our digital economy stronger and bigger?

DIGITAL SENTINEL

When Shanghai made every effort to fight the battle against COVID-19 and accelerated the resumption of work and production, SEDT actively leveraged its unique digital intelligence capabilities to develop the "Digital Sentinel" solution based on the temperature-sensitive pandemic prevention equipment and smart access to public places. This is a further upgrade of its former digital solution for public access.

Connected with the Shanghai Municipal Data Center, the device can instantly verify the status of "Shanghai QR Code" and synchronize information including the latest nucleic acid test, antigen test, health code and body temperature. After it was put into use, the tool, which was independently developed by SEDT, greatly improved the management efficiency of public access and prevented the possible risks arising from the gathering of people, providing strong support for enterprises to resume work and production.

At the beginning of the recent outbreak, SEDT hoped to use digital means to relieve manual input in the regular pandemic control and reduce the workload in health code verification and registration at the entries and exits. When working from home, our staff plunged themselves into the project and completed the development, adaptation and testing of the solution in remote work. Considering the multiple ways of public access, the team predicted the needs of enterprises and upgraded the function from a single identification terminal to a comprehensive solution with the combination of online

and offline visitor systems, temperature-sensitive auto gates and other access systems. Online visitors can immediately complete pre-identification through the program when registering, and offline visitors can enter through face recognition for simultaneous verification of “Shanghai QR Code” and access control, enabling full-process monitoring for enterprises’ COVID-19 prevention and control.

Since the full resumption of work in Shanghai, Shanghai Electric’s 206 “Digital Sentinel” devices have served 32 enterprises inside and outside the Group, followed by the release of an upgraded management platform with a data visualization feature. While employees complete health information verification in an orderly and smooth manner, managers can monitor dynamic data in real time through backend screens for overall scheduling and arrangements.

The company has equipped all the parks with the "Digital Sentinel" tool. The Group’s Economic Operation Department, Safety and Environmental Protection Department and Enterprise Service Company have been working with SEDT to actively expand its application scope inside and outside the Shanghai Electric Group.

UNMANNED FACTORY

With the rapid progress of technology, the manufacturing industry is also constantly pursuing higher efficiency. Fully automated production lines and factories are becoming more and more popular. As one of the leading enterprises in the domestic high-end manufacturing industry, Shanghai Electric has been actively exploring solutions for “unmanned factories” in the past few years, which has resulted in fruitful results and laid a solid foundation for promoting economic growth under the pandemic crisis.

SHANGHAI HIGHLY GROUP: INTEGRATING THE INDUSTRIAL CHAIN WITH DIGITAL NETWORK

In Highly’s intelligent factory, the traditional production mode with personnel controlling each machine has long since become a thing of the past, and most of the processes on the machining line are conducted by industrial robots. Most of the production lines have achieved contactless production, effectively solving the problem of insufficient personnel during the pandemic and minimizing the risk of infection caused by in-person contact.

Automatic storage, flat warehouse, AGVs, automatic production line, elevators and other advanced features are integrated by WMS and MES to form an intelligent storage and logistics system. The incoming materials, logistics, loading and unloading bundles are all automatically processed by the system; the “unmanned logistics” solution not only eases the labor intensity in logistics but also reduces the cost.

Highly believes the heart of a smart factory is a digital network that integrates orders, production, warehousing, and supply chain management. It can connect all departments of the enterprises and smooth the whole industrial chain.

After a client places an order online, the suppliers are automatically notified while the manufacturing department responds so that the parts can be delivered in time; after that, the AGVs will automatically deliver the required parts to the work stations according to the system arrangement; the manufactured products are also automatically delivered by the AGVs to the shipment area or warehouse according to the order.

WIND POWER GROUP: EXPLORING NEW MODE OF INTELLIGENT PRODUCTION

Similar to the intelligent factory of Highly, we can see intelligent logistics robots, movers and magnetic robots busy everywhere in the Putian manufacturing base of Shanghai Electric Wind Power Group. There are only a few equipment maintenance personnel in the factory, making the huge workshop more like a world of robots.

Several years ago, the Wind Power Group started its exploration in intelligent manufacturing, and the Putian base is only Shanghai Electric's first step in the unmanned factory. The Shantou manufacturing base has been put into operation with more advanced management and operation. With the first "three-dimensional imaging" system in China, the accuracy of the installation of direct-drive generator stators is ensured in the workshop. It is also equipped with intelligent vehicles for more effective human-machine cooperation.

The Shantou base also constantly improves the visualization of operational information. With its fast integration of informatization and industrialization, the base simulates the manufacturing systems through big data to establish virtual models of production processes for optimization, providing decision guidance for the establishment of new factories and the development of new products.

SHANGHAI GENERATOR PLANT: REDUCE THE IMPACT OF THE PANDEMIC WITH INTEGRATED INTELLIGENT SOLUTIONS

During the COVID-19 resurgence, Shanghai Generator Factory's "intelligent factory" also displayed its unique advantages. The latest intelligent production line for the linear part of rotor coils enables the automatic production of nearly 200 specifications, and all the equipment can be operated intelligently.

Work order instructions are issued directly from MES, real-time machining progress is displayed within MES and monitoring screens, and control point data is synchronized with MES to ensure product quality. The measured processing efficiency of the product is 20 minutes per piece, which has nearly doubled the efficiency compared with the previous solution.

Since 2010, Shanghai Power Plant has already started to replace manpower with press-fit robots in production. In March 2019, the Plant's "Smart Factory", as a demonstration project meticulously constructed over three and a half years, was accepted by a group of experts from the State Ministry of Industry and Information Technology, becoming one of the first smart factories to be put into operation in China. During the COVID-19 pandemic, the Plant upgraded its processes and intelligent equipment to create a systematic solution to minimize the adverse effects of the pandemic.

INTELLIGENT HEALTH

Although Shanghai Electric is a latecomer in the medical field, Shanghai Kangda Medical Equipment Group Co., Ltd. ("Shanghai-electric Kangda" or "Kangda") has shown good momentum of development in recent years, creating an intelligent medical system covering prevention, diagnosis, treatment and rehabilitation, which plays an important role in COVID-19 prevention and control.

Mobile Health (mHealth)

The prevention and control of COVID-19 have created a huge demand for mHealth. Kangda's mobile CT unit can break the location limitation to realize more effective medical outreach that can reach rural towns and mountain villages. It enables medical care for the poor, routine screening tests and epidemiological surveys and other common medical mission trips, to meet the need for COVID-19 prevention and control in a comprehensive manner. The mobile CT unit also contributes to precision poverty alleviation by enabling poverty-stricken people to enjoy the high-quality medical treatment.

Online Medical Care

mHealth will be more effective through the empowerment of online medical care. Based on the 5G technology, the Kangda Cloud system connects local and county-level medical imaging diagnostic centers with telemedicine technology to form a network for remote image consultation, examination and remote training services.

Portable Ultrasound

Through the integration of AI technology and medical services, Kangda vigorously develops its capability in product and technology integration, so that its devices are more lightweight, intelligent and user-friendly to meet the diversified needs of health institutes. Meanwhile, the company is committed to the development of remote diagnosis, collaborative consultation and AI-assisted diagnostic applications to enable convenient, intelligent and high-level medical diagnostic services for all people.

Surgical Robots

Surgical robots have become one of the advanced technologies in the medical equipment industry with more and more companies joining the competition. The surgical robot not only overcomes the pain points of poor precision, long operating time, tiredness of doctors and lack of 3D precision vision in traditional surgery but also brings a better clinical experience to patients and shortens the learning period of doctors for complex surgeries. Shanghai Electric has entered the medical equipment industry several years ago as one of the important steps for its strategic transformation and development. Shanghai Electric's Central Academe has pooled a lot of scientific research resources and made significant breakthroughs in fields such as surgical robots and robotic exoskeletons.

Rehabilitation Robots

As the medical and robotics sectors become new economic hotspots, rehabilitation robot enterprises also entered a period of rapid growth. In early 2013, Shanghai Electric officially launched the research and development of key technologies for rehabilitation robots with a focus on limb rehabilitation. The Group set up a subsidiary named GeniKIT Medical Science and Technology for this purpose. As an important deployment of Shanghai Electric in the intelligent medical industry, the company is responsible for the research of cutting-edge technologies in rehabilitation and medical care as well as the market expansion. At present, the company has a variety of products and solutions that provide speed and strength training and assessment for muscles, such as upper limb rehabilitation robot, lower limb rehabilitation robot, mobile lower limb rehabilitation robot, and sensory rehabilitation training equipment.

SEUNICLOUD

SEUNICLOUD REVEALS GROWING CAPABILITIES

The construction of Shanghai Electric's IIoT platform "SEunicloud" was commenced in 2018, with three versions released respectively in 2019, 2020 and 2021 to facilitate the intelligent upgrade of products, manufacturing and services in high-end equipment industry. Through the platform, more than 100,000 high-end devices have been connected online, including wind power generation equipment, photovoltaic power plant equipment, batteries, elevators, machine tools and so forth.

The relationship between the platform and industries in IIoT applications is similar to that between the socket and the plug. The platform provides underlying service capabilities such as data collection, cleaning, analysis and computing, forming a friendly development environment through the architecture of "micro-services and micro-applications" to provide enterprises with ready-to-use services; while enterprises can focus on their own business and quickly develop industry applications according to their needs.

Based on the industrial mechanism model library and industrial database, the Group strives to build SEunicloud into a hub for data asset storage and allocation to provide users with solutions such as intelligent production, networked collaboration, tailored application and service extension.

SEunicloud supports remote operation and maintenance. Based on the support of digital base of Shanghai Electric's SEunicloud industrial Internet platform, the Group creates intelligent solutions such as smart wind power generation, machine tool maintenance, digital medical care, environmental-friendly water system and digital factory for targeting the pain points and the needs of industries such as elevator, wind power and thermal power, with digital empowerment for different application scenarios. For example, after accessing SEunicloud, wind turbines can be monitored, operated and maintained remotely. As the pandemic restricts the movement of personnel, it is difficult for managers to reach the project fields, and the remote monitoring of equipment status through SEunicloud can minimize the impact of the pandemic.

The platform enables the digital management of new energy power stations. For the pain points of scattered resources and the low utilization rate of new energy stations, SEunicloud employs cloud computing, big data analysis, IoT and other advanced technologies to establish a centralized management platform featuring advanced technologies, open data, unified standards, safety, reliability, remote monitoring, centralized power prediction, coordinated control, intelligent production management, intelligent health management and other functions for users. As a result, staff can remotely monitor the operation of new energy stations.

Shanghai Electric has built the "Shanghe" intelligent supply chain platform for digitized procurement. Shanghai Electric's Shanghe platform provides services for the digital transformation of supply chain management for corporates, enabling smooth supply chains covering various business scenarios involving suppliers, customers, procurement and sales. Providing functions such as supplier review, dynamic management, performance evaluation, online inquiry and quotation, order interaction, and financial services, it is committed to being an efficient, transparent and convenient platform for procurement, collaboration and supplier management, enabling enterprises to standardize procurement management, optimize procurement processes and achieve cost reduction and efficiency improvement. The realization of online sourcing, procurement and collaboration effectively alleviates the raw material shortage caused by the pandemic.

The platform enables checking of the COVID-19 situation in the supplier's location. Due to the lingering pandemic, it is very important for enterprises to keep abreast of the real-time COVID-19 situation and prevent the supply chain from being affected after they resume work and production. To provide digital tools for the purpose, Shanghai Electric's intelligent supply chain platform has added a feature for COVID-19 info query to the supplier module. The users can check the COVID-19 status in the supplier's province in the "Details" to keep abreast of risk factors and take corresponding measures,which enables enterprises to effectively cope with the COVID-19 and ensure the smooth development of business.

During the pandemic, SEunicloud continues to provide various cloud-based applications and online services to facilitate the resumption of work and production.

Innovation results are quickly migrated to the cloud. The value of innovation results needs to be demonstrated in commercialization. SEunicloud provides quick PaaS deployment, a safe and reliable operation environment, as well as the TSDB timing database and APIs for message push. They are

combined with low-code rapid development tools such as IABC to support the industrial players of different sectors to link their devices and applications to the cloud. According to statistics, 55 tenants are using the platform to release and subscribe to applications; the number of subscriptions for services and applications reached more than 2,000, and the number of access devices is more than 120,000.

As the Group gradually resumes work and production, its SEDT company continues to provide technical support and online services for cloud-based applications and product subscriptions, assisting in the release of APPs for industrial fields such as work hour management, hazardous waste operation, rehabilitation medical training and assessment and heat treatment production management. It provides comprehensive assistance to the operation of cloud-based applications, supports the software development for enterprises, and constantly upgrades the applications to provide customers with more value-added services.

The platform provides continuous remote operation and maintenance services. The pandemic puts higher requirements on user services. How does the platform help enterprises handle the difficulty of providing technical support for their equipment caused by the COVID-19? SEunicloud quickly builds production monitoring and remote O&M services for enterprises. Based on the massive data, it analyzes key production elements and helps enterprises understand the status of equipment in real time through the online channel.

In the remote "Air Cooling Unit" O&M project of Shanghai Electric SPX Engineering & Technology Co., Ltd., the platform connected to 2,688 heat dissipation areas and helped the company establish an all-in-one solution for the lifecycle operation and maintenance by developing a remote service application for the "Air Cooling Unit". Through big data, IoT and other technologies, the platform establishes cloud services to reduce the direct cost and labor cost of operation and maintenance services; the system realizes an energy consumption reduction of more than 10%, greatly reducing the failure rate of the equipment.

In addition, the platform's intelligent O&M system for high-voltage inverters has connected 50 high-voltage inverters to provide real-time fault diagnosis and analysis.

The platform provides real-time monitoring and intelligent warning. For Shanghai Electric Environmental Protection Group's monitoring and management needs of new energy stations in Xinjiang, SEunicloud has connected 232 photovoltaic inverters and 2 convergence stations, realizing the data migration of photovoltaic power stations and wind farm equipment to the cloud. The staff is free from being stationed in remote project sites for long, which solves a pain point during the COVID-19 pandemic. Through the integrated remote monitoring of wind and solar power stations, managers can keep abreast with the operation status of equipment in real time, and technical experts can conduct remote diagnosis and analysis of equipment based on operational data for examination and preparation of preventive maintenance plans.

Based on big data analysis, intelligent early warning, and intelligent AI algorithms, the SEunicloud-based applications effectively assist managers of centralized control centers of new energy in data monitoring, equipment tracking, faults prediction, equipment control, energy management and other operations that could only be done on site in the past.

In the face of the COVID-19, the players in the real economy need to change their mindsets, use the joint online and offline operating model, embrace the Internet, and promote digital transformation for sustainable development and coping with the difficulties. More companies have realized that digital transformation is the only solution for a prosperous future.

In the past decades, we have experienced a series of digital revolutions including the Internet, online, cloud, two-wheel (digital industrialization and industrial digitalization) drive, and link-wide digitalization, which represents not only the reconstruction of business infrastructure but also the remodeling of business ecology with consumer operation as the orientation.

For years to come, it will be critical for enterprises to seize the market through digital transformation and to speed up the construction of digital infrastructure as digitalization represents huge potential.

VIEWPOINTS

INTERVIEWS

Wang Yong

PRESSING AHEAD TOWARDS TECHNOLOGICAL INNOVATIONS:

A SHANGHAI CRAFTSMAN'S STORY WITH GAS TURBINE WORKSHOP OF SHANGHAI ELECTRIC

A middle-aged man with big wise eyes and of average height is full of energy and passion as if he were still young. For most people who see him for the first time, that is their first impression of Wang Yong. Due to the pandemic, this interview started from Wang Yong's photo, and then was performed via phone calls and WeChat messages, making it quite different. The title "Shanghai Craftsman" was transformed into a real person of flesh and blood through his gales of laughter and memes of him smiling, contemplating or showing support.

It is widely acknowledged at the Shanghai Turbine Plant (hereinafter referred to as "Shanghai Turbine") that Wang Yong is smart and agile. He always volunteers to take heavy responsibility and embrace new challenges just like his name "Yong" (the Chinese character "勇" means "courage"). Throughout his 23 years in the plant, there were countless stories in which he dared to be the pioneer. He tackled technology bottlenecks of heavy gas turbine localization, and made the legend of producing one turbine per month averagely. He was awarded the Reward of National Science and Technology Progress by participating in the manufacture of domestic broaches. Staying committed to technology optimization, he helped to cut the manufacturing cost by 5 million yuan through upgrading the processing of F-class gas turbine's stationary blade carriers. He increased production capacity by processing rotor blade terminal windows with shapers instead of the boring and milling machine that was rather expensive. He also invented a workshop-oriented antiskid board to make the working environment safer by preventing workers from slipping, which has been applied in the whole plant and is undergoing national patent-related procedures. What on earth pushes him to invent restlessly for decades?

OPEN THE DOOR TO INNOVATION OF TECHNOLOGICAL REFORM

Wang Yong was born on Chongming Island, Shanghai, in 1979. “I was too excited to have a good sleep for several days after getting to know that I was going to work at Shanghai Turbine Plant, one of the ‘Top 4 Heavy Industry Plants’ (Shanghai Turbine Plant, Shanghai Electric Machinery Plant, Shanghai Boiler Works and Shanghai Heavy Machinery Plant) at Shanghai.” He was recruited by Shanghai Turbine Plant after graduating from the machinery manufacturing major of Shanghai Agricultural, Industrial and Commercial Secondary Technical School in 1999.” It was not that easy for graduates of secondary technical schools to find a job in the late 20th century, as our jobs were no longer uniformly distributed by the government, so I really cherished this job opportunity offered by Shanghai Turbine Plant.”

In the early summer of 1999 when neither Metro Line 5 nor Shanghai Yangtze River Tunnel-bridge was built, he finally arrived at the Shanghai Electric’s Minhang Site in the southwest of Shanghai after travelling nearly 150 km from his home, Sanxing County at the westernmost of Chongming Island, with luggage prepared by his parents, and taking more than half a day. But at that time, with high expectations for both the high-profile company and a better life in the future, he was still enthusiastic and passionate, and his pace seemed brisk and urgent.

” It felt like I had entered a new world in my early days at the plant.” He was extremely popular with his workmates and roommates thanks to his extrovert personality.” Senior workers were so helpful. They answered every question you asked and offered a hand whenever you needed. The equipment in the workshop was very ‘advanced’ in my eyes, and I had broadened my horizon by operating it. In the gas turbine workshop, I followed my master worker Liu Zhaolin and learnt how to operate the Czech Skoda 160 floor-type boring-milling machine, mainly processing parts and components like high-pressure inner cylinders for 60kW and 30kW steam turbines. After 2 years of serious study, I became a master worker of large machine tools myself. ”

“ OPTIMISM IS AN ABILITY, AN ATTITUDE AND WISDOM. ”

Wang Yong

IMPLEMENT SMALL RENOVATIONS BASED ON THOROUGH ANALYSIS

Optimism is an attitude. Who can live a life without any challenges? It is one of Wang Yong's regrets that he did not go to college in that from time to time, he finds what he has learned is far from enough to tackle existing difficulties. At the same time, however, he feels reassured that he has been on the track of life-long study for decades. If it were not for the epidemic, he would take a 60-km drive on the weekend as usual for the post-graduate program held by Shanghai Polytechnic University. Whenever there are difficulties in life or at work, he will immediately invite his friends to have a cigarette together and take a break. Wang Yong sees negative feelings as nothing but dusts on the face or clothes that can be washed off in a second.

He talked about a small technological innovation that has made him "proud". The heavy-duty gas turbines are one of Shanghai Electric's prioritized products, but their holes for air cooling on the rotor wheel were drilled inefficiently in the old days. The cooling holes were spatial inclined holes with large length-to-diameter ratio and complex structures. They were numerous and located at the bottom of the turbine's groove, which means drilling must be carried out without touching the groove. Therefore, drilling such holes became a bottleneck in wheel processing. Tiny as they were, the holes impeded the whole production procedure and even affected the delivery time. Wang Yong resolved to remove the obstacle through innovations. In order to solve the problem, Wang Yong began to use his noodle.

According to him, holes for air cooling in grade-11 and grade-13 wheels of large F-class gas turbines were drilled by high-speed steel tools. When processing parts made of high-temperature alloy like the wheel, the cutting power increases with the cutting strength, meaning that it is necessary for the cutting tool to have large length-to-diameter ratio to drill holes as required. However, it will cause severe deformation and stickness of the wheel material, resulting in the formation of built-up edges, leading to poor processing performance and poor chip evacuation. Thus, the tools become severely worn, greatly reducing the processing efficiency and increase the costs.

Honestly speaking, deep hole processing can be seen as art, which is determined by factors like whether drills and drilling process are chosen properly, whether cutting parameters are applied reasonably and how chips are removed. Starting from scratch without any experience to learn from, Wang Yong managed to remove the curb and completed the deep hole processing after repeated testing coupled with CNC automatic self-acting feeding on basis of thorough observation and analysis. He finally chose the mechanically-clamped blade gun drill, which not only increased the cutting efficiency through raising the tool feeding rate, but also optimized the process flow by streamlining the process from 7 steps to 3, thereby reducing the types of tools needed. This change alone can save over 600,000 yuan in the whole year, calculated on the 8 large F-class gas turbines in 2021.

"It is only an example of many innovations he has made, in which he addressed many practical problems. When I saw the satisfied smiles of people seeking help, I was much happier than they were." I've been asked many times where my creativity comes from, and I think it comes from the sense of gain and satisfaction underpinned by the fact of being valued, needed and recognized. Wang Yong said that over the years, the way he was called evolved from Wang to Master Wang, and then to Greatmaster Wang, a change demonstrating not only his own development through years but also acknowledgement and praise for his morals and expertise from friends and colleagues.

THE "SUPER SUBSTITUTE" TURNED INTO A DOUBLE-QUALIFIED TALENT

Optimism is wisdom. Wherever he goes, Wang Yong always lights up the atmosphere, because he likes to work in a harmonious work environment, and believes that a harmonious work environment improves efficiency and causes less fatigue. He shared his optimism by writing down his experience and results in training materials.

Wang Yong deals with all types of problems every day. The reasons workers call for him were various, including inappropriate CNC programs, tooling, or process, and failure to produce a blank hole or meet the requirements of the drawing. Rushing back and forth between the technology department and the production workshop every day, he said that "solving all kinds of problems in the production process is my top priority at the moment. The experience accumulated and the ability developed

Wang Yong

in the work for more than two decades qualified him for this job and gave him confidence to solve these problems calmly. But they were not easy to come by, and sometimes preceded by setbacks.

In 2006, when participating in the trial production of the radial bearing of an F-class gas turbine, Wang Yong overcame difficulties and met the requirements of tight dimensional tolerances and high geometric tolerances, passing the Siemens experts' inspection at one time. It was the first gas turbine product set completed by Shanghai Turbine Plant that year. Since then, he has formed an indissoluble bond with gas turbines, and has been involved in the processing of almost all large parts of Shanghai Turbine Plant. However, when Shanghai Turbine Plant faced a grim situation in 2017, Wang Yong had little work to do in his main business - processing gas turbine wheels. During that time, he became a "super substitute" in the workshop, going wherever he was needed. "I used to be lost and confused, and had little enthusiasm for work." He said frankly: "But I tried to do my best to help because, on the one hand, it hurt to see a production line worth more than a billion yuan lying idle. On the other hand, I was anxious about not having a stable job although I was busy all day." As if responding to Wang Yong's anxiety, in 2019, his leader decided to send him to the process department to work on rotation. Even though he was already the chief technician then, Wang Yong knew that everyone had their own strengths and limitations. He didn't feel ashamed to ask questions whenever he encountered one, even if the person he asked was merely a college graduate new to the factory. "As I had enough practical experience, the two years in the process department enriched my theoretical knowledge, and taught me that you must sharpen your tool if you want to do a good job."

In order to improve the efficiency of CNC machine tools, Wang Yong, the process programming group and the resource team put forward many ideas on program application and carried out partial modularization. In line with the standardized CNC program for CNC vertical lathe of the steam turbine workshop, they formulated the program standardization strategy for boring and milling machines. For example, they conducted parametric modeling of structures such as U-notch, welding bevel, keyway, steam seal groove, etc., and collated the corresponding variables, so that the programmer only needed to select the corresponding program module according to the structure of the part and input a few parametric variables to realize programming quickly. In terms of tools, they soaked themselves in the study of advanced tool technology and cutting methods, and conducted cutting tests with localized tools to optimize and adjust the functionality of them. Meanwhile, they compared costs and performances of different tools to find the optimal cost reduction solution. They developed a unified standard for tool types, compressed tool categories, encoded large lathe tools in the gas turbine workshop, and put them into the warehouse. The next step will be to collect and sort out the existing tools for boring and milling machines and gantry milling machines to minimize tool categories and unify standards. It also helps to unify processing methods and lay the foundation for standardized production.

Today, as the head of the technician innovation studio, a member of the CNC studio and the cost reduction committee, Wang Yong has benefited a lot from the infinite cycle of "discovering problems-solving problems-discovering new problems again". He is also grateful for the experience of being a "super substitute" which saw him rotating among various positions and made him more familiar with the products. Every quarter, he raises at least three rationalization proposals, analyzing problems in the production process and listing all the improvement effects and cost reduction targets. He also developed a good habit of keeping a work diary. Every day before heading home, he records his day at work on the computer: details to be improved, experience to be shared, and mistakes to be avoided... "A diary is always more reliable than the memory. This habit helps me avoid many mistakes and accumulate more experience. The experience and results became part of the training materials I wrote and they were proved to be useful to younger people," he smiled cheerily.

During the Shanghai epidemic, Wang Yong volunteered in the residential quarter, wearing the white protective suits. When the factory resumed production on April 20, he changed back into his work suit. "It feels good to be back to work." From his tone we can feel his love for the factory and his work, and this love comes from the bottom of his heart.

上海电气
SHANGHAI ELECTRIC

Shanghai Electric

CREATE OUR FUTURE TOGETHER