SINOSTEEL E&T ENGINEERING NEWS TECHNOLOGY LETTER

2022

Beyond Expectations

Digital Transformation —— Building a Solid Digital Foundation for the Steel Industry

$1.1 Billion Contract: Go green, Go digital Build Tosyali Algeria Steel Complex Phase IV

Essential Move to Meet Baowu's Green Pledge

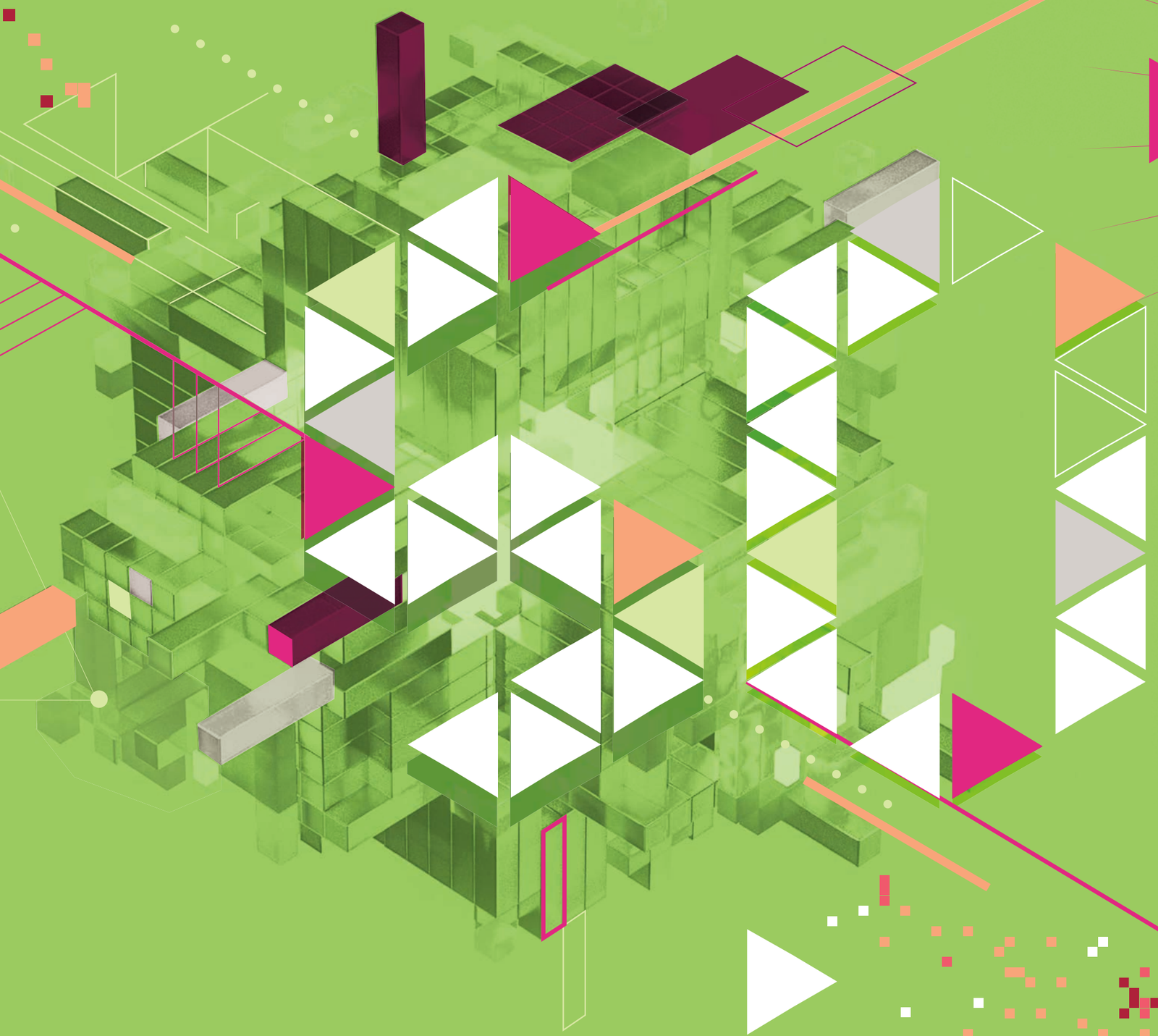
Low-carbon Trial Kicked off to Cut Carbon Emission by 30%

Innovative Prowess

LOW-CARBON TECHNOLOGY

FORGING A LOW-CARBON TECHNOLOGY LEADER IN METALLURGY

SINOSTEEL



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Industrial Engineering & Service

As Sinosteel E&T's wholly-owned subsidiary and founded in 1972, Sinosteel Equipment & Engineering Co., Ltd *(abbr Sinosteel MECC)* has grown into an industry-leading company and made significant contributions to the development of Chinese steel industry. The company is capable of industrial general contracting covering diversified areas including metallurgy, mining & mineral processing, coal chemical, energy and infrastructure.

By accomplishing over 500 national key projects for giant steel producers, Sinosteel MECC has made outstanding contributions to the development of China's steel industry. With business footprints in more than 40 countries, the company has also gained an excellent reputation in the overseas engineering market.

2022 commemorates the semicentennial of the founding of the company. As proper utilization of resources and lower carbon footprint rise on the list of steelmakers, Sinosteel MECC advances foresightedly and quickly, rolling out a feasible action plan toward a greener future. The company has already built two of the world's largest DRI plants and is now undertaking prominent carbon-cutting projects. Meanwhile, it continues putting efforts into developing and deploying a broader portfolio of technologies to optimize process efficiency and mitigate CO_2 emissions, paving the way for China's iron and steel metallurgy industry to accomplish low-carbon transformation in the coming years.

CELEBRATING THE 50TH ANNIVERSARY OF SINOSTEEL E&T

50 Years of Endeavour Beyond Expectations

SINOSTEEL ENGINEERING & TECHNOLOGY CO., LTD.

As a member of China Baowu Steel Group Corporation Limited and a listed company (stock code: 000928), Sinosteel Engineering & Technology Co., Ltd. (abbr Sinosteel E&T) is a leading industrial engineering company focusing on industrial engineering & service with multiple businesses including mining engineering, energy saving, safety & health and environmental protection.

Pursuing sustainable development and innovation-driven growth, Sinosteel E & T provides outstanding life-cycle service along the entire iron and steel production chains, as well as all-in-one green solutions to customers around the globe. Thanks to its continuous input into technological innovation & research, Sinosteel E&T is steadily moving forward into a new stage of growth: innovation of ground-breaking green & low carbon technologies and advancing future-oriented digitalization measures to reduce carbon footprint and improve sustainability. Making the *Solution Provider of Low-carbon Metallurgy, Pioneer of Greener Growth* as the company's business motto in the new era, Sinosteel E&T is determined to forge a leading low-carbon metallurgy company in China and assist iron & steel industry to achieve the goal of carbon dioxide peaking and neutral ahead of time.

Environmental Protection

Sinosteel Tiancheng Environmental Protection & Technology Co., Ltd *(abbr Sinosteel Tiancheng)*, a subsidiary of Sinosteel E&T, is a front runner in developing green solutions for iron & steel makers. Boasting of two national technology centers and one workstation for academicians of the Chinese Academy, Sinosteel Tiancheng has built a great number of model projects by applying its pillar tech on ultra-low emissions. With its dedication to technology innovations, Sinosteel Tiancheng will help customers to achieve synergy between pollution and carbon emissions control.

Health, Safety & Protection

Sinosteel Wuhan Safety & Environmental Protection Research Institute Co., Ltd *(abbr Sinosteel SEPRI)*, a subsidiary of Sinosteel E&T, focuses on providing professional HSE consulting services & solutions. Possessing rich experience in risk management and control, the company expands its business into the area of green and decarbonization development.
Excels in basic research and best-in-class know-how, Sinosteel SEPRI can tailor-make roadmap and strategies for customers to cope with CO_2 emission controlling targets and climate change.

CELEBRATING 50YRS OF INNOVATIVE PROWESS

Chairman's Message

2021

2021 was marked by challenges and change. Business and society are setting their sights on sustainable, green growth amid the ongoing economic recovery. Sinosteel E&T has maintained its strategic determination and made precise efforts in the new layout, displaying a steady forward trend in all endeavors.

The company succeeded not only in shepherding the development through the pandemic ups-and-downs, but also in laying a solid foundation for more inclusive growth.

This year, we have chosen green as the primary hue to promote high-quality development. We sang the declaration of "Low-Carbon Metallurgical Service Provider and Green Growth Pioneer" in the new development stage with our forward-looking technology layout, R&D achievements, and engineering practice in green and low-carbon. Sinosteel E&T rolled out feasible action plans and roadmaps for carbon-emission-cutting goals through its continued efforts in developing green and disruptive low-carbon technologies. The portfolio of green technologies includes blast furnace-basic oxygen furnace (BF-BOF) decarbonization, travelling grate pelletizing, direct-reduction, highly-efficient TMCP for wire rod and bar mills, hydrogen metallurgy, synergy of pollution control and carbon-emission reduction, as well as consulting services for carbon asset management. Thanks to our expertise, tools, and experience, we are confident in our capability to steer our customers toward a green and low-carbon future.

Based on the main battlefield of metallurgical engineering, Sinosteel E&T has advanced the optimization of long-processes steel production to pursue greener development and pushed forward cuting-edge technological innovations to achieve carbon emission goals, formulating a road map with multiple energy-saving and low-carbon technologies as well as consulting services.

The company participates in two ground-breaking projects: the hydrogen-enriched carbon recycling blast furnace and China's very first one-million-ton hydrogen-based shaft furnace, both of which are part of China Baowu's efforts to reach its low-carbon goal of peaking carbon emissions by 2023. The success of these projects will hopefully pave the way for China's steel industry to realize a low-carbon transformation in the coming years.

This year, the company showed its unapparelled resilience and grita- midst the still-raging pandemic, as it made the most of the opportunities and delivered results for both clients and staff. We signed two important contracts as we embarked on a new adventure of using green technologies to reduce emissions and adapt to climate change, namely the Tosyali Algeria Phase IV integrated green steel plant and the Stargate Indonesia 2x33MVA nickel-iron alloy project. Overseas EPC projects overcame obstacles and progressed: the first steel complex in Bolivia resumed and is now in the structure installation stage. Dexin steel plant projects in Indonesia were all put into operation.

The company has been devoted to the green construction of the ***Belt and Road Initiative***, exporting Chinese technology, Chinese equipment, and China's high-level management capability to nations along the route, as well as providing comprehensive support services to the steel industries of developing countries.

This year, we gained recognition and appreciation from our customers as a number of domestic projects came to fruition, including MaSteel's traveling grate pellet plant, Jianlong Steel's double high-speed bar rolling production lines, Sichuan Shehong Steel's wire rod adopting 330mm modular single-drive reducing and sizing mills, pre-charged bag filtration technology for Xin Steel's large-scale sintering machine. These projects all adopted self-developed technologies and made breakthroughs in the market. Whether it was for new customers or longtime acquaintances, we have always lived up to the concept of "Beyond Expectations" and delivered on every assignment. All of this demonstrated our commitment to using technology to reduce costs and boost productivity while offering outstanding service.

This year, adhering to technology-driven growth, we accelerated digital transformation and strengthened our scientific and technological innovation potential. Sinosteel Tiancheng won two *National Science and Technology Progress Awards*, and the development of a digital delivery platform was completed, laying the groundwork for the establishment of a digital twin factory and a digital base for steel companies. Sinosteel E&T now has six national high-tech companies, and 101 patents have been granted.

What we have accomplished could not be possible without our customers and partners. Here, I would like to express my thanks and gratefulness to our valued customers & partners.

2022

Heading into 2022, the steel industry enters a new development era marked by technological innovation as well as intelligent and green manu-facturing transformation. The work has just begun, and challenges remain. Following China Baowu's new strategy and vision for 2035, Sinosteel E&T is poised for its next chapter and will be celebrating its 50th anniversary.

The new era brings with it a new mission, as well as new actions, possibilities and challenges. Sinosteel E&T will maintain its high morale and strive to make new contributions to China Baowu's ambition of "Becoming a worldwide leader in steel an-dadvanced materials industry," as well as to demonstrate its new role in the steel industry's green and low-carbon transition.

Mr. Lu Pengcheng
Chairman of Sinosteel E&T
April, 2022

Content

On December 1st, 2021, Sinosteel Equipment & Engineering Co., Ltd. (Sinosteel MECC) concluded a USD 1.096 billion EPC contract with Tosyali Group to expand the capacity of its steel complex in Algeria.

Sinosteel MECC will be the general contractor of Phase IV after delivering the 2.3mtpa DRI-based steel complex in 2018.

The signing ceremony was held in Tosyali Group in Istanbul, Turkey, with the presence of Fuat Tosyali, Chairman of Tosyali Group, Suhat Korkmaz, CEO of Tosyali Group, Hua Guanglin, General Manager of Sinosteel MECC. Lu Pengcheng, Chairman of Sinosteel E&T attended the ceremony online.

Seizing Opportunity in Adversity

The world economy is volatile and international business is subject to multiple challenges while the global COVID-19 pandemic is still ongoing. Sinosteel MECC and Tosyali Group have been conducting online technical communication and business negotiations for the past six months since April 2021. At the end of October, led by Hua Guanglin, the Sinosteel MECC delegation headed to Turkey braving the serious international COVID-19 situation, to negotiate with Tosyali to finalize key technical and commercial details. Finally, Sinosteel MECC successfully signed the contract by virtue of its advanced technology, rich international engineering experience, solid partnership foundation, and high-quality service.

According to the contract, Sinosteel MECC will build a 2.5mtpa DRI plant, a 2.3mtpa EAF steel-making plant, and a 1,800mm hot strip mill production line. It is also in charge of project design, procurement and supply of equipment and material, engineering construction,

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Sinosteel MECC will build a 2.5mtpa DRI plant, a 2.3mtpa EAF steel-making plant, and a 1,800mm hot strip mill production line.

2.5mtpa
DRI

2.3mtpa
EAF

1,800mm
Hot-strip

COVER STORY

Sinosteel MECC Wins USD 1.1 Billion Contract to Build Another Steel Complex for Tosyali in Algeria

The overseas spreading of COVID-19 has not deterred Sinosteel MECC from developing its international business. The project signals tremendous progress in overseas business made by the company after signing Tosyali Turkey's 1,800mm hot-strip rolling project in 2020, and also a new step forward for Sinosteel MECC on its way to promoting the green Belt and Road.

equipment installation, and commissioning services. Among them, the DRI plant will take 30 months to complete, while the steelmaking and the hot strip units take 24 months. As the third overseas green and low-carbon steel complex undertaken by Sinosteel MECC, the project will substantially enhance Tosyali's product range and strengthen its market competitiveness in the Mediterranean and neighboring areas upon its completion. As a result, Tosyali Algeria will become the largest steel producer in North Africa.

Go Green Go Digital

The project will adopt a gas-based shaft furnace for direct iron reduction. Such a route greatly minimizes environmental pollution and energy consumption caused by the related processes as well as significantly improves steel production which is green, efficient and clean.

The direct iron reduction will use natural gas as the source of reduction supplement gas, and the reduced gas, after scrubbing and compression, is then reformed and transformed with the supplement natural gas to achieve carbon recycling. The proportion of hydrogen in the reducing gas exceeds 55%, and the carbon emission per ton of product is about 0.5~0.6 tons of CO_2, which is about 60% lower than the iron-making process using coal as the reducing agent. With the hot charging process (HDRI), the power consumption per ton of steel will be reduced from 550 kWh to 400 kWh, the smelting time can be shortened by 17%, and the steel production capacity of an EAF can be increased by over 17%. This is also the fourth overseas DRI project undertaken by Sinosteel MECC. Previously, it has built two of the world's largest DRI projects, namely the 2.5mtpa DRI Project of Tosyali Algeria and the 2.5mtpa DRI Project of AQS (Qatari Steel) in Algeria, both of which are now in operation. The third is the Mutun DRI integrated steel plant in Bolivia, which is under construction.

To assure product quality and continuous casting, an LF performs heating, desulfurization, deoxidation, de-inclusion, alloying, and fine-tuning of composition and temperature.

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As the third overseas green and low-carbon steel complex undertaken by Sinosteel MECC, the project will substantially enhance Tosyali's product range and strengthen its market competitiveness in the Mediterranean and neighboring areas upon its completion.

DRI process reduces carbon emissions by

60%

New Steel Complex for Tosyali

COVER STORY

Cover Story

Contract to Build a USD 1.1 Billion

Green & Low Carbon Steel Complex for Tosyali in Algeria

>>> To improve the metallurgical quality of steel and satisfy the needs of producing high-quality steel of various grades, a VD furnace can realize vacuum degassing, inclusion removal, and exact composition fine-tuning of liquid steel. The entire steelmaking and CCM shop is controlled by an intelligent steelmaking centralized control center, which is equipped with an advanced automatic control system and uses a fully-integrated steelmaking intelligent manufacturing mode to automatically detect and control the whole process, resulting in optimal operation and intelligent production of the steel of typical grades.

The world-leading Chinese hot strip rolling technology will be applied, which has its own intellectual property rights. It has AWC, a powerful bending roll system, work roll shifting system and VCS work roll system, as well as hot coil boxes for customer's product specifications and steel grades, and also advanced width, thickness, straightness, and upper and lower surface inspection system to ensure product quality. The project also includes an intelligent rolling system, which has an online monitoring energy optimization management system, and autonomous crane management. Overall, it depicts the technological and equipment frontiers of the world.

Reduce power consumption per ton of steel from 550kWh to

400kWh

World's Largest

250mtpa

DRI Plant for
Tosyali Algeria

DRI Plant for
AQS (Qatari Steel)
in Algeria

New Steel Complex for Tosyali

COVER STORY

Sinosteel MECC has maintained a long-term relationship and fruitful cooperation with Tosyali Group by building several projects for the latter including the 950 mm hot rolling project and the bar and wire project in Osmaniye of Turkey, the welded pipe project in Algeria, and the slab CCM project in Osmaniye.

“The 2.3mtpa steel complex, built by Sinosteel MECC on an EPC basis in Algeria, is a short-process low-carbon integrated steel plant that combines the advantages of large scale, modernization, green and low carbon with leading technologies.”

Win-win and Long-lasting Cooperation

Lu Pengcheng, Chairman of Sinosteel E&T, witnessed the signing ceremony online.

At the signing ceremony, Hua Guanglin said: “Sinosteel MECC cherishes every cooperation with Tosyali Group, and is honored to witness and participate in Tosyali’s rapid development, as well as to enhance trust and achieve a win-win situation in the partnership. The cooperation in the era of the pandemic is Tosyali’s trust and recognition of us, and is also an excellent opportunity for us to fully exploit our capabilities to assist Tosyali in achieving high-quality development,” Hua noted. Sinosteel MECC will face challenges and strive to make the project a benchmark throughout the entire life cycle of green and low-carbon solutions to return our customers’ trust and contribute to Tosyali’s sustainable development.

Mr. Fuat, Chairman of Tosyali Group, thanked Hua for bringing his team to Turkey for face-to-face talks, particularly at this crucial time during the pandemic. “The Algeria steel complex (Phase IV) has been a long-held ambition of the Tosyali Group, and it is critical to the group’s growth. The signing of the contract demonstrates our complete trust in Sinosteel E&T”, said Fuat, “As our largest project since our cooperation, I am confident that it will be a key turning point in our relationship.”

Sinosteel MECC has shown strong resilience and vigor in the face of unprecedented changes and the pandemic of the century, providing comprehensive supporting services for the steel industry in more developing countries. Sinosteel MECC, as the first Chinese engineering company to practice low-carbon metallurgical projects, can integrate full-process services and technologies to assist the green development of steel, thanks to its sharp understanding and forward-looking layout.

Guided by its new manifesto of “Low-carbon Metallurgical Service Pro-vider and Green Development Pioneer”, Sinosteel MECC insists on building a green Belt and Road, seeking green economic growth together and moving cooperation forward in the direction of high-quality development.

Short process low-carbon integrated steel plant

ESE LOW

Feature Stories

In 2021, Sinosteel E&T never stopped moving forward with dream and faith in every corner of the world.

The Bolivian Mútun low-carbon steel complex project was reactivated and saw a fast advancement. Besides, Baowu Bayi hydrogen-enriched carbon recycling project commenced its third stage trail aiming to cut carbon emissions by 30%, and to boost the global green metallurgy with a new solution.

FEATURE

01 Efforts and Perseverance Paid Off –Bolivia's Mutún Steel Complex Ushers in a New Stage

Bolivia, a "Highland Country" in South America on the other side of the globe, is taken as one of the richest areas of mineral resources in the world, with gold ore, oil, natural gas, tin, iron and lithium deposits throughout the country. Besides, the country is also famous for its lovely alpacas, and Salar de Uyuni dubbed the "Mirror of the Sky".

Although the Mutún Iron Mine, located on the border between the territories of Bolivia & Brazil, is one of the world's largest iron ore reserves, the country still has to import all its steel from neighboring Brazil and Peru. Due to lack of infrastructure such as highways, railways and ports, nothing could be done but left the treasure buried deep in the ground.

Chairman Lu and Sinosteel MECC'S team with Bolivian Minister of Mining in 2016

No Pain No Gain

As early as 2007, the Bolivian Government launched the Program of Mutún Iron Mine and Steel Cooperation and Development. Five years later, the program ended in failure. Then came a long process of looking for new partners, during which companies from countries like Russia, Australia, Venezuela and China were all interested. Until 2016, Sinosteel MECC won 6 out of 7 votes in the bidding and was selected by EMPRESA SIDERÚRGICA DEL MUTÚN (ESM) as the EPC general contractor. Later, according to the board members, it was Sinosteel MECC's rich experience in international industrial engineering and its good reputation that prompted them to make the final decision.

As a national strategic project of resource industrialization in Bolivia, Mutún Steel Complex is not only the cornerstone to opening its industry chain, but also the pillar to realize Bolivia's industrialization and modernization. What is more, it is the country's long-cherished wish for more than 50 years.

Since the two parties signed the contract in March 2016, after more than two years of in-depth discussions and feasibility studies, the financing plan was successfully implemented. The project officially kicked off in early 2019, followed by tasks being done one by one: basic design, three availabilities and one leveling (availability of water, electricity, and roads as well as site leveling), construction of temporary facilities such as camps, relocation of construction companies, detailed design, ordering of major equipment, and the arrival of the first batch of steel structures on site.

Mutún Steel Complex is not only the cornerstone to opening its industry chain, but also the pillar to realize Bolivia's industrialization and modernization.

Luis Arce, Bolivian President (third from left) and Huang Yazhong, Chinese Ambassador (second from left) attended the ceremony

In January 2020, the project was forced to suspend due to regime change and the outbreak of the Coronavirus. The Total Quarantine Policy adopted throughout Bolivia brought government departments and many companies to a standstill, but not Sinosteel MECC, who shifted to online working to ensure that project engineering was in full operation.

As the saying goes, no pain, no gain. With joint efforts of many parties, the project resumed on June 18, 2021. A ceremony was held to announce the re-launch. Luis Arce, President of Bolivia, and Villavicencio, Minister of the Ministry of Mining and Metallurgy attended the event, as well as 200 other people, including officials, community representatives, and representatives from ESM. At the event, Arc stated that under the new government, the project would resume soon, creating jobs and revitalizing the local economy.

On November 26, 50 trucks loaded with the first batch of over 1,700 tons of large steel structures arrived at the Puerto Suárez, marking the official start of the on-site steel structure installation of the project.

"Dream Coming True"

"To build the Mutún Steel Complex corresponds to the ardent wish of our people. It is also a beautiful dream to realize the industrialization and modernization of our country. Today, the arrival of the steel structures is a sign that this dream is becoming reality." stated Arc, "Once completed and put into operation, it will meet the domestic demand for steel and change the status quo of our reliance on imports from other countries." Calling the Bolivia-China relationship unbreakable, Arce said Bolivia cherishes its friendship with China and hopes to consolidate the bilateral relations. He expressed his gratitude for China's help and hoped to deepen cooperation which will promote Bolivia's economic development.

Mr. Huang Yazhong, Chinese Ambassador to Bolivia, said that Bolivia is a good friend and partner for China, and since the Arce administration took office, the strategic partnership between the two countries has been developed continuously and cooperation in all areas deepened. Mr. Huang also noted that as Mutún being the future industrial capital of Bolivia, the steel complex represents the future of Bolivia's industrialization, as well as the bilateral ties. Mr. Huang added, "We believe that with close cooperation, the project will be completed on schedule and put into operation as early as possible, contributing to the economic recovery, metallurgical industry growth, and bringing real benefits to the Bolivians."

> *To build the Mutún Steel Complex corresponds to the ardent wish of our people. It is also a beautiful dream to realize the industrialization and modernization of our country.*

FEATURE

Construction in Full Swing

Under Sinosteel MECC's highly-efficient planning and management, the Project proceeded rapidly, and the on-site construction is in full swing. Five sub-works, including beneficiation, steel making, steel rolling, power plant, and utilities press ahead, while the pellet plant, DRI plant, and water lines are gearing up for start-up.

Sinosteel MECC actively adjusts its plans to rise to various challenges brought about by the pandemic. They set up a logistics team to follow closely with the logistics market and keep abreast of the bulk and container ships from China to South America. Also, they keep in good communication with domestic and foreign suppliers to ensure progress. Besides, another professional team is assigned to supervise equipment manufacturing, conduct patrol inspections, and draft weekly progress reports for quality guarantee.

Green and Customized Solutions

As The Mutun Steel Complex is a landmark project of Sinosteel MECC promoting high-quality development of the *Belt & Road Initiative (BRI)*, the project team sticks to the concept of environmental-friendly throughout design and construction. They cracked hard nuts in technology and made innovations on several sub-works, so as to optimize the process flow, improve the operational efficiency, & increase energy-saving while decreasing emission reduction, striving to make the project a green benchmark.

With the introduction to DRI technology and the abundant natural gas reserves in Bolivia, Sinosteel MECC adopts the HYL direct reduction shaft furnace of Mexico to produce DRI with an iron content of about 86% for steelmaking by using

H_2 and CO generated from natural gas pyrolysis. Compared with the traditional BF process, this process will reduce CO_2 emissions by 50-60% while saving more energy so as to achieve low-carbon production.

To avoid the load impact of the electric furnace on the power grid of the whole plant during steelmaking, Sinosteel MECC adopts the steelmaking process of intermediate frequency furnace and electric furnace arranged in tandem, that is, the intermediate frequency furnace will directly smelt the DRI, and then the hot metal enters the electric furnace for steelmaking by blowing oxygen. In the case of an isolated grid, the combination of an intermediate frequency furnace and an electric furnace for steelmaking is a new design, tailor-made for Mutun. The project team also designed an isolated grid control system, which dispatches, controls, and protects the isolated grid power station of the entire plant, to ensure the stable operation of the plant.

50-60%

Cut Carbon Emissions by

Energy-saving & Clean Prduction

LOW

Mutún Steel Complex is an important cooperation between the two sides. Sinosteel MECC will hold up to the concept of green and low-carbon development, with its strong technical and engineering capabilities, to seek development for Bolivia and break its long-standing dependence on steel import.

On December 18, 2021, at minus 12°C, colorful flags fluttered on the site of China Baowu Steel Group's Xinjiang Bayi Iron & Steel Co., Ltd. (China Baowu Bayi Steel).

Amid the cold came enthusiasm. Not far away hang a striking banner — the Groundbreaking Ceremony of the World's Low-carbon Metallurgy Demonstration Project.

As China Baowu's Global Low-carbon Metallurgy Innovation Center, here at Bayi Steel, experimental research on low-carbon metallurgy and zero-carbon hydrogen-based shaft furnace are carried out. The project is undertaken by Sinosteel MECC on an EPC basis.

Exploration of the World's Most Advanced Low-carbon Steel Manufacturing Process

China aims to peak its carbon dioxide emissions before 2030 and achieve carbon neutrality before 2060. The steel industry, a major carbon emitter in the manufacturing sector, ramps up efforts to advance energy conservation and reduce carbon emissions. The carbon peak and neutrality targets urge the industry to upgrade its industrial structure and production modes, pressing ahead with an irreversible shift to a greener development.

After hundreds of years of development, the modern blast furnace ironmaking process has become very mature, both in terms of thermal efficiency and production capacity. In today's metallurgical industry, there is no better reactor than the blast furnace. It would be regrettable if the blast furnace process route was abandoned. In China, ironmaking by BF-based process is mainstream, using coke as the main fuel, thus emission of CO_2 is inevitable. In addition, because the retaining and circulating amount of scrap steel in China is small, the EAF-based production route featuring low carbon is temporarily insufficient to meet the demand for steel production. Therefore, blast furnace steelmaking will remain the mainstream process in China in the foreseeable future.

Is it possible to achieve breakthroughs in low-carbon technologies of Chinese blast furnaces? How to improve ironmaking energy efficiency and reduce carbon emission in blast furnace smelting? In order to answer such questions, China Baowu has carried out basic and experimental research in terms of energy structure optimization, energy-saving, and environmental protection technologies. Under such circumstances, the hydrogen-enriched carbon recycling blast furnace trail project came into being.

Higher Ironmaking Efficiency
Lower Carbon Emission

30%

02 Low-carbon Trial Kicked off to Cut Carbon Emission by 30%

The three-phase project is based on a previously idled blast furnace. Once the technological upgrade is completed, it will reduce carbon emission by nearly one-third and improve the efficiency of smelting furnaces, featuring total oxygen smelting, hot gas injection into BF stack, and hot gas injection into tuyeres. This is the world's first long-process low-carbon metallurgy production project and its success will hopefully pave the way for China's iron and steel metallurgy industry to realize low-carbon transformation as well as boost the global steel industry's low-carbon transformation.

Leads Way for Greener Conventional BFs

The main component of conventional BFs is nitrogen. To achieve high-efficiency and low-carbon ironmaking, high-oxygen-enriched or even full-oxygen smelting must be carried out. To realize oxygen enrichment, full oxygen, hydrogen enrichment, and coal gas self-circulation injection for blast furnaces, heating the hydrogen-enriched gas and the decarbonized circulating coal gas to a high temperature are the requisites. The high-temperature coal gas heating system is a brand-new application scenario arising from oxygen blast furnaces. How to realize a safe, stable, efficient and economic heating is one of the core challenges.

To this end, Sinosteel MECC joins hands with China Baowu Central Authority Research Institute to study the safety, flexibility, and stability of the heating system. They focus on the development of low-carbon metallurgical technology based on abilities accumulated from overseas engineering practices of short process ironmaking, as well as abilities formed by long process and technical engineering practice in the fields of metallurgy, chemical industry, and energy at home and abroad. R&Ds include the followings:

- On the reaction mechanism and experimental verification of the gas heating process.
- On mechanism and comparison of heating devices with different forms and heat sources, including indirect and direct heatings.
- On the risk of carbide precipitation that may occur during the heating process.
- According to the analysis of the project target, the composition and flow of the heated gas will vary on a wide range in the test and production. Therefore, the heating system must have strong flexibility and can adapt to the gas in different conditions, and the output gas composition and temperature must meet the requirements of oxygen blast furnace reduction.
- Based on the technical capabilities and achievements and application of cross-industry technology paths, and given the requirements of oxygen blast furnace gas heating, a target-oriented design of the oxygen blast furnace heating system has been carried out, in which various aspects such as system configuration and process system have been considered.
- While meeting the heating requirements of the oxygen blast furnace, the design must be adaptive to variations of the input gas and meet the requirements of future tests. At the same time, it can bear long-time operations while applying new energy such as green electricity and hydrogen.

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Hydrogen-enriched Carbon Recycling Blast Furnace on the Horizon

An essential move to reach China Baowu's target of being capable to reduce carbon emissions per metric ton of crude steel by 30% from 2020 to 2035

> By cutting carbon emission by 30%, the project will pave the way for China's iron and steel metallurgy industry to realize low-carbon transformation.

After phase II was completed, Sinosteel MECC started technical research and process route design for phase III. Under the leadership of China Baowu, Sinosteel MECC worked with Bayi Steel, scientific research institutes, and equipment manufacturing enterprises to conduct special research, such as "Theoretical Model and Furnace Type Research on Hydrogen-enriched Recycling Blast Furnace", "Simulation Study and Comparison of Furnace Stack and Tuyere Injection", "Various Safe and Efficient New Processes for Gas Heating". Together with other studies related to equipment and materials, results have been achieved. These results, involving a combination of theoretical research, simulation, and engineering design, lead the way for design and implementation of phase III.

Worth to mention that the design work for phase III is conducted on Sinosteel MECC's self-developed Digital Twins Platform. The 3D real scene platform provides designers with lightweight point cloud models and panoramas as if they were on the spot. Top-down design is realized via BIM, which allows designers and customers to discuss and optimize the design with much higher efficiency and accuracy. Up to now, Sinosteel MECC has completed the process flow chart design for phase III, with the design parameters of each process system confirmed. Steady progress has been made in the construction drawing design.


Photo credit: Bayi Steel

A High-efficiency, Low-carbon, Hydrogen-enriched Ironmaking is On the Horizon

On December 18, amid passionate music and firecrackers, Wu Bin, Chairman of Bayi Steel, and Ke Shanliang, GM of Bayi Steel, together with the management members, pushed the rod of the ceremony machine which reads the world's low-carbon metallurgy demonstration project, marking the official kick-off of phase III. The project is officially set towards its ultimate goal. When in due time, the blast furnace will realize full-oxygen blast and CO separation of BF top gas. The tuyere will see a gas injection with a temperature as high as 1,100°C - 1,200°C while the furnace stack 800°C - 900°C, and CO will be recycled.

Early in January 2021, China Baowu rolled out a roadmap of peaking carbon emissions by 2023 and achieving carbon neutrality by 2050, setting a tone for China's steel industry. As a member of China Baowu, Sinosteel MECC is fully dedicated to pushing forward the ongoing low-carbon metuarllgy demonstration project in Xinjiang, which is an essential move to reach China Baowu's target of being capable to reduce carbon emissions per metric ton of crude steel by 30% from 2020 to 2035. The success of the project would also provide Baowu's solutions of green low-carbon smelting to the world.

1100 / 1200°C

Gas injected at tuyere

800 / 900°C

Gas injected to furnace body

Company Headlines

Sinosteel E&T has made new advances in the aspects of international business and green and low-carbon technologies, notwithstanding the world being hit by a once-in-a-century pandemic.

The company was awarded the contracts of steel complex phase IV in Algeria by Tosyali and 2x33MVA ferronickel plant by Stargate in Indonesia. Even more to mention, Sinosteel Tiancheng won both the First and Second Prize of the 2021 State Scientific and Technological Progress Award for two co-accomplished projects on the subject of ultra-low emission of the steel industry.

02

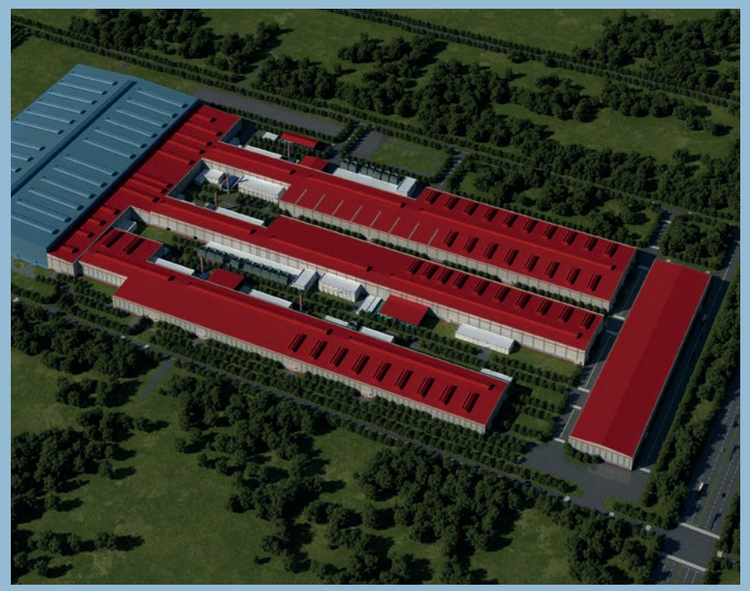
CALENDAR

Jan.

- Renovation of flue gas circulation system for sintering machines No. 1, No. 2 and No. 3. for Zongheng Fengnan Iron & Steel — *Sinosteel MECC, EPC*

Feb.

- Dedusting of No.9 BF cast house for ArcelorMittal Kryvyi Rih — *Sinosteel MECC, EPC*
- Design of 2x48 MVA ferronickel furnaces for Solway ACN — *Sinosteel MECC*
- Dedusting systems for 67t EAF and LF for Yunnan Taibiao Precision Casting — *Sinosteel Tiancheng, EPC*
- Comprehensive technical service for Zenith Iron & Steel on production safety management — *Sinosteel SEPRI*



Mar.

- Delayed coking project for Shandong Huaxing Petrochemical Group. — *Sinosteel Tiancheng, EPC*

Apr.

- 450m² sintering project for Hebei Jinxi Iron & Steel — *Sinosteel MECC, EPC*
- Desulfurization for travelling grate pelletizing for ArcelorMittal Kryvyi Rih — *Sinosteel MECC, EPC*

May

- EPC contract signed with the Qixingtai Town Government of Zhijiang City on the comprehensive ecological environment management of the Juzhang River Basin (Zhijiang Reach) — *Sinosteel SEPRI, EPC*

June

- Eco-upgrading of Phase-II stockyard shed for Donghua Iron & Steel — *Sinosteel MECC, EPC*
- TRT for BF No.1 for Isdemir of Turkey — *Sinosteel MECC, EPC*
- Belt conveyor for Russia MMK — *Sinosteel MECC, EPC*
- Consulting service on energy-saving and low-carbon technologies for WISCO. — *Sinosteel SEPRI*

July

- Twin high-speed bar TMCP rolling project for Jianlong Xilin Iron & Steel — *Sinosteel MECC, EPC*
- Green precision manufacturing industrial park project, including pelletizing, blast furnace, and coke ovens, for Hubei Youke — *Sinosteel MECC, EPC*
- Dedusting renovation of refining system of smelting and rolling plant No. 1 for Valin Lianyuan Iron & Steel — *Sinosteel Tiancheng, EPC*

Aug.

- Flue gas desulfurization and denitration for 2mtpa coke oven batteries for Yunnan Coal & Energy — *Sinosteel Tiancheng, EPC*
- Delayed coking projects for Luqing Petrochemical in Shandong Binhai and Shandong Shouguang plants, — *Sinosteel Tiancheng, EPC*
- The Ultra-low emission renovation project for the pellet plant for Chizhou Hengxin Material Technology — *Sinosteel Tiancheng, BOT*

Sep.

- Replacement of converter with alloy steel EAF and steelmaking projects for Rockcheck Steel Grp. — *Sinosteel MECC*
- Flue gas desulfurization of reheating furnace for SD Steel Rizhao — *Sinosteel Tiancheng, EPC*
- Renovation of wet scrubbing to dry dedusting for 75 MVA fully-enclosed SAF for Shanxi Taigang Wanbang Furnace Charge Co., Ltd. — *Sinosteel Tiancheng, EPC*

Oct.

- 4.8mtpa coking project for Risun Indonesia — *Sinosteel MECC, EPC*
- 1450mm hot strip rolling project for Tangshan Donghua Iron & Steel — *Sinosteel MECC, EPC*

Nov.

- Closed decoking and odor treatment for 1mtpa delayed coking unit for Shandong Changyi Petrochemical — *Sinosteel Tiancheng, EPC*

Dec.

- Steel Complex (stage IV) for Tosyali in Algeria — *Sinosteel MECC, EPC*
- 2x33 MVA ferronickel project for PT Stargate Mineral Asia in Indonesia — *Sinosteel MECC, EPC*
- 2mtpa travelling grate pelletizing project for Fujian Longgang New Materials — *Sinosteel MECC, EPC*
- Sinosteel SEPRI signed an agreement on the Research and Application of Quality Infrastructure Collaborative Control Technology System for Leading Typical Industries to Advance in Carbon Peak, the national key R&D project of China's Ministry of Science and Technology — *Sinosteel SEPRI*

COMPANY HEADLINES

NEW DEALS

01.

Outstanding Achievements in Southeast Asia: Sinosteel E&T's Mark in Indonesia

Indonesia is where the 21st Century Maritime Silk Road was first proposed by Chinese President Xi Jinping. Since the announcement of the Belt and Road Initiative(BRI) in 2013, the development-oriented strategic approach between China and Indonesia has seen steady progress, yielding positive cooperation outcomes in the fields of economy, trade, science, technology, and culture. Indonesian President Joko Widodo once applauded that it is the investment from many Chinese companies that helps Indonesia, which previously only exported raw nickel ore, achieve stainless steel exports up to US$20.8 billion in 2021.

Sinosteel MECC Clinches Deal with Indonesian Stargate for 2x33MVA Ferronickel Plant

On December 28, 2021, Sinosteel MECC signed an EPC contract with Indonesian PT Stargate Mineral Asia (Stargate) for the 2x33MVA ferronickel alloy project via video conference. Participants attended the ceremony online from Beijing, Inner Mongolia, Jakarta, Indonesia, Russia, and Mongolia.

Indonesia is one of the countries with the richest laterite nickel raw ore resources in the world. In January 2014, it introduced a law banning the exportation of laterite nickel raw ore to encourage foreign companies to invest in the construction of laterite nickel raw ore deep processing plants in Indonesia. As a local mining company, Stargate has 147 million tons of laterite nickel ore reserves.

Since February 2019, Sinosteel MECC has been in contact with Stargate and has visited Indonesia many times for field surveys and business negotiations. Even the pandemic has not interrupted the close communication between Sinosteel MECC and Stargate. After nearly three years of negotiations, Sinosteel MECC successfully signed the contract with its advanced technology, rich and solid international engineering experience, and high-quality services.

Per the contract, Sinosteel MECC is responsible for engineering, equipment procurement and supply, erection, and civil construction. The main content of the project is two sets of fully enclosed 33MVA FeNi alloy submerged arc furnaces and related dry kilns, rotary kilns, production and process auxiliary facilities of each equipment, and the auxiliary facilities for the entire plant. The plant, after completion, is expected to produce 140kt ferronickel annually and create more jobs.

As the first FeNi alloy EPC project to be constructed by Sinosteel MECC overseas, it will adopt the RKEF process and a number of self-developed technologies of Sinosteel MECC:

- ✓ *Self-developed technology reduces investment and operating costs.*
- ✓ *New high-efficiency, energy-saving and environmental-friendly hot stove is simple in structure, space-saving, easy to operate and maintain, and can sufficiently reduce costs while ensuring heating efficiency.*
- ✓ *Self-developed rotary kiln primary air preheating technology is expected to save about 10,000 tons of standard coal per year for the rotary kiln.*
- ✓ *Self-developed submerged arc furnace flue gas waste heat utilization technology can save about 100kg/t alloy of standard coal while realizing the recovery and utilization of gas waste heat.*
- ✓ *Self-developed submerged arc furnace automatic feeding system is not only stable, safe, and reliable, but can also reduce labor intensity and improve the production efficiency of submerged arc furnaces.*

Sinosteel MECC upgraded the original technology in terms of process flow, equipment, energy efficiency, environmental protection, and safety in production.

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The signing of this contract started the second close cooperation between Sinosteel MECC and Stargate. Prior to this, Sinosteel MECC provided Stargate with the consulting services for the same project.

At the signing ceremony, Lu Pengcheng, Chairman of Sinosteel E&T, said it is a great honor for Sinosteel MECC to cooperate with Stargate on the FeNi alloy project. "Sinosteel MECC started business in Indonesia in 2006 and set up a representative office in 2016. After years of marketing , we have gained rich experience and achievements. In the past two years, the coking, sintering, lime kiln and raw material plant projects for Dexin steel complex on an EPC basis have been successfully put into operation. Along with merging to China Baowu Group, Sinosteel MECC will be more competitive and confident to provide professional and high-quality service for Stargate." Lu added.

Dixon Koesdjojo, Chairman of Stargate, expressed his gratitude to Sinosteel for its patience and support. He said: "It has always been Stargate's development strategy to build a FeNi melting and deep processing plant. Therefore, it is very important to choose a professional industrial engineering company with strong technology and trustworthiness, and Sinosteel MECC is the perfect option. The FeNi alloy project serves as an important part of Stargate's future planning, and will play a pivotal role in the future development of industrial park and stainless-steel manufacturing." Dixon Koesdjojo looks forward to closer cooperation between Sinosteel MECC and Stargate and establishing a win-win relationship.

Hua Guanglin, General Manager of Sinosteel MECC, sent greetings and congratulations from Russia. He said: "Even facing the huge challenges caused by the pandemic, Sinosteel MECC and Stargate are able to overcome the difficulties together, and show great trust in each other. Regardless of the scale of the project, Sinosteel MECC always takes every project seriously to contribute to our customers' development. We are looking forward to furthering long-term cooperation with Stargate."

02

A World-class 4.8mtpa Coking Project to be Built for Risun Indonesia

On October 12, 2021, Sinosteel MECC signed an EP contract with PT Risun Wei Shan New Energy (Indonesia), a subsidiary of China Risun Group Limited, for its 4.8mtpa coking project. Yang Xuegang, Chairman of Risun Group, Lu Pengcheng, chairman of Sinosteel E&T, and representatives of both parties attended the meeting and witnessed the contract signing.

The steady development over the past 26 years has forged Risun Group into a large conglomerate operating in the fields of coke, chemical, operation management service, and trade. With the vision of growing into world-leading energy and chemical company, Risun Group made its international debut in Indonesia, aiming to build the largest coking project in Indonesia.

According to the Contract, the project, located in the Morowali Industrial Park, Central Sulawesi, Indonesia, includes 6 top-charging coke oven batteries comprising 66 ovens each with a chamber height of 7.1 meters, as well as a gas purification system. The annual output of coke is expected to reach 4.8 million tons. Sinosteel MECC will provide engineering design and equipment, employing its self-developed technology.

Both Indonesia and Risun Group are no strangers to Sinosteel MECC. Since 2006, Sinosteel MECC has accomplished projects of steel, power and mining after years of development. The 1.3mtpa coking project for Dexin Steel Complex contracted on an EPC basis employed Sinosteel MECC's self-developed technologies. Despite the COVID-19 pandemic, the project was put into complete operation in June 2021, and maintained a stable and efficient operation ever since. It is Indonesia's first 5.5m stamp-charging coke oven battery with by-product production and gas cleaning.

Yang Xuegang, Chairman of Risun

Lu Pengcheng, Chairman of Sinosteel E&T

Sinosteel MECC has cooperated with Risun Group on many projects including Phase-II CDQ and waste heat utilization, 1.2mtpa coking relocation project, and Dingzhou Tianlu coking project. The gas cleaning project was awarded the National Quality Engineering Award (2020-2021).

At the signing ceremony, Yang Xuegang noted that the contract signing is a positive result of the sincere cooperation of many parties. Thanks to the mutual support and understanding of our partners, Risun Group has taken the first step of "going global", and it is of great significance to build a world-class coking project with an annual output of 4.8 million tons. Yang said, "The world gives us industry chain and the times leave us the opportunity. We hope to work as one with Sinosteel E&T and other partners to forge the Risun Wei Shan Project into a benchmark."

Lu Pengcheng expressed his gratitude to Risun Group and other investors for their support and trust, "Sinosteel MECC is very pleased to participate in the Risun Wei Shan Project. The signing of the project deepens our cooperation with Risun Group, and marks a new start and milestone for the two companies to explore overseas market. As a leading engineering and technology company, Sinosteel MECC will fulfill its outstanding advantages in international operation capability, independent technology and equipment, as well as engineering management, and devote itself whole-heartedly to the project.

Indonesia's first 5.5m stamp-charging coke oven battery with by-product, undertaken by Sinosteel MECC

02.

Sinosteel E&T Unveils Plan for Strategic Partnership of Low-Carbon Metallurgical Technology with NEU

On June 17, 2021, Sinosteel E&T signed the strategic cooperation agreement with Northeastern University (NEU) to further collaborate in developing low carbon steel technologies.

❶ All-round cooperation

To thoroughly implement the carbon peak and carbon neutrality strategy and promote the innovation-driven high-quality development of the steel industry, Sinosteel E&T and NEU, important participants and contributors to the metallurgical industry, start the comprehensive strategic cooperation. The two parties will expedite the industry-university-research innovation to achieve breakthroughs in cutting-edge technologies, and promote the green, low-carbon, intelligent and high-quality development of the steel industry, using their strengths in technological research, talent cultivation, research findings industrialization, and project implementation.

| Fields of cooperation |

Establish cooperation in the fields of low-carbon metallurgy, metallurgical materials, hydrogen energy utilization, solid waste disposal, and smart manufacturing in respect of scientific R&D, talent development, platform co-construction, and research findings industrialization.

| Technological R&D |

Low-carbon metallurgical technology, metallurgical material technology and products, hydrogen energy preparation, storage and utilization technology, metallurgy-energy-chemical coupling optimization technology, industrial solid waste disposal and recycling technology, metallurgical all-process intelligent manufacturing technology, intensive clean and efficient utilization technology for mineral resources, etc.

❷ In-depth industry-university-research integration

NEU is one of the country's national key state universities, and is part of China's 211 and 985 educational development projects. The university has researched and developed a pile of advanced scientific research achievements, including low-carbon and cutting-edge metallurgical smelting technology, steel-chemical combined production, metallurgical energy conservation theory and tech nology, TMCP technology, all-process metallurgical smart manufacturing technology.

Xiong Xiaomei, Head of NEU, Sun Lei, Vice President of NEU, and Wang Guodong, Academician of the Chinese Academy of Engineering, Lu Pengcheng, Chairman of Sinosteel E&T, and Hua Guanglin, Executive Deputy General Manager of Sinosteel E&T attended the signing ceremony.

In August 2020, the Institute of Low-Carbon Frontier Metallurgical Technology was inaugurated at NEU. It is the first specialized research institute focusing on hydrogen metallurgy, steel-chemical co-production and smart manufacturing in universities across China. Professor Chu Mansheng presented the technology R&D and platform set-up of metallurgical carbon neutrality at the symposium. Participants exchanged and discussed in-depth on industrial development, technical routes, and cooperation models.

Xiong Xiaomei
Dean of NEU

Xiong Xiaomei extended warm welcome to Lu Pengcheng, and said that Sinosteel E&T has outstanding industrial engineering and international capabilities, and also strong innovation advantages and industrialization strength in green development of metallurgical industry. Xiong expressed her sincere hope that the two parties can accurately grasp the international development trend of cutting-edge technologies and explore efficient operation modes targeting scientific technology and engineering implementation problems of common concerns. The two parties will jointly build a major scientific and technological innovation platform to cultivate high-caliber talents and make new and greater contributions for the goals of carbon peak and carbon neutrality in the steel industry.

Lu Pengcheng
Chairman of Sinosteel E&T

Lu Pengcheng gave a brief introduction of Sinosteel E&T and its latest development. He stressed that as a member of the China Baowu Group, Sinosteel E&T also formed a scientific, pragmatic and implementable roadmap for green and low-carbon development. "With forward-looking layout and investment, Sinosteel E&T is the first Chinese engineering and technology company that built gas-based DRI projects, which are the 2.5mtpa DRI plant for TOSYALI Algeria and the 2.5mtpa DRI plant for Algerian Qatari Steel (AQS). Both are the world's largest DRI projects and have been put into production. "We always insist on empowering development with technological innovation. With strong technological and theoretical support from NEU, we look forward to forming a technical alliance in basic research, applied research, engineering commercialization, and marketing.

Wang Guodong
Academician of the Chinese Academy of Engineering,

Academician Wang Guodong said that carbon emission reduction is the most pressing issue facing the steel industry today, urging the integrated development of process, equipment, product and service, especially the greater industry-university-research synergy and interdisciplinary integration. Sinosteel E&T has good concept in green and low-carbon development and strong engineering and industrialization capabilities, Wang noted, adding that the cooperation with NEU created a pathway from front-end technologies to back-end project implementation to achieve real technological innovation.

03.

Sinosteel E&T Starts Strategic Cooperation with HBIS Xuansteel on Green and Low-carbon Development and Takes the lead on Hydrogen Metallurgy

On March 20, 2021, Sinosteel Engineering & Technology Co., Ltd. (Sinosteel E&T) and HBIS Xuanhua Iron & Steel Co., Ltd. (Xuansteel) signed contract of hydrogen energy development and utilization project at a green and low carbon strategic cooperation signing ceremony in Beijing.

Lu Pengcheng, Chairman of Sinosteel E&T, Xie Haishen, Chairman of HBIS Xuansteel, and representatives from both companies were present at the ceremony and witnessed the cooperation towards a new journey of green, low-carbon and high-quality development.

HBIS Xuansteel, a core enterprise of HBIS Group, with a history of 100 years, has made historic contributions to the development of China's steel industry. HBIS Xuansteel has been a leader committed to promoting green development of the industry with low-carbon environmental protection technologies. In the past five years, a green action plan covering the entire life cycle of the industry has been implemented, making HBIS Xuansteel the first one to meet ultra-low emission standards in multiple processes in the

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Lu Pengcheng
Chairman of Sinosteel E&T

Xie Haishen
Chairman of HBIS

Jia Jianping
Deputy GM of Sinosteel E&T hosts the signing ceremony

industry. At present, HBIS Xuansteel is achieving transformation upgrade. Both sides will study to build a hydrogen metallurgical project, which will be China's green and low carbon steel upgrade benchmark, in Zhangjiakou city, Hebei Province. As per agreement,

1 ***With the strategic cooperation in place, Sinosteel E&T will contribute its outstanding strengths in technology and whole-process integration to start the hydrogen energy project using hydrogen-rich gas, expecting to cut carbon emission by 60% annually.***

2 ***As one of the first batch of energy-saving and green development evaluation centers recognized by the Ministry of Industry and Information Technology, and the support company of climate change response of Wuhan, Sinosteel SEPRI will provide carbon asset planning, management and consulting services, as well as technical support in terms of carbon emissionreduction, carbon accounting, and carbon trading for HBIS Xuansteel.***

3 *Zhangjiakou is China's first and only national-level renewable energy demonstration zone, and has abundant renewable sources including wind and solar energy. The partners will take the advantages to explore zero-carbon development for the hydrogen energy industry, including renewable hydrogen, hydrogen energy utilization, as well as low carbon and zero carbon hydrogen technology.*

Sinosteel E&T will employ the Energiron-ZR technology from its strategic partner Tenova. As an innovative carrier of China's hydrogen-rich and low-carbon new technologies and processes, the project is expected to reduce carbon by up to 60% annually.

At the signing ceremony, Lu Pengcheng said that the cooperation between the two companies for the goal of green and low-carbon development boasts broad prospects.

Xie Haishen shared his impression of Sinosteel E&T, "The two companies have had a long communication before signing the contract. Sinosteel E&T is professional, dedicated and at the top of the industry for its international vision and outstanding ability. Xie Haishen said, "No doubt we made a right choice to partner with Sinosteel E&T." Regarding to the further advancement of green and low-carbon, Xie believes that the two parties will strengthen communication centering on low-carbon environmental protection and intelligent manufacturing.

Participants from both sides had extensive exchanges on the project and especially the future strategic cooperation. On May 10, 2021, the hydrogen energy development and utilization project of HBIS Xuansteel officially kicked-off.

Participants from the two companies took photo after contract signing

04.

Sinosteel MECC to Design a Twin High-speed Bar Rolling Project for Jianlong Xilin

In July 2021, Jianlong Xilin Iron and Steel Co., Ltd. (Jianlong Xilin) awarded Sinosteel MECC an EP contract for the twin high-speed bar TMCP rolling project, with aim to build a leading intelligent production line in the industry.

This first cooperation between the two companies comprises part of Jianlong Xilin's high-quality long products project. The twin high-speed bar rolling line will produce 1.6 million tons of rebar with diameters from 12.0mm to 16.0mm. Sinosteel MECC will provide project engineering and equipment supply, as well as the integration of technology and intelligent equipment, so as to achieve the maximum rolling speed of 45 m/s.

Sinosteel MECC's self-developed, leading and efficient long product rolling technology and core equipment will be applied. CCDR, hot charging and hot delivery, and TMCP will contribute to the targets of high capacity, low consumption, long lifetime, environmental protection and high quality. The last two or four stands of reducing/sizing mills will roll the finished products at low temperature. RVM265 mm modular rolling mill, individual-drive reducing/sizing mill, and intelligent cooling equipment will enable flexible controlled cooling and low-temperature rolling of large-size bars." Advanced, energy-saving and efficient technology and equipment to reduce carbon emissions:

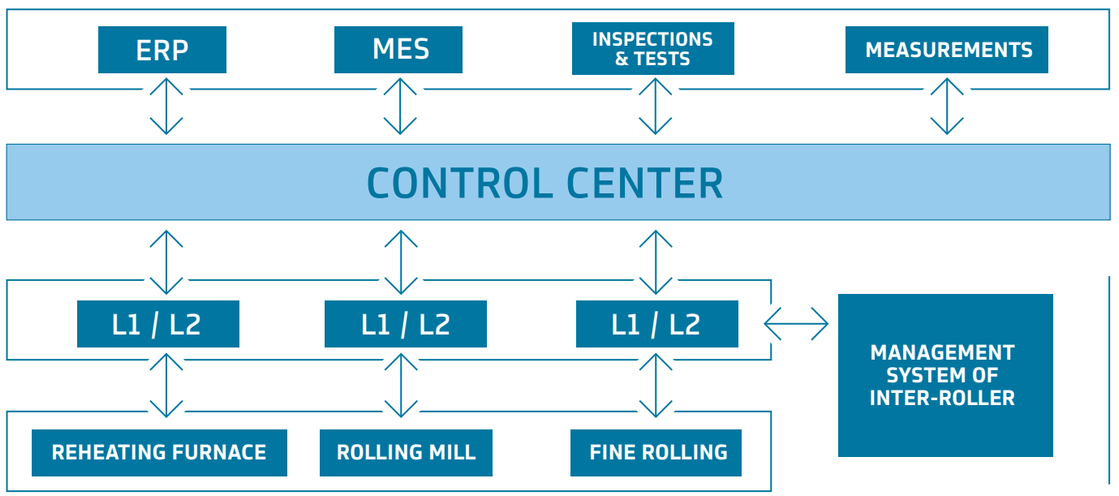
01 Green manufacturing

- The oxide iron fines generated during the high-speed rolling of the bar and wire rod RM train are dedusted by spray and exhausted by reserved fan.
- Waste heat from exhaust gas generated in the production process is recovered.
- The modular individual-drive motor used for FM train further saves energy.
- Zero-interval rolling technology shortens the interval time between billets, and reduces the idle time of the rolling mill and energy consumption.

02 Smart manufacturing

Integrated intelligent manufacturing solution characterized with less manpower, system digitization, and intelligent control:

- Intelligent technology and equipment;
- Production line data nodes based on AI and big data analysis technologies;
- Centralized control center supported by intelligent operation and intelligent control;
- Unmanned crane system for finished bars.



05.

Green Development Prevails — 2mtpa Travelling Grate Pelletizing Project for Fujian Longgang

Sinosteel MECC signed an EPC contract with Fujian Longgang New Materials Co., Ltd. (Fujian Longgang) for a 2mtpa travelling grate pelletizing project, two years after the completion of China's first self-developed travelling grate pelletizing project also delivered by Sinosteel MECC in Fujian Province. The scope of Sinosteel MECC covers engineering, equipment supply, construction, installation, and commissioning. The project is a substantial part of Fujian Longgang's intelligent customized steel complex.

Fujian Longgang shows great recognition to Sinosteel MECC's self-developed technology and engineering capability by selecting Sinosteel MECC to provide the first travelling grate pelletizing project, also the only EPC project of the complete new steel complex.

Sinosteel MECC will employ its self-developed travelling grate pelletizing technology, one of the key technologies to achieve energy efficiency improvement of traditional blast furnace ironmaking, to help Fujian Longgang achieve green and low-carbon development. The process energy consumption of is less than 18Kgce/t at complete magnetite production, which is the cleanest agglomeration process for blast furnace burden. In addition, the travelling grate pelletizing process is predominant in reducing pollution before ironmaking and carbon dioxide emissions, compared with sintering. In case fraction of pellets for BF is increased from 10% to 50%, carbon emissions before iron making will drop by nearly 10%. This green technology is highly consistent with the Fujian Longgang's goal of "environmental protection, green development, and ultra-low emissions throughout the entire process".

Fujian Longsteel's intelligent customized steel complex aims at a modern steel company characterized with automated equipment, intelligent production lines, and information management. As the general contractor, Sinosteel MECC will fully utilize its advantages in digitalization and intelligence, and implement digital engineering on its digital delivery platform.

06.

HBIS Tangyin Awards Contract for Hot Strip, High-speed Bar and Wire Rod Rolling Project to Sinosteel MECC

On April 40, 2021, HBIS Tanggang Tangyin Iron & Steel Co., Ltd. (HBIS Tangyin) signed EPC contract with Sinosteel MECC for the steel rolling project. The latter will build two 0.6mtpa high-speed wire rod rolling lines, a 1.4mtpa twin high-speed bar line, and a 2mtpa 1450mm hot strip line. The product specifications and rolling speed are designed as following:

- 2x0.6mtpa high-speed wire rod lines: wire rod between 5.5 and 16.0mm diameter, coiled bars between 6.0 and 16.0mm diameter, maximum rolling speed of 105m/s (plain bars between 5.5 and 6.5mm diameter).
- 1.4mtpa twin high-speed bar line: rebar between 12.0 and 25.0mm diameter, maximum rolling speed of 40m/s.
- 2mtpa 1450 mm hot strip line: strips between 1.5 to 20.0mm thickness, and 700 to 1300mm width; coils of 762mm inner diameter, 1950mm (max.) outer diameter, 23.8t (max.) weight, and 19.1kg/mm (max.) unit weight.

"HBIS Tangyin awarded the general contract including wire rod, bar and strip rolling lines to Sinosteel MECC, a rare occurrence, reflects its trust in our technology, equipment and management capabilities", said project manager of Sinosteel MECC. The high-speed bar line will be designed employing Sinosteel MECC's self-developed technologies, including CCDR, hot delivery & hot charging and TMCP, will be implemented to achieve maximum rolling speed of 45m/s.

Hu Yunbo, Deputy GM of Tangyin Steel

On June 23, the project was officially kicked off amidst the commencement ceremony.

At the ceremony, Hu Yunbo, Deputy General Manager of HBIS Tangyin, said that the relocation project is a priority of Hebei Province and also a good start for Tangyin to step into a new stage of leap-forward development.

Tang Faqi, Deputy GM of Sinosteel MECC

Tang Faqi, Deputy General Manager of Sinosteel MECC, said that Sinosteel MECC is honored to be the general contractor and will deliver a quality project with pace.

HBIS Tangyin is a giant steel complex co-founded by HBIS Tangsteel and Hebei Silver Water Group. The relocation project of HBIS Tangyin is in a bid to promote green development with the philosophy of circular economy and cleaner production.

07.

Sinosteel SEPRI Provides Energy-saving and Low-carbon Technical Consulting Services for WISCO

The Energy-saving and Low-carbon Technical Consulting Service Contract was signed in June 2021 by Sinosteel SEPRI and Wuhan Iron and Steel Co., Ltd. (referred to as WISCO). This is the first low-carbon consulting service project for a steel enterprise after Sinosteel SEPRI completed local research projects such as Research on Scenarios and Paths of Peak Carbon Emissions in Key Industries in Hubei Province, The 13th Five-Year Plan Pilot Evaluation, and the 14th Five-Year Plan of Wuhan City to Address Climate Change, and List of Greenhouse Gas for Waste Disposal in Hubei Province in 2019 and 2020.

Based on the international, national, provincial and municipal carbon peaking and carbon-neutral policies of the steel industry, combined with the specific requirements of Hubei provincial carbon emission trading pilot market and the national carbon emission trading market to be launched, this energy-saving and low-carbon technical consulting service mainly include the analysis of the impact of different carbon emission calculation methods, emission factors, and other methods on enterprise quota allocation and compliance costs. It contributes data to WISCO's overall carbon emission strategy in the 14th Five-Year Plan period.

WISCO is a long-process steel company that specializes in coking, sintering, ironmaking, steelmaking, and steel rolling, as well as auxiliary processes including refractory, hydrogen production, and energy and power generation. WISCO is also Wuhan's only long-process steel smelter and manufacturer, ranking top in carbon emissions and serving as the city's primary monitoring unit for energy consumption and carbon emissions during the 14th Five-Year Plan period. As a result, performing carbon emissions accounting and analysis for WISCO's entire plant and sub-processes, as well as the carbon emission intensity per unit product, will assist the company in gaining a clear picture of

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its condition, developing a scientific and reasonable carbon peaking and carbon-neutral pathways. It can also lay a data foundation for the company to enter the national carbon emission trading market. The relevant research reports based on carbon emission accounting prepared by Sinosteel SEPRI will greatly help WISCO in developing a scientific and reasonable action plan, standardizing the statistical methods and scope of carbon emission intensity benchmarking, and providing a scientific and practical roadmap to achieve green and low-carbon development.

Sinosteel SEPRI organizes the project into three phases to guarantee that the whole work progresses smoothly: preparatory field study and on-site data collecting; data collection and analysis; and the creation of WISCO Carbon Accounting and Compliance Cost Study. With its first-mover advantages in energy efficiency diagnosis and greenhouse gas emission accounting, Sinosteel SEPRI immediately set up a professional team to conduct field studies.

After Shenzhen, Shanghai, Beijing, Guangdong, and Tianjin, the first carbon emission trading pilot market in central China was officially launched in Wuhan in 2014. Wuhan became the sixth pilot city to start carbon emission trading and WISCO the first batch of trading participants. In the context of accelerating the building of the national carbon emissions trading market, advancing provincial and municipal low-carbon pilot projects, and strengthening local capacity building to cope with climate change, WISCO and Sinosteel SEPRI initiated the collaboration. The cooperation aims to clarify the current situation of its green and low-carbon development through systematic low-carbon consulting services, with Sinosteel SEPRI's provision of scientific and solid data as well as decision-making support for the "Carbon Peak and Neutrality Goals" work of the enterprise. In addition, using the results of this collaboration, Sinosteel SEPRI will also provide data and reasonable support to authorities in order to set the "Carbon Peak and Neutrality" targets for total greenhouse gas emissions and intensity of steel companies, allocate carbon emission quotas for steel producers by process, and support policies and evaluate the effectiveness evaluation of carbon peaking and carbon neutrality work for the industry.

08.

Sinosteel Tiancheng Gains a 75 MVA Fully-Closed SAF Dry Dedusting Project — First Application of its Self-developed Technology on a Large Ferroalloy SAF

On September 30, 2021, Sinosteel Tiancheng and Shanxi Taigang Wanbang Furnace Charge Co., Ltd. (referred to as "Taigang Wanbang") signed an EPC contract for the 75 MVA enclosed SAF Dedusting Project.

Sinosteel Tiancheng is responsible for the construction of two 75 MVA fully-closed SAF gas dry dedusting systems and two preheating kiln fume dry dedusting systems to achieve particulate matter concentrations of less than 10 mg/m^3 after SAF gas cleaning, particulate matter concentrations of less than 10 mg/m^3 after preheating kiln fume purification, average SAF gas filter resistance of 1,000 Pa, and average resistance of preheating kiln fume filter of 1,200 Pa. The Project will assist the customer in achieving a Class A rating for environmental performance.

The short-process dry gas cleaning technology for fully-closed ferroalloy SAFs, Sinosteel Tiancheng's technological breakthrough of the National Key R&D Program During the 13th Five-Year Plan period, will be adopted in this project, as a new technology for pollution and carbon reduction, energyconservationandconsumption reduction. The new tech is to convert the customer's existing wet gas scrubbing process to a dry cleaning short one, resulting in multiple benefits such as efficient cleaning and water and electricity conservation.

Compared with foreign technologies introduced into the market, Sinosteel Tiancheng's technology has multiple advantages such as higher cleaning efficiency, a faster process, lower energy usage, and smaller area occupation.

75 MVA

Fully-closed SAF dry dedusting project

09.

Cooperation with Donghua Steel: Phase II Stockyard and 1450 mm Hot Rolling Strip EPC Projects

On June 30, 2021, Sinosteel MECC, together with Baosteel Engineering & Technology Group Co., Ltd., signed the EPC contract for the Phase II Stockyard Project with Tangshan Donghua Iron and Steel Group Co., Ltd. (referred to as "Donghua Steel"). The project consists of a BF stockyard, a sintering stockyard and feeding systems, with the primary purpose of feeding blended to a 198m^2 sintering machine and two 352m^2 sintering machines, as well as feeding coke, pellets and lump ore to a 1,580 m^3 blast furnace and two 2,300 m^3 blast furnaces.

The project is planned to have an annual receiving and feeding capacity of 30.373 million tons after it is put into operation, with a major stockyard with an effective storage capacity of 549,000tons. Furthermore, the stockyard will handle the customer's highway-railway transshipment, reducing truck transportation significantly. Besides, the material stacking, reclaiming and transportation are entirely enclosed and equipped with innovative dedusting process systems that are highly mechanized to effectively reduce CO_2 emissions, assisting Donghua Steel to achieve a green and low-carbon transformation.

The two parties also agreed to a new contract in October 2021. Sinosteel MECC will construct a new 1,450 mm hot rolling strip line in the EPC mode, with an output of 4mtpa hot rolled steel coils, including 0.5mtpa raw steel coils for cold rolling, 3mtpa hot rolled commercial coils and 0.5mtpa hot rolled pickled coils. This project will employ advanced processes, equipment, and control technologies to create a high-quality, high-output production line. The reheating furnace and the RM and FM trains, respectively, will utilize fume cleaning and dedusting technology to realize energy-saving and clean operation.

Sinosteel MECC built 2 high-speed wire rod lines for Donghua Steel in 2014

10.

Sinosteel MECC Signed Its First Contract with Yukun Steel for a Sintering EPC Project

In January 2021, Sinosteel MECC and Yunnan Yuxi Yukun Iron and Steel Group signed an EPC contract for two sintering production lines, with an output of 9.9mtpa sinter.

Yunnan Yuxi Yukun Iron and Steel Group Co., Ltd. (referred to as "Yukun Steel"), a private steel company based in Yunan, has planned a series of capacity replacement and upgrading projects, including new modern blast furnaces, as well as sintering, pellet and steel rolling production lines, to accelerate the green, low-carbon and circular development of the industrial economy and build a "Green Steel City of Yuxi, Yunnan". Sinosteel MECC won the bid for the sintering upgrade and transformation project thanks to its outstanding technical advantages, rich experience in sintering projects and good management capabilities.

To ensure that the technology andequipment are state-of-the-art domestically, Sinosteel MECC will employ time-proven, advanced, cost-effective, and practical processes and equipment. Besides, efficient, dependable andwell-proven environmental protection facilities and energy-saving measures will be applied.

11.

Sinosteel MECC and Hebei Jinxi Steel collaborates on the 450 m2 Sintering Project

Sinosteel MECC and Hebei Jinxi Iron and Steel Group Co., Ltd (referred to as "Jinxi Steel") signed an EPC contract for a 450 m^2 sintering project in April 2021. With an annual production capacity of more than 10 million tons, Jinxi Steel is the world's largest structural steel production base. The sintering project is a critical component of the company's equipment upgrade and transformation, and it is important for the company to achieve energy-saving and environment-friendly manufacturing. Sinosteel MECC had previously completed two 2000m^3 blast furnaces for Jinxi Steel, laying a solid foundation for this new collaboration.

The project's concrete structures are now completed, the building closure and steel structure installation are 90% completed, and the equipment installation is nearing completion.

12.

By Virtue of Its Breakthroughs in Independent Technology, Sinosteel Tiancheng Wins an EAF Dedusting Contract

Sinosteel Tiancheng made strides with its core independent R&D technology in February 2021, when it signed an EPC contract with Yunnan Taibiao Precision Casting Co., Ltd. for its 67t EAF and LF supporting dedusting system. Sinosteel Tiancheng is in charge of building the EAF's primary dedusting system, secondary and tertiary dedusting systems, as well as dedusting systems for refining furnaces and dust emission locations and supporting utility and auxiliary facilities. The project will use Sinosteel Tiancheng's PM2.5 pre-charged fine particles control technology, which will open a new chapter in the technology's application in Consteel EAF to achieve ultra-low emissions, with key parameters such as the dust emission concentration of the primary dedusting system being less than or equal to 3.91 mg/Nm^3, the secondary and tertiary dedusting systems, and the dedusting system for refining furnaces and dust emission point realizing less than or equal to 8 mg/Nm^3, and of the dioxin realizing less than or equal to 0.20 ng-TEQ/Nm^3.

Green Steel City

13.

Shandong Huaxing Petrochemical Awards its Delayed Coking Project to Sinosteel Tiancheng

In July 2021, the delayed coking project of Shandong Huaxing Petrochemical Group Co., Ltd. (referred to as "Huaxing Petrochemical") was officially launched, contracted by Sinosteel Tiancheng on an EPC model. The delayed coking unit was designed to have a capacity of1.4 MTPA. Sinosteel Tiancheng is in charge of comprehensive waste gas treatment through closing the coke storage tank, developing the automation of coke-grabbing cranes, and treating waste gas, making the exhaust gas emission to meet the requirements of the Emission Standard for Pollutants from the Petroleum Refining Industry (GB31570-2015) and the Emission Standard for Odor Pollutants (GB14554-1993).

Sinosteel Tiancheng's self-developed control and collaborative treatment technology for fugitive waste gas from the coke storage tank will be adopted. The waste gas treatment capacity was designed to be 31,000 m^3/h (working condition), with each stage of decoking satisfying the change in waste gas volume at the same time. The annual operation time shall be 8,400 hours, using the same operating shift arrangement and delayed coking unit. profiled steel plates were used to seal the coke storage tank, the top coke grabbing crane, the sedimentation tank for decoking water, and the oil separator, helping to separate the coke charging area and manage the exhaust gas created by the coke storage tank in a confined environment. For one thing, improving the top crane's automation helps to achieve complete automation for grabbing and unloading coke. For another, exhaust vents at the top of the closed area, the coke discharging chute, and the coke tower enable targeted collection of the waste gas generated throughout the entire process. The gas, along with that collected in the cold coke water tank area, will be centralized and processed through "alkali liquid absorption + reheating furnace incineration (existing)", making the outlet of the absorption tower satisfying H_2S less than or equal to 25 mg/m^3, and particulate matter less than or equal to 10 mg/m^3.

14.

Sinosteel SEPRI Wins an EPC Contract for Comprehensive Treatment of Ecological Environment in Juzhang River Basin (Zhijiang Reach)

The Juzhang River, as an important tributary of the Yangtze River system, and an agricultural base, industrial and agricultural water source in Qixingtai Town, plays a critical strategic role in the town's national economic development. Due to numerous pollution-related problems that the Juzhang River (Zhijiang Reach) is currently experiencing, it is crucial to improve its water environment, as well as the overall living environment, in order to ensure the basin's water ecological safety and the stable water quality through continuous improvement of the local water environment.

Sinosteel SEPRI has exceptional strength possesses outstanding and accomplishments in wastewater and sewage treatment, water environment improvement, landfill treatment, soil remediation and other areas, which helped the company stand out among many bidders for the project of comprehensive ecological environment treatment in the Juzhang River basin (Zhijiang Reach). In May 2021, the company signed an EPC contract with the People's Government of Qixingtai Town in Zhijiang City.

According to the contract, Sinosteel SEPRI is responsible for developing measures to support sewage interception and treatment of surrounding ponds, ecological dredging of ditches and ponds, sludge treatment, sewage treatment,ecologicalslopeprotection (water and soil conservation, slope vegetation restoration), ecological island construction, pollution isolation system, landscape construction, the construction of diverse aquatic vegetation, management of small and micro water bodies, the construction of wetlands in situ in estuaries, ecological water makeup and water level control, wetland system management and protection and water quality monitoring, separation of clean and waste drainage, ecological interception ditches, belts, etc. Based on an EPC model, the entire process services, including construction drawing design, budget, procurement, construction, and project completion and acceptance, will be provided.

To create an ecological farmland landscape with the most natural form and optimal cost, Sinosteel SEPRI has developed an integrated solution and specially formulated the material-using principle of "being in line with local conditions, getting materials nearby, using old and waste materials, and recycling". The three "new" aspects of the solution, namely new technologies, new materials, and new products, have attracted much attention.

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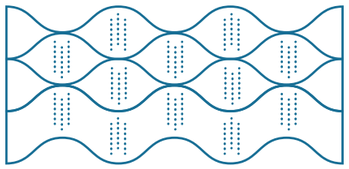
New technology: honeycomb cells.

It is a ground-breaking method for soil stabilization and complex problems, with advantages in ecology, environmental protection, speed, and economic efficiency.

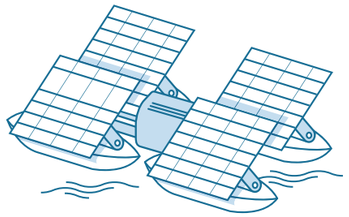


New material: geotechnical tube bag.

It can achieve internal resource circulation in the context of black and odorous water treatment with more consistent treatment performance, simpler process, and better results, and minimize secondary pollution and pollution transfer caused by external transportation of pollutants or landfill disposal.

New product: solar aerator.

It has a one-of-a-kind rotary cutting and pulling aeration impeller that achieves the triple effect of water body disintegration, oxygenation, and circulation exchange in both vertical and horizontal directions, as well as improving the water body's self-cleaning ability.



15.

Sinosteel SEPRI Makes Efforts to Promote Safe Development of Zenith Steel.

Sinosteel SEPRI and Zenith Steel Group Company Limited inked a comprehensive technical service contract for work safety management on February 24, 2021.

The official launch took place on March 23. As per the contract, Sinosteel SEPRI shall provide three-year services for Zenith Steel covering:

- Complete one status diagnosis of the southern and northern districts of Zenith Steel, as well as the formulation and formal filing of the Three-Year Action Plan on this basis.
- Special safety training courses that must be completed in batches with high quality, totaling 50 working days, to effectively develop safety awareness and knowledge, and Zenith Steel's comprehensive safety management capabilities at all levels.
- Special inspections and recommendations pertaining to 12 major types of safety hazards are to be carried out in batches for the company in its southern district.
- Guidance to Zenith Steel to promote its safety performance of duties and the development of a competent safety management system.
- Through eight technical services, the review, in-depth analysis, and summary of the work that has been completed, as well as guidance to Zenith Steel on how to improve the concept, idea, and manner of sustainable and safe development.

COMPANY HEADLINES

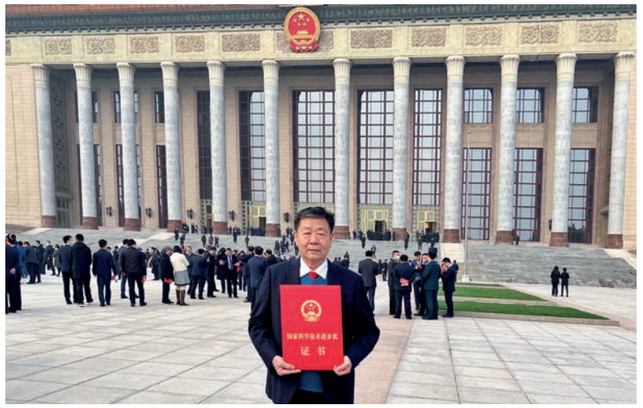
AWARDS &HONORS

01.

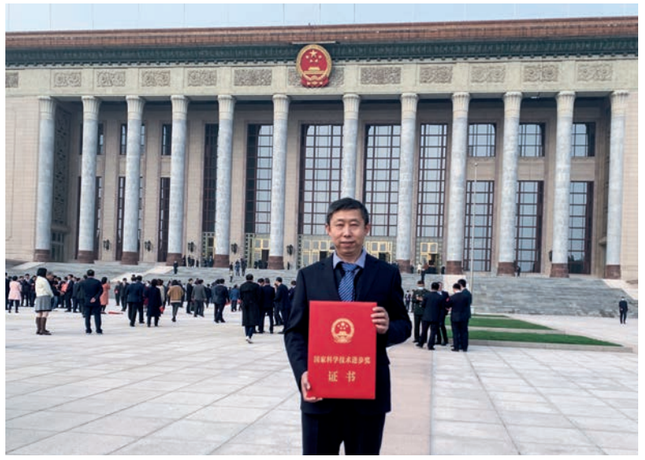
Sinosteel Tiancheng Wins the First and the Second Prizes of 2020 National S&T Progress Awards

The State Council announced its annual awards to scientists and organizations that have made great contributions to science and technology progress, economic and social development and national defense modernization on November 3 in Beijing.

The achievements of:
"the Technology and Application of Collaborative Control for Industrial Flue Gas Multi-pollutant" and "the Technology and Application of Ultra-low Control on Multi-process & Multi-pollutant of Iron & Steel Industry" co-completed by Sinosteel Tiancheng Environmental Protection & Technology Co., Ltd. (Sinosteel Tiancheng) were awarded respectively the first and second prize of the State Scientific and Technological Progress Award.



Yao Qun, Deputy GM & Chief Engineer of Sinosteel Tiancheng



Xu Hanyu, Senior Engineer of Sinosteel Tiancheng

1 — Important sci-tech supports for China's high-quality and green development

The program, "the Technology and Application of Collaborative Control for Industrial Flue Gas Multi-pollutant", in which Tsinghua University is the first accomplisher and Sinosteel Tiancheng is the fourth accomplisher, wins the first prize. Focusing on the challenges of collaborative in-depth emission reduction of multiple pollutants in the flue gas in sectors of steel and building materials in China, the Program has developed core materials including dual-function catalysts, carbon-based multi-functional materials, and film-coated gradient filter materials, key equipment for desulfurization and dedusting as well as absorption and regeneration of multiple pollutants at a low temperature, and a series of advanced technologies for collaborative deep control of multiple pollutants, the application of which in projects can satisfy the most rigorous requirements for ultra-low emissions in the world.

Those achievements have been piloted and applied in steel, cement, and glass projects over 32 municipalities, provinces, and autonomous regions in China, and 23 other countries, leading the development of deep control technologies for industrial flue gas and providing key scientific and technological supports for China's high-quality and green development.

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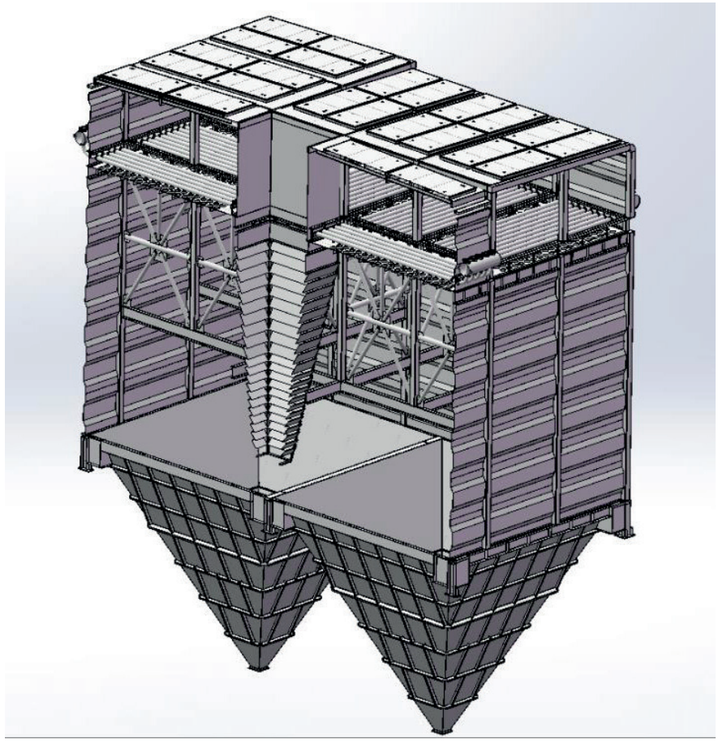
In this program, as the R&D undertaker for ultra-low emission technology and equipment for processing the fine particles in the flue gas from industrial furnaces, Sinosteel Tiancheng developed straight-through uniform flow bag filtering equipment, designed of fine filter structure with superfine fiber surface whose spinnability problem is also overcome. Surface filter material is also developed and applied in commercial and industrial projects. With those R&D outcomes, Sinosteel Tiancheng has completed over 10 modifications and upgrades of projects of ultra-low emissions for companies including Anshan Steel and Liuzhou Steel. Besides, Sinosteel Tiancheng has also formulated 9 standards including the General Technical Specifications for Bag Filtering Engineering, leading the technological progress and industrial development of advanced control of multi-pollutants in the steel industry.



❷ — Systematic solutions for comprehensive emission reduction in the steel industry

The program "Technology and Application of Ultra-low Control on Multi-process Multi-pollutant of Iron & Steel Industry", of which the Institute of Process Engineering of the Chinese Academy of Sciences is the first accomplisher and Sinosteel Tiancheng is the fourth accomplisher, wins the second prize.

After more than 10 years of challenging work, this program, based on the "source-process-end" whole-process control philosophy, has developed source and process emission reduction technologies based on the optimization of blast furnace burden composition, promoting the reform of blast furnace ironmaking process and realizing the in-depth integration of environmental protection and production. Targeting for a differentiated requirement for sintering, pelletizing, coke oven, and converter flue gas control, the end ultra-low emission control technology fits the characteristics of the respective process. The concept of the "overall optimization" control proposal provides a reliable technical approach to the full implementation of the "Guidelines on Promoting Ultra-Low Emissions in the Steel Industry" jointly issued by the Ministry of Ecology and Environment and other four ministries and commissions, and a systematic solution to the comprehensive emission reduction of all pollutants in the whole process in the steel industry.

In this program, focusing on the technology of "enhanced catching by electrostatic bag filter coupling for fine particles in converter flue gas", Sinosteel Tiancheng researched on the process parameters and invented the high-efficiency and low-resistance pre-charged electrostatic bag filtration technology and equipment which have been applied in engineering projects and realized ultra-low emissions. With particle concentration of 2-8 mg/m^3 equipment resistance of 600-900Pa, and reduction of operating energy consumption by more than 40% compared with conventional bag filters, it is the main technology for ultra-low emission in the iron and steel industry and proven to be advanced worldwide.

❸ — Adhering to innovation to make outstanding achievements

The 2020 National Science and Technology Awards saw a dropping award rate down to 14.9%, of which the rate of grand and first prizes was lowered by 20% compared with 2019. Moreover, the achievements of the nominated programs are required to be applied for over three years. The 2020 award-winning programs have been studied on average for 11.9 years. These two great honors mark both a recognition of and incentives to the core capabilities of Sinosteel Tiancheng, who has been committed to achieving more "zero-to-one" breakthroughs by adhering to independent innovation and solving prominent environmental problems.

The year 2021 marks the 20th anniversary of Sinosteel Tiancheng. Since its establishment, Sinosteel Tiancheng has regarded technological innovation as the engine for its development. In 2003, the subject of "High-efficiency Control Technology and Equipment for Fine Particles of Boiler Flue Gas in Coal-fired Power Plants" undertaken by Sinosteel Tiancheng under the National 863 Programme ushered in outcomes. This bag filter-based dedusting technology for power plants with independent intellectual property rights filled the gap and has promoted the technology and industrial progress in the coal-fired power plant sector in China. In September 2016, the achievements of the subject of "Technology and Equipment for Ultra-low Emissions of Fine Particles from Kilns and Furnaces in the Steel Industry" undertaken by Sinosteel Tiancheng under the National 863 Programme was identified by experts as world-leading level, featuring high efficiency, low energy consumption, stable operation, and easy maintenance.

In 2020, Sinosteel Tiancheng and the Ministry of Science and Technology signed the program plan for the Integration of Supporting Technologies for Whole-process Air Pollution Prevention and Control in the Large-scale Comprehensive Industrial Parks Along the Middle Reaches of the Yangtze River, which is also the 7th R&D program participated by Sinosteel Tiancheng, initiated by the same ministry. As the atmospheric special program under the National Key Research and Development Plan of China, it plays an important role in restoring the ecological environment of the Yangtze River and promoting the high-quality development of the Yangtze River Economic Belt.

Staying focused on the development of scientific and technological innovation capabilities, Sinosteel Tiancheng has successively established the National Industrial Flue Gas Control Engineering Technology Center for Environmental Protection under the Ministry of Ecology and Environment and the National Industrial Flue Gas Dedusting Engineering and Technology Research Center under the Ministry of Science and Technology, and jointly built the National Engineering Research Center for Collaborative Control of Air Pollutants and Greenhouse Gases led by Tsinghua University. In April 2019, the Academician Workstation led by Professor Hao Jiming was established in Sinosteel Tiancheng, marking China's first academician workstation focusing on atmospheric environmental protection in the steel industry.

Attaching great importance to the rapid transformation and application of achievements, Sinosteel Tiancheng has successfully developed "PM2.5 Pre-charged Electrostatic Bag Filtering Technology and Equipment" into the mainstream for ultra-low emissions of steelmaking flue gas. The past two decades have witnessed a number of unprecedented environmental protection projects undertaken by Sinosteel Tiancheng in China, including the dedusting of China's largest 150t electric furnace of Baosteel in 2007, China's largest 5500m^3 blast furnace of Jingtang Steel in 2008, China's largest 300t converter of Jingtang Steel in 2009, China's largest 7.63m coke oven battery of TISCO in 2008, China's largest 5mtpa pellet plant of WISCO in 2014, and China's largest 660m^2 sintering machine of TISCO in 2019.

2007 — 150t
Dedusting of China's largest 150t electric furnace of Baosteel.

2008 — 5500m³
China's largest 5500m^3 blast furnace of Jingtang Steel

2008 — 7.63m
China's largest 7.63m coke oven battery of TISCO

2009 — 300t
China's largest 300t converter of Jingtang Steel

2014 — 5mtpa
China's largest 5mtpa pellet plant of WISCO

2019 — 660m²
China's largest 660m2 sintering machine of TISCO

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In recent years, Sinosteel Tiancheng also developed a number of original technologies, including the collaborative control of catalytic cracking flue gas in the petrochemical industry, the control and collaborative treatment of fugitive VOCs emissions from delayed coking in the petroleum refining sector, the collaborative cleaning of reheating furnace flue gas desulfurization and denitration, and the short-process dry cleaning of large submerged arc furnace gas. Completed a number of the "first" projects, Sinosteel Tiancheng made remarkable achievements in pollution and carbon reduction, energy conservation and consumption reduction, and green technology, contributing to the ultra-low emissions and pollution prevention for industrial sectors and supporting the enterprises with pollution and carbon reduction technologies. Besides, Sinosteel Tiancheng has formulated over 30 standards, specifications, and industry development reports for the country and the relevant industries, and registered more than 100 patents.

30+

standards, specifications, and industry development reports formulated

100+

registered patents

02.

Ranked No. 8 in CECA's Project Management and Gross Contracting Revenue of Engineering & Consulting Firms 2021

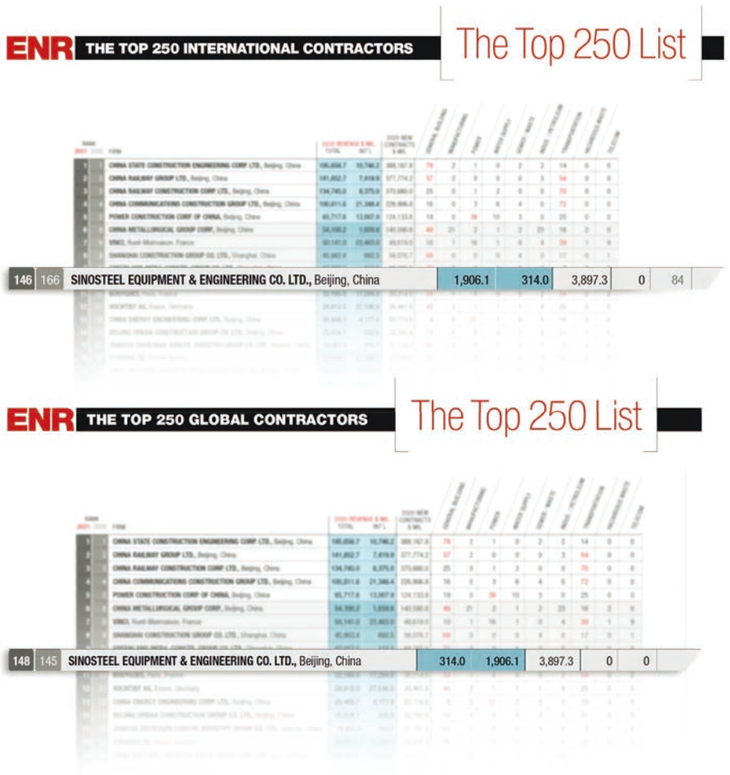
On September 9, 2021, China Engineering and Consulting Association (CECA) released the ranking of project management, general contracting, overseas project management, and overseas general contracting revenue 2021. Sinosteel MECC ranks No. 8 on the list with its revenue of 13.31¥ billion.

Sinosteel MECC has been included in the list ever since 2006.

03.

Sinosteel MECC Ranks in ENR's List 2021

On August 18, 2021, *the Engineering News-Record (ENR)* released its lists of 2021 Top 250 International Contractors and 2021 Top 250 Global Contractors. Sinosteel MECC ranked 148th and 146th respectively.



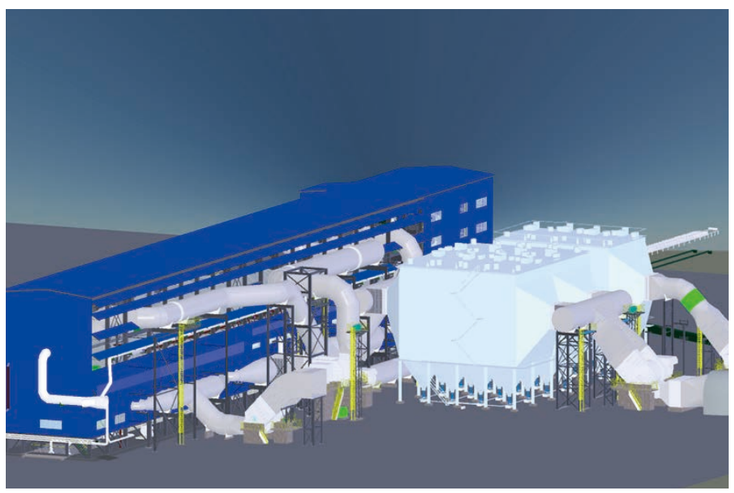
04.

Sinosteel MECC: High-tech Enterprise Recognized for All Subsidiaries

The Leading Group Office for the National High & New Technology Enterprise Recognition and Management announced the list of the candidacy of Beijing's third batch of National High & New Technology Enterprise of 2020, and Sinosteel MECC was certified. So far, Sinosteel MECC and its subsidiaries Sinosteel Tiancheng, Sinosteel SEPRI, and Sinosteel Shijiazhuang Design & Research Institute, specialize respectively in industrial engineering and services, energy-saving and environmental protection, safety and occupational health, have all been recognized as national high-tech enterprises.

Under the administration of the Ministry of Science and Technology, the Ministry of Finance, and the State Administration of Taxation, the national high & new technology enterprise certification is issued to recognize the outstanding performance of enterprises in acquiring intellectual property rights through continuous research on scientific and technological development and technological achievements transformation in the high-tech fields supported by the state, and implementing production and operation activities on this basis. It serves to cultivate new technologies and new forms in the industry to upgrade and develop the economy. Enterprises seeking to obtain high-technology enterprises status must meet the required criteria: ownership of core intellectual property, be operating within the specified high-tech fields, technical personnel engaged in research and development and related technological innovation activities account for a certain percentage, R&D expenditure, ability in innovation and transformation of scientific and technological achievements, and growth indicators. The certification of the national high-tech enterprise of Sinosteel MECC marks the recognition of its achievements in scientific and technological innovation.

Directed by the strategic goal of building a world-class metallurgical engineering and technology company with global competitiveness, Sinosteel MECC has been focusing on high-tech development and increased investment in research, resulting in breakthroughs in cutting-edge technologies in many sectors to provide efficient, safe, green, low-carbon and digital intelligent services for customers.



SINOSTEEL MECC

and its subsidiaries

Sinosteel Tiancheng,

Sinosteel SEPRI,

Sinosteel Shijiazhuang Design & Research Institute

have all been recognized as high-tech enterprises

05.

EPC Projects of Sinosteel MECC Win Annual Awards of CMCA

In July 2021, China Metallurgical Construction Association (CMCA) released the list of Engineering Excellence in Metallurgical Industry 2021, and two EPC projects undertaken by Sinosteel MECC got the honor. The Fujian Sangang Minguang Pelletizing Project won the second prize of the Excellent Engineering Design Achievement Award, and the 1.9mtpa Coke Ovens with 3mtpa By-product Project for JSPL in India secured the Excellent Engineering Quality Achievement Award.

Those two Awards are presented by CMCA once a year to recognize outstanding technological innovations in the engineering design sector and encourage enterprises in the fields of project development, survey, design, construction and supervision to strengthen science-based management, improve design capabilities, project quality and investment efficiency, and increase brand awareness.

Adopting an advanced design concept, the 2mtpa travelling grate pelletizing project for Fujian Sangang Minguang Co., Ltd. is the first one put into operation in China with intellectual property and core equipment domestically made. The production line is recognized leading level in China and advanced level abroad, bridging the gap with international competitors and significantly raising the technical level of the domestically-made main equipment. The project is energy-saving, environment-friendly, and highly efficient. Since its operation, it has greatly reduced energy consumption and dust concentration far lower than the requested 10 mg/m³ by the national environmental protection standard for ultra-low emissions. All indicators measuring energy consumption and product specification have topped similar projects.


证 书

中钢设备有限公司：

印度JSPL年产190万吨焦炉配备300万吨化产回收项目获2021年全国冶金行业工程质量优秀成果奖。


证 书

中钢集团工程设计研究院有限公司：

福建三钢闽光炼钢工程获2021年度全国冶金行业工程设计优秀成果二等奖。

The 1.9mtpa Coke Oven Batteries with 3mtpa By-product project of JSPL, lasting more than 10 years from the contract signing to commissioning, had survived site change and customer's financial crisis. The project has maintained stable operation and achieved production targets on both quality and output. The major technical and economic indexes have exceeded those specified in the contract and reached the internationally advanced level.

06.

Sinosteel Tiancheng's Three Environmental Protection Technologies and Equipment are Selected in the Catalogue of: Major Environmental Protection Technology and Equipment Encouraged by the State (2020 Edition)

The pre-charged electrostatic fabric filtering technology for ultra-low emissions of fine particles from kilns and furnaces in the steel industry, independently developed by Sinosteel Tiancheng, was selected in the Green Technology Promotion Catalogue (2020) jointly issued by the National Development and Reform Commission, the Ministry of Science and Technology, the Ministry of Industry and Information Technology, and the Ministry of Natural Resources.

The Catalogue aims at accelerating the promotion and application of advanced green technologies, including a total of 116 core technologies and processes related to industries such as energy conservation and environmental protection, cleaner production, cleaner energy, ecological environment, and green upgrading of infrastructures.

The green technologies included in the Catalogue need not only to be advanced, applicable and of high promotion value but also to meet the stringent criteria:

- Be leading in China and up-to-date, and play a guiding role in the green development of related fields in China.
- Be proven and reliable, with clear intellectual property rights, and can be widely applied and promoted in relevant industries or fields.
- Be cost-effective with high promotion value and great potential, and can significantly advance the sustainable development of the economy and society.

Sinosteel Tiancheng's technology is suitable for cleaning flue gas from metallurgical furnaces and kilns, by means of pre-charging fine particles in the flue gas to aggregate into porous cakes on the surface of the bags of straight bag filter, which can intensify the Brownian diffusion and electrostatic interactions of fine particles during filtration, and thus improve the purification efficiency by a higher chance of contact, adhesion and agglomeration. The superfine fibers on the filtering media can provide surface filtration, stop some fine particles from entering the filtering media, and prevent PM2.5 from penetrating and escaping, thus stably achieving ultra-low emissions. Particle emission concentration is less than 10 mg/m³, PM2.5 capture efficiency is more than 99%, the resistance of equipment can is 700-1000 Pa, the air leakage rate of equipment is less than 1.5%, an operating voltage of the pre-charged device is 50-72 kV, and the secondary current of the same is 80-120 mA.

Compared with the conventional bag filtering technology, the pre-charged electrostatic fabric filtering technology can reduce the particle emission concentration by 30%-50%, showing a remarkable environmental protection effect, lower the energy consumption of operation resistance by more than 40%, delivering significant energy-saving benefits, and save the land occupation by 35%, bringing 25% reduction of steel per unit filtering area.

99% PM2.5 capture efficiency

10 mg/m³ Particle emission concentration

30-50% Particle emission concentration reduced

Project Spotlights

Adhering to innovation-driven growth, Sinosteel E&T is capable to provide low-carbon solutions and service for all processes of steel industry.

The patented technologies were commercialized with greater success – the 4mtpa travelling grate pellet plant, also the first one of Baowu Group, and the world's first twin TMCP rolling lines with extra-heavy 330mm modular mill for Jianbang Group started operation. Moreover, JSW expressed sincere gratitude at the moment when the CDQ project launched and No.1 coke oven battery pushed the first coke, which has marked another brilliant achievement of Sinosteel E&T along the Belt and Road routes.

PROJECT SPOTLIGHTS

01. CDQ for JSW in Production

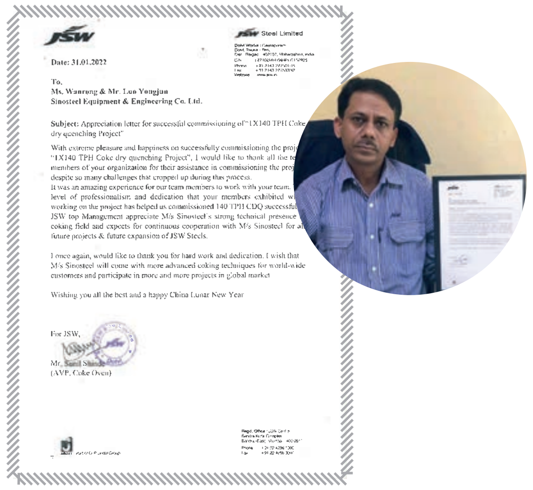
On December 24, 2021, the 140t/h CDQ project constructed by Sinosteel MECC for its Indian partner JSW Steel Limited (JSW) was put into production. The project was contracted three years ago to support the 5.5m and 2x55-oven stamp-charging coke ovens previously constructed by Sinosteel MECC, with an annual output of 1 million tons of coke.

Sinosteel MECC's business footprints in India

The overall technical level of the project is in line with the advanced standard of similar scale in China. Besides, the plant is so planned as to share the resources, shorten the process flow, save the space and maximize the investment benefits to the greatest extent without changing the master plan of the plant area. Equipment selection, based on the situation of JSW Dolvi Works, is to match the customer's operation habits and individual requirements as far as possible. Efforts in optimization and innovation in aspects of electrical automation control, equipment service life, operation and maintenance, and waste water recycling are made to ensure that the whole project has higher production efficiency and less overall investment.

In March 2019, construction of the project officially started. Affected by the COVID-19, the project team started online guidance to ensure progress. They worked 24/7 online to answer customer's doubts and questions. The project was successfully put into production on December 24, 2021, and Sinosteel MECC was highly recognized by the customer.

On the eve of Chinese New Year, Assistant Vice President of JSW and project manager sent a letter of thanks.



JSW Steel Limited

Date: 31.01.2022

To,
Ms. Wanrong & Mr. Luo Yongjun
Sinosteel Equipment & Engineering Co. Ltd.

Subject: Appreciation letter for successful commissioning of "1X140 TPH Coke dry quenching Project"

With extreme pleasure and happiness on successfully commissioning the proj "1X140 TPH Coke dry quenching Project", I would like to thank all the te members of your organization for their assistance in commissioning the proj despite so many challenges that cropped up during this process.
It was an amazing experience for our team members to work with your team. level of professionalism and dedication that your members exhibited wi working on the project has helped us commissioned 140 TPH CDQ successful JSW top Management appreciate M/s Sinosteel's strong technical presence coking field and expects for continuous cooperation with M/s Sinosteel for al future projects & future expansion of JSW Steels.

I once again, would like to thank you for hard work and dedication. I wish that M/s Sinosteel will come with more advanced coking techniques for world-wide customers and participate in more and more projects in global market

Wishing you all the best and a happy China Lunar New Year

For JSW,

Mr. Sunil Shinde
(AVP, Coke Oven)

Efforts in optimization and innovation in aspects of electrical automation control, equipment service life, operation and maintenance, and waste water recycling are made to ensure that the whole project has higher production efficiency and less overall investment.

Sinosteel MECC went into the Indian market in the early 1990s and signed its first contract in 2005. Afterwards, Sinosteel MECC established a profound friendship with the Indian steel giant O.P. Jindal Group and served all sub-companies. The in-operation and under-construction coking capacity provided by Sinosteel MECC adds up to 10 million tons/a. Sinosteel MECC has become the largest Chinese contractor for coking projects in India. As a part of Jindal, JSW operates businesses covering steel, power, mining, petroleum, natural gas and infrastructure in more than 140 countries globally, and comes first of India's steelmaker with total production capacity of 22 million tons/a.

Sinosteel MECC's first contract in India was to build a heat-recovery coke oven with an annual output of 400,000 tons/a for JSW. Next year, Sinosteel MECC was awarded the contract of 4x56-oven with a chamber height of 4.3-meter coking project with an annual output of 1.5 million tons/a, and in 2008, another 4x72-oven with a chamber height of 4.3-meter coking project with an annual output of 1.9 million tons/a.

2006

4x56 oven

1.50 million tons

4.3 meter chamber

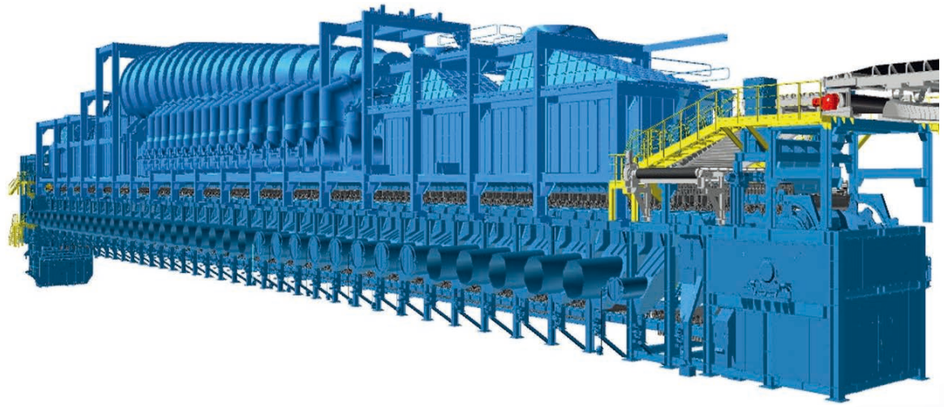
2008

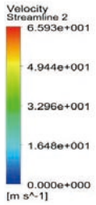
4x72 oven

1.9 million tons

4.3 meter chamber

02. 4mtpa Travelling Grate Pelletizing Project for Baowu Masteel Started Up





Produce green, low-carbon and high-quality pellets with lower energy consumption

On November 5, 2021, the 4mtpa travelling grate pellet plant of Baowu Maanshan Iron & Steel Co., Ltd. (Baowu Masteel), also the first one of the entire Baowu Group, contracted by Sinosteel E&T on EPC basis successfully started up. A record of "fastest" construction which only took 13 months was created of its kind.

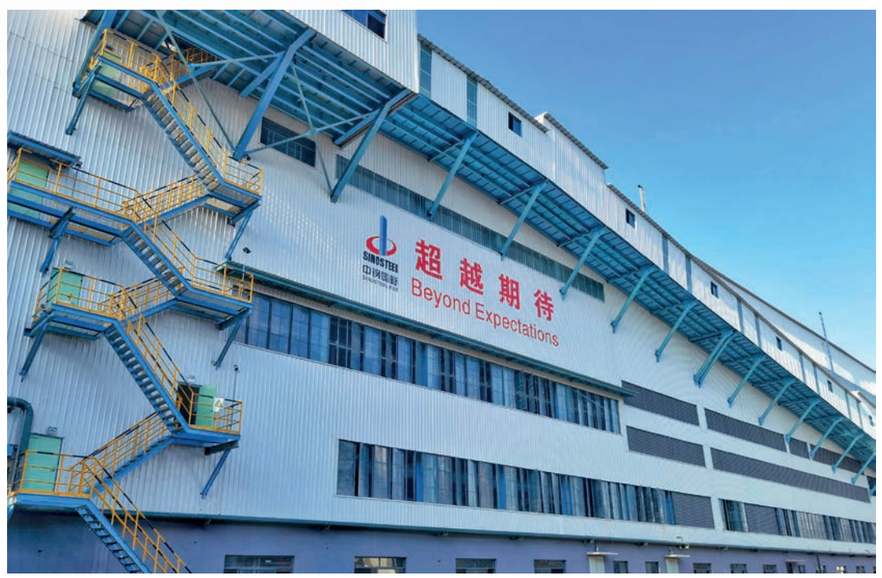
The project employs Sinosteel E&T's self-developed travelling grate pelletizing technology and core equipment with the application of computational fluid dynamics to produce low-carbon, green and high-quality pellets with low energy consumption.

The process energy consumption is less than 18Kgce/t at full magnetite production. As the cleanest burden and a substitute to sinter in blast furnace iron making, the travelling grate pellets have a substantial advantage in decreasing pollutants and carbon emissions which will drop by 10% in case the proportionof pellet for blast furnace is increased from 10% to 50%.

The project adopts 3D design and digitizes the basic 3D application environment. Cloud collision and cloud collaboration technology help detect space interference in advance and avoid collision, decreasing the construction rework and project costs, so as to guarantee the project progress and quality.

The equipment failure and spare parts replacement were used to be found via various troubleshooting routines. Now the sensors will automatically monitor the running status of equipment to detect and locate the fault in real-time.

By virtue of digitalization, Sinosteel E&T will enable its customer to achieve greater leapfrog development by reducing operating costs, enhancing productivity, improving product quality, and decreasing resource and energy consumption.

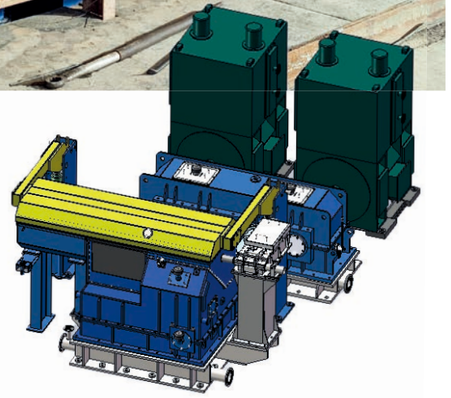


The process energy consumption is less than 18Kgce/t at full magnetite production. This self-developed travelling grate pelletizing technology has a substantial advantage in decreasing pollutants and carbon emission.

Synchronize with direct rolling, high temperature charging and core double TMCP technology.

Sinosteel MECC has independently developed a series of single-drive modular rolling mills including 230mm, 265mm and 330mm.

Flexible controlled cooling and large-scale low-temperature rolling.



03. High-speed Bar Mill Produced at Record Speed of 45m/s at Shanxi Jianbang

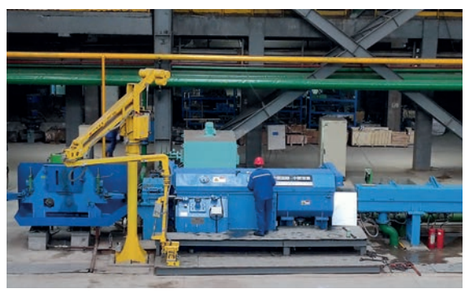
On November 30, 2021, the 1mtpa high-speed bar rolling project contracted by Sinosteel MECC on an EPC basis for Shanxi Jianbang Group was successfully hot-commissioned, achieving the maximum rolling speed of 45m/s. The system maintained stable and efficient operation thereafter, with a fixed rolling speed of 42.75 m/s and first-level main technical parameters in the industry. The project is another successful cooperation between Sinosteel MECC and Shanxi Jianbang Group, and also witnessed the commissioning of the world's first super-heavy 330mm modular rolling mill with three-level controlled rolling process.

1 million tons of rebar between diameters of 12.0mm to 25.0mm will be produced annually. The rolling technology and equipment independently developed by Sinosteel MECC, including three-level controlled rolling and cooling process, large-scale high-speed flying shear and high-speed delivery system, are adopted. The continuous casting direct rolling (CCDR) process and centralized individual operation room for each rolling line are designed, which greatly improves efficiency and effectively reduces operators. The world's first dual-TMCP with a super-heavy 330 mm modular rolling mill created a new era of high-speed bar production with outstanding advantages:

A

"2+2+2" process layout of modular rolling mill in high speed area

The "4+2" process layout originated by Sinosteel MECC is optimized to "2+2+2", considering the customer's existing product mix and overall plan of the workshop, which solves the problems of roller groove outburst caused by broken roll collar, low rolling speed and limited product specification range of the traditional high-speed bar rolling mills. Larger rolling force (up to 50 tons), higher rolling speed (up to 50 m/s) and wider product range (φ10 mm-φ32 mm) are also achieved.



B

Controlled rolling and cooling technology & equipment reduce cost per ton of steel by approximately US $15

The project also adopts Sinosteel MECC's self-developed controlled rolling and cooling technology and equipment which will improve the internal structure and steel bar strength whilst upgrading the grain size of products by 2 grades. Manganese content of rebar between diameters 12mm to 25mm is less than 0.8% to 1.2%. Microalloy elements such as vanadium and niobium will not be added. At present, the latest core technology and equipment developed by Sinosteel MECC can achieve the minimum manganese content added for rebar below diameter 28mm across China, with no vanadium and niobium added.

C

CCDR saves 3000m³/h of natural gas

CCDR technology increases the temperature and conveying speed of CCM billets so as to ensure the direct rolling rate, remove the looper between casting and rolling and integrate the steel making and rolling systems. According to preliminary calculation, 3000m³/h of natural gas will be saved, reducing energy consumption and carbon emissions. At the same time, it improves product quality and save investment.

At the end of 2021, the project was put into production and maintained efficient operation, with a stable rolling speed of 42.75 m/s, which breaks the record of a fully continuous high-speed bar rolling system. This is a new breakthrough of Sinosteel MECC's long product rolling technology and equipment and another achievement in providing optimal solutions and services to customers.

The world's first dual-TMCP with a super-heavy 330 mm modular rolling mill created a new era of high-speed bar production.

04.

Energy Saving & Carbon Reduction: Ferronickel Plant Started Operation in Inner Mongolia

In July 2021, the first production line of the 1.2mtpa ferronickel plant of (Naiman) Jing'an Non-ferrous Metal Materials Co., Ltd. in Inner Mongolia started operation. The project is contracted (EPC) by Sinosteel MECC based on the RKEF process, with 18 fully-enclosed submerged arc furnaces having a capacity of 33000kVA, placed in 9 workshops. Sinosteel MECC has made optimizations and improvements in combination with its own technical advantages, which greatly improved production efficiency and achieved energy saving and cost reduction.

Upgrade in SAF crane feeding tech: fast, accurate, quantified and unmanned 1

The traditional SAF crane feeding technology has shortcomings such as long feeding cycle, big heat loss, high labor intensity, low automation level, high dependence on external conditions, and high equipment and operating costs. Given this situation, Sinosteel MECC has optimized at the design stage.

The traditional feeding crane is upgraded to hoist whose connection with the hot charging bin is also adjusted, enabling accurate positioning. In addition to this, the automatic charging system is optimized with analysis of charging cycle and control modeling proven to be efficient, low-fault, and cost-effective.

First-adopted cylinder HBS: efficient, energy-saving and eco-friendly 2

A cylinder hot blast stove is used in the project. The HBS is fueled with rotary kiln gas, submerged arc furnace gas, and pulverized coal. The mixture of the latter two is fully burned through the multi-channel cyclone gas mixing burner, and entered into the rotary kiln at a properly controlled temperature, making the combustion in the hot stove more complete and stable, compared with traditional hot blast stove.

Recycling SAF gas to cut pulverized coal consumption 3

The enclosed submerged arc furnace guarantees good sealing performance whilst the gas is purified by cooling, sedimentation and dedusting to clean gas with low temperature, dust and moisture and can be recycled for re-utilization in drying kiln, saving energy consumption by 25%-30%.

In view of the great amount of flue gas and high temperature generated by submerged arc furnace, Sinosteel MECC arranged a waste heat recovery system at the outlet of furnace gas to carry the waste heat to rotary kiln where the heat efficiency is improved, significantly lowering the consumption of pulverized coal.

Saving 10,000 tons of standard coal yearly 4

Different from conventional grate, the calcine screening system, whose heat can elevate the heat efficiency of rotary kiln, is adopted, saving 10,000 tons of standard coal per year of each production line.

05. Sinosteel Tiancheng Breaks Through in Charge End Bag Filtering of Large-scale Sintering Machine

On September 9, the project of flue gas bag filtering at charge end of large-scale sintering machine, also the world's first one, contracted by Sinoteel Tiancheng for Xinyu Iron and Steel Co., Ltd. (XinSteel), was officially put into operation. The project uses the latest technology independently developed by Sinosteel Tiancheng. The excellent performance of the project represents another breakthrough of China's independent technology in atmospheric environmental protection.

Guan Caitang, General Manager of Xin Steel

Feng Bin,Vice Chairman Sinosteel Tiancheng

During the trial operation period, the fans maintain complete operation without replacement and have no impact on the sintering production with outstanding performance in ultra-low emission:

The stable operation of project is a proof that Sinosteel Tiancheng's independent technology is feasible and reliable in terms of process route, technology and performance.

5.1mg/m³
PM2.5 concentration

650PA
Running resistance

20%
Comprehensive energy consumption reduced

Flue gas at the charge end of large-scale sintering machine is characterized by large volume, high temperature, corrosivity, condensation and negative pressure, as well as volatility of flue gas condition, hence difficult to be controlled. ESPs are normally used worldwide to control flue gas. However, the unstable operation and excessive particle concentration at the outlet lead to problems including unstable operation of subsequent desulfurization, denitration and activated carbon facilities, short life of cleaning materials and maintenance workload. The bag filter has long been on the bench due to failure to break through the bottlenecks of condensation and filter bag caking. Therefore, to efficiently control the flue gas at charge end of large-scale sintering machine to obtain stable and ultra-low emissions is a worldwide challenge.

Since 2015, Sinosteel Tiancheng has been working on this problem and, after years of R&D and hot industrial tests, made major progress in core technologies such as process, key cleaning equipment, filter materials, and risk prevention and control measures of flue gas bag filtration at charge end of large-scale sintering machine.

The technology and equipment also have functions of high negative pressure resistance, condensation resistance, corrosion resistance, spark capture, and prevention of ash deposition and spontaneous combustion, which can effectively ensure the long-term reliable and safe operation of the system, with the filter bag life expectancy up to over 2 years.

The project brought greater impetus to achieve clean production and green development for XinSteel, from whom Sinosteel Tiancheng has won high recognition. Guan Caitang, general manager of XinSteel Group, said: "As a first-class environmental protection high-tech enterprise with leading technology in China, Sinosteel Tiancheng has a long history of cooperation with XinSteel. Over time, the two sides have been working together even more extensively and deeply. The one-time successful operation of this project is quite satisfactory for Xinsteel."

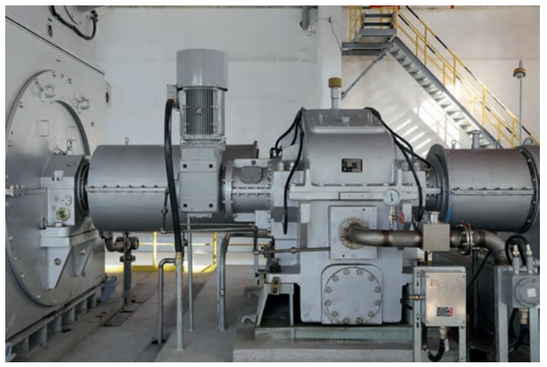
"Sinosteel Tiancheng will continue to track the operation and carry out further evaluation and analysis to promote technological improvement, so as to reassure the customer and seek to put this independent technology into wider application." said Feng, Vice Chairman of Sinosteel Tiancheng.

To efficiently control the flue gas at charge end of large-scale sintering machine to obtain stable and ultra-low emissions is a worldwide challenge.

06.

Projects at Huaxi Special Steel Successfully Hot-commissioned with One-stop Service from Planning to Commissioning

On September 25, 2021, the projects of stock-yard, sintering, blast furnace, steel making and continuous casting for the complex of Hebei Huaxi Special Steel Co., Ltd. (Huaxi Special Steel) contracted by Sinosteel MECC, on an EPC basis, successfully hot-commissioned, with the process-through from BF being processed into steel billets. Sinosteel MECC provided one-stop service from planning to commissioning, with forward-looking planning, proven know-hows, cutting-edge technologies and attentive service.



PROJECT
SPOTLIGHTS

320m²
Sintering Machine

Sinosteel MECC was awarded several contracts by Huaxi Special Steel to provide engineering, equipment supply and construction:

2300m³
Blast Furnace

170t
Converter

12X12
Strand Billet Continuous Caster

120,000m²
Stockyard

1.76million tons
Hot Metal

1.7million tons
Molten Steel

The plant, located at Tangshan Seaport Development Zone, is an important part of Huaxi Special Steel's transformation and upgrading.

1

Sinosteel MECC provided the customer with overall plant planning service.

In October 2019, Sinosteel MECC was awarded several contracts by Huaxi Special Steel to provide engineering, equipment supply and construction of a 320m2 sintering machine, a 120,000m2 stockyard, a 2300m³ blast furnace, a 170t converter, a 12-strand billet continuous caster, as well as the supporting auxiliary facilities. The complex is designed to produce 1.76 million tons of hot metal and 1.7 million tons of molten steel annually.

Sinosteel MECC provided the customer with overall plant planning service, targeting at high value-added products in urgent need in markets, with consideration of investment returns and customer's development strategies. The concept of green and low-carbon development runs through the planning, manifested by the application of advanced, reliable, stable, efficient, and environment-friendly technologies and equipment.

Sinosteel MECC also came up with innovative solutions in aspects of cutting-edge process technologies, intensified control of pollution sources and early safety warning:

2

- Three-stage sintering, low-negative-pressure hot air ignition, and ultra-high bed depth ensure the production of high-yield and high-quality sinter. The application of Sinosteel MECC's self-developed technologies such as flue gas recycling, oligodynamic circulation and cascade utilization of circular cooler gas, as well as comprehensive utilization of flue gas waste heat enables the low energy consumption sintering. Stable and intelligent sinter production is achieved by unremitting improvement of sintering machine, circular cooler, and expert systems.

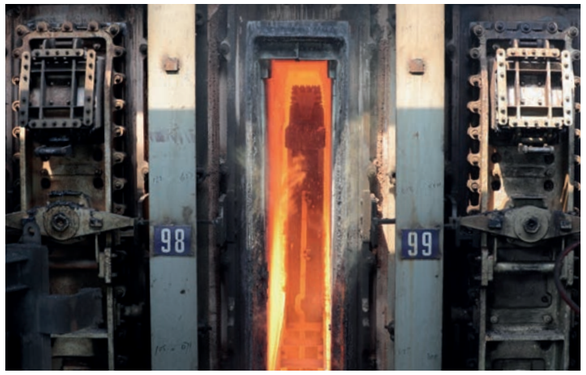
- Clean gas back-blowing dry bag filter and the BPRT residual pressure recovery system were adopted for blast furnace to improve the energy recovery rate and reduce energy waste. Hearth multi-dimensional erosion intelligent monitoring expert system and water temperature difference online monitoring and early warning system were provided to ensure the safe operation.

- Pollutant source control is approached from raw material transfer, screening, smelting, power supply and fan equipment, to ensure that all indicators meet ultra-low emission criteria.

The overall construction period of the project was greatly shortened by overlapping all projects.

Design drawings were finished within 6 months, and more than 90% of major equipment was procured within 3 months. Sinosteel MECC is prominent inconstruction execution and organization by means of target decomposition, data analysis, and quantitative management, practicing refined management in human resources, machinery, materials, craftsmanship and environment.

07. Coke Ouen Batteries Comes on Stream at Dexin Steel in Indonesia



The second of the pair of coke oven batteries pushed its first coke in June, 2020 at Dexin Steel Works in Indonesia, marking the successful completion of the complete coke oven plant delivered by Sinosteel MECC.

The two coke oven batteries, each comprising 65 ovens with a chamber height of 5.5 meters, are designed for a total production of 1.3 million tons of coke per year, along with coal preparation, coke screening, as well as coke oven gas (COG) purification system consisting of condensing blower, PDS desulfurization, ammonia benzene scrubbing, crude benzene distillation and ammonia distillation processes. Self-developed technologies of Sinosteel MECC and completely China-made equipment were applied.

The coke is fed to blast furnace and by-product including coke oven gas and tar ensures the smooth operation of the entire steel complex.

So far, the projects of two 230m^2 sintering machines, three 600t/d lime kilns as well as a 100,000m^2 raw material yard contracted by Sinosteel MECC for Dexin Steel are completely in operation. The breakthrough of Sinosteel MECC in Indonesia is for sure a result of the sincere cooperation with Dexin Steel, which in a time of global pandemic is even more valuable for successful project implementation.

Self-developed technologies of Sinosteel MECC and completely China-made equipment were applied.

08. Sinosteel Tiancheng Making New Contributions to Anti-air-pollution

On May 14, 2021, the airtight decoking and VOCs-laden waste gas treatment project for the delayed coking unit of Shandong Huifeng Petrochemical Co., Ltd. (Huifeng Petrochemical), which was contracted by Sinosteel Tiancheng on an EPC basis, was put into trial operation. The project marks not only the first cooperation between the two sides, but also the debut of the technology developed by Sinosteel Tiancheng in China.

As a result, the fugitive emissions of waste gas from delayed coking unit have been addressed, with the emission indicators far lower than the required in relevant national and local standards, winning recognition from the customer.

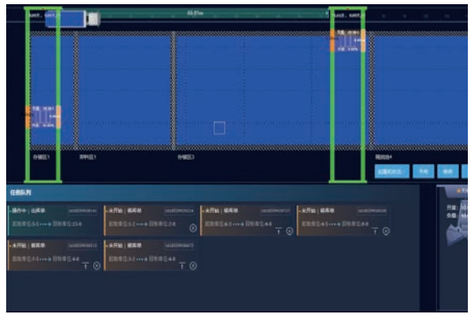
The turnkey project features low investment and reduced energy consumption with the self-developed technology of Sinosteel Tiancheng. In view of the open cold coke treatment adopted by the delayed coking unit, Sinosteel Tiancheng made an overall consideration of the waste gas source, comprehensive waste gas treatment system and process, and equipment layout. Based on self-developed technology, Sinosteel Tiancheng developed the tailor-made integrated solution through the process route of "airtight coke tank + waste gas collection and treatment + coke grabbing by intelligent cranes".

Q1 How to achieve effective control of fugitive emissions of waste gas?

Sinosteel Tiancheng's proprietary movable flip-open exhaust hood and multi-point air volume balance system are used over the tops of the coke tank, coke tower and coke chute after the coke tank is closed, which help achieve effective control of fugitive emissions of waste gas with minimum air volume. The collected waste gas, after desulfurization and denitrification, is sent to a nearby incinerator, so as to ensure the up-to-standard emission of waste gas and green production. Thus, the production and surrounding environment are significantly improved.

Q2 How to reduce cost whilst increasing efficiency in a short time?

The renovation of delayed coking units by means of most of the existing technologies is subject to heavy workload and a long period worldwide, normally requiring a shutdown for 3 months or even longer. In order to shorten the construction period, Sinosteel Tiancheng made the plan conform to the principle of "installing the comprehensive waste gas treatment system without changing the existing coke production process". The downtime ended up taking only 45 days thanks to Sinosteel Tiancheng's plan which was closely integrated with the main production unit and retained the original production process.



Q3 Safety-enhanced intelligence

Employing technologies of "laser scanning for 3D modeling + fixed-point coke grabbing and unloading", Sinosteel Tiancheng made intelligent renovations to the existing cranes. The whole decoking cycle of the delayed coking unit can be accomplished automatically. After operation, the intelligent control of coke grabbing and unloading replaced the dependence on the experience of operators to judge the decoking condition. The unmanned operation eliminates the potential safety hazards to operators and improves efficiency. In addition, intelligent cranes feature high efficiency, stable operation, easy maintenance and low energy consumption. In consideration of human-based operation, Sinosteel Tiancheng also set up full-automatic operation, semi-automatic operation and manual operation modes.

One of the major targets of air pollution prevention and control in China's collaborative control of PM2.5 and ozone, the key, also the shortage, of which is the coordinated emission reduction of nitrogen oxides and VOCs, needs relevant equipment and technologies urgently. The successful trial operation of the project not only solved the burning problem of the industry, but also an effective attempt of VOCs control and support to national air pollution prevention and control.

09.

Intelligent Safety: Sinosteel SEPRI delivering on-site safety risk control services to Tiangang United

On April 17, 2021, the project of an intelligent safety risk control system for construction sites, which was undertaken by Sinosteel SEPRI for Tianjin Tiangang United Special Steel Co., Ltd. (Tiangang United), completed its acceptance.

Thanks to increased attention and joint efforts from the state, all levels of governments, and enterprises, construction-related incidents have declined in recent years. However, due to its characteristics such as high personnel mobility, many operations at heights and in the open air, complex cross construction, irregular structures, and multiple points, the construction industry is prone to poor construction conditions, various unsafe factors, high risks and high difficulty in accident prevention. As a result, typical safety risk control measures are unable to properly manage construction sites risks. In this context, Sinosteel SEPRI and Tiangang United inked a contract in January to develop an intelligent safety risk control system for construction sites (the construction site smart safety system project).

Sinosteel SEPRI has a long history of providing safety consultation and research on production safety technology in industries and trades such as construction and metallurgy, thus possessing a solid theoretical foundation and on-the-ground experience, as well as an expert team with diverse disciplines, sufficient talents and technical strength. Sinosteel SEPRI has also made significant theoretical advances and gained extensive experience in providing technical consulting services to governments and enterprises, laying a good foundation for the establishment of databases for safety risks, hidden danger screening, and laws and regulations, and safety risk evaluation models.

Based on field research and the theoretical research on safety control, Sinosteel SEPRI has implemented the new technologies such as video-based intelligent identification, Internet of Things +, big data, and cloud computing to achieve informatization & intelligence of the construction site safety control, with the goal of preventing accidents, raising the level of safety risk control in metallurgical enterprises, and reducing costs. The highlights include:

The project has been running smoothly during the warranty period. Sinosteel SEPRI has actively researched new modes of safety supervision with the use of informationization and intelligence to help customers minimize the cost of on-site monitoring and risk control, mitigate the pressure of risk prevention & control, and improve their ability to control hazards. It will also optimize on-site safety control in steel enterprises and at metallurgical construction sites in the future, as well as expand the project model to diverse metallurgical construction sites.

10.

Sinosteel MECC Praised for the Commissioning of the Largest Sintering Flue Gas Circulation System in China

On June 8, 2021, the flue gas circulation system for the sintering machine No. 3 of Hebei Zongheng Group Fengnan Iron and Steel Co., Ltd. (Zongheng Steel) was successfully commissioned. The flue gas circulation systems for sintering machines No. 1, No. 2 and No. 3 have all been put into operation so far, marking the success of the renovation project undertaken by Sinosteel MECC on an EPC basis. This is also the largest sintering flue gas circulation system in China.

The flue gas circulation systems for three sintering machines have all been put into operation, each with effective ventilation area of 500m²

Sinosteel MECC uses various air intake methods depending on the flue gas conditions at both the charge and discharge ends of the sintering machine. The air draft for the charge end is taken from wind boxes and that for the discharge end from the large flue, which adopts Sinosteel MECC's exclusive technology to ensure the smooth operation of the system as well as minimal pipeline wear.

The three sintering flue gas circulation systems have been operating smoothly, and the customer is very pleased with the data on emission reduction. The project's flue gas circulation rate has raised to 20%, resulting in a 20% reduction in total sintering flue gas emissions. While the overall dust content in the exhausted flue gas is decreased by 15-20%, several harmful substances in the circulating flue gas, such as SO_2, NOx, and dioxins, are partially degraded, with NOx emissions reduced by 12-18%, dioxins by 10-20%, and SO_2 by 8-12%.

15-20%
overall dust content decreased

NOx 12-18%
NOx emissions reduced

SO2 8-12%
SO_2 reduced

11.

Following the Commissioning of Liuzhou Steel's Tertiary Dedusting System, Sinosteel Tiancheng Received Positive Feedback

The tertiary dedusting system project of Liuzhou Iron and Steel Co., Ltd. (Liuzhou Steel) was launched to promote the ultra-low emissions, as well as an important measure for Liuzhou Steel to support enterprise transformation and upgrading and seek high-quality and environmental-friendly development. Sinosteel Tiancheng is the gen-eral contractor for the project.

Among the airtight hoods at each dust-generating point, dedusting pipelines, brackets, valves, deduster propers, dust conveying equipment, fan motors, mufflers, chimneys, and other equipment, three tertiary dedusting systems are newly built in three zones, covering all equipment as well as supporting civil works and electrical facilities. The first zone is designed to accommodate 1.8 million m^3/h of total air volume, the second zone 1.55 million m^3/h, and the third zone 1.55 million m^3/h.

The project employs Sinosteel Tiancheng's ultra-low emission technology for fine particles in flue gas from industrial kilns and furnaces, which was developed independently. The dust removal control system utilizes the world's advanced and intelligent pulse valve system, which provides benefits as high dust removal efficiency, remote terminal feedback, monitoring via mobile app, online fault analysis and intelligent fault handling.

Each cleaning system's stable operation not only successfully overcomes the problem of intermittent dust pollution throughout the converter's tap-to-tap cycle in the three zones, but also achieves ultra-low emissions. The project's overall particle emission is significantly lower than the national ultra-low emission standard, with an emission concentration of 6mg~7mg/Nm^3 according to online data. At the same time, the smelting pace is quickened, and production efficiency is enhanced. The equipment's operational resistance remains constant between 600 Pa and 1,000 Pa, which is more than 30% lower than that of conventional dedusters, seeing a noticeable energy-saving effect, with an annual electric charge of 4.8 million yuan saved.

Sinosteel Tiancheng and Liuzhou Steel have been working closely for a long time, and their strategic partnership of mutual benefit and win-win is growing stronger as time goes by. In recent years, Sinosteel Tiancheng has provided full-process services for Liuzhou Steel headquarters, Liuzhou Steel Zhongjin Stainless Steel Company, and Liuzhou Steel Fangchenggang Base, covering multiple processes like coking, sintering, pelletizing, ironmaking and steelmaking; as for the newly-built and renovation projects for environmental protection, the emission indicators have all met or even exceeded the ultra-low emission standards of the steel industry, winning the full trust and unanimous praise from Liuzhou Steel Group.

"The completion of the project will play a positive role in realizing the ultra-low emissions across Liuzhou Steel's complete process," representatives from Liuzhou Steel commented at the completion ceremony on November 30. "In return for Liuzhou Steel's trust, we are committed to applying the best research results to Liuzhou Steel and delivering quality service with the best team to make each project a classic," said Feng Bin, Vice Chairman of Sinosteel Tiancheng.

12.

Sinosteel MECC Hailed as an Excellent Partner upon Commissioning of 1,250 m³ BF of Binxin Steel

The 1,250m³ blast furnace project of Binxin Steel Group (Binxin Steel), which was undertaken by Sinosteel MECC on an EPC basis in eastern China's Jiangsu province, was successfully put into operation in March 2021. The project has accomplished the objective effect of energy savings and emission reduction, optimal resource utilization and maximal economic benefits by using the rotary drum type slag granulating process, thus helping the customer implement environment-friendly upgrades.

Sinosteel MECC was not only complimented by the customer for its excellent services, but also secured another EPC contract for Binxin Steel's blast furnaces No. 3 and No. 4. During the entire construction process, Sinosteel MECC strictly controlled every procedure to assure construction quality, and thus was able to fulfill all requirements meticulously. The customer called Sinosteel MECC an excellent partner who always goes out of its way to help its customers.

13.

Sinosteel MECC Built the First Tubular Conveyor in Algeria

The tubular conveyor project of SPA Bethioua Port Mineralier (BPM tubular conveyor project) in Algeria, which was completed by Sinosteel MECC on an EPC basis, entered the on-load test run in June 2021, and successfully conveyed a total of 121,000 tons of iron concentrate and 119,000 tons of pellets from six ships, featuring safe, efficient and stable operation.

This 10.89-kilometer-long conveyor line, which includes 7 regular belt conveyors and 4 tubular conveyors, is Algeria's first of its kind. It transports materials efficiently and concurrently between the port and the steel plant, about 4,000 t/h from the port to the steel plant and 2,000 t/h the other way around.

Prior to commissioning, the customer's sole option for transportation was trucks, which took 7 days to unload and convey the materials from a 40,000-dwt ship. With the help of the conveyor line, it now only takes one day. Furthermore, tubular conveyors keep materials closed, resulting in lower dust emissions and more environmental-friendly transportation.

This 10.89-kilometer-long conveyor line is Algeria's first of its kind.

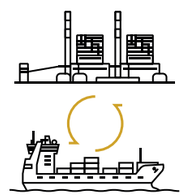
10.89KM
Conveyors full length

7X
Regular belt conveyors

4X
Tubular conveyors

4000t/h
Between the port and the steel plant

2000t/h
From the port to the steel plant



2x100t
Converters

1x LF
Ladle Surface

2x9x9
Strand Billet CCM

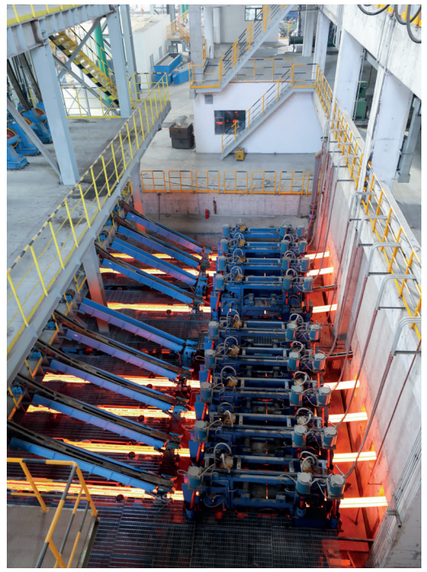
35mn
Stealmaking/heat

72hr
Production of High-Quality Cast Billets

3.89m/mn
Top Speed Withdrawal

14.

2×100t Converters of Hongda Special Steel Put into Operation



The 2×100t-converters steelmaking project of Hejin Hongda Special Steel Co., Ltd. (Hongda converter steelmaking project), which was undertaken by Sinosteel MECC on an EPC basis, was put into operation at the end of April 2021, with equipment running stably at the site. Its commissioning has injected new impetus into Yuncheng city's development as one of the city's major industrial transformation and upgrading projects.

For the customer, Sinosteel MECC was tasked with two 100t top-bottom combined blown converters, one ladle furnace (reserved) and two 9-strand billets CCM. Among them, top-bottom combined blowing, dropping analysis, and fully automatic argon stirring are applied in the converters No. 1 and No. 2, which have maintained stable operation since their commissioning, with an average steelmaking time of roughly 35 minutes per heat. The CCMs feature advanced technologies like automatic tundish temperature management, electromagnetic stirring, infrared cutting to length, and direct delivery to hot rolling mills, allowing for 72-hour production of high-quality cast billets. With an average withdrawal speed of 2.26-3.89 m/min and a top speed of 3.89 m/min, they have achieved the best production state. In addition, advanced environmental protection technologies such as advanced and efficient primary dry ESP technology, secondary environmental dedusting technology, intelligent converter control technology, and efficient continuous casting technology are implemented throughout the entire process, leading to a dust emission concentration of flue gas less than 2 mg/Nm³ and dust-free green steelmaking.

15.

Sinosteel Tiancheng Won Praise by Maintaining Efficient and Stable Operation of Zongheng Fengnan Steel's Project

Two environmental protection-featured upgrading projects of Fengnan Steel Co., Ltd. of Hebei Zongheng Iron & Steel Group (Zongheng Fengnan Steel), which were undertaken on an EPC basis by Sinosteel Tiancheng, have recently finished the acceptance inspection. The customer lauds them both with pennants and certificates of merit, marking a successful conclusion to the projects.

Sinosteel Tiancheng constructed a new ground dedusting station for the coking project, consisting of two 70-oven coke oven batteries with a height of 7.65 meters, bringing the particle emission concentration down to be less than or equal to 10 mg/Nm³; upgraded the flue gas cleaning facilities for four lime kiln lines (No. 5 to No. 8), successfully reducing NOx emission concentration to be below 30 mg/Nm³.

In 2020, Sinosteel Tiancheng won several environmental protection-specific upgrading projects of Sinogiant Group, kicking off extensive cooperation between the two parties across the whole steel production process. In January 2022, thanks to Sinosteel Tiancheng's great contributions, the environmental performance of the two companies attached to Sinogiant Group was recognized Grade A in Hebei province.

16 .

Sinosteel Shijiazhuang Design Institute's New Tech of Metallurgical Plant Thermal Waste Heat Recycling successfully Applied

Sinosteel Shijiazhuang Engineering Design and Research Institute Co., Ltd. (Sinosteel Shijiazhuang Design Institute) developed metallurgical plant thermal waste heat recycling technology, which was successfully applied in a comprehensive surplus gas utilization project of a steel plant in central China's Henan province in December 2021.

The direct exhaust of boiler offgas not only generates the urban heat islands effect, but also leads to energy waste due to the large heat content. Most flue gas heat exchangers are designed as flue gas on the outside and water on the inside, causing particles in the flue gas are prone to accumulate outside the coil tubes, leading to cleaning difficulties and lowering heat exchange efficiency. In response to these issues, Sinosteel Shijiazhuang Design Institute initiated the "R&D of thermal waste heat recycling technology for metallurgical plants" in March 2021. Its thermal waste heat recycling device for metallurgical plants not only effectively recovers heat that was previously wasted, but also removes ash to prolong the device's service life. In a steel plant in central China's Henan province, Sinosteel Shijiazhuang Design Institute applied the thermal waste heat recycling device through a small range of renovation, which can provide 14t/h of hot water at 55°C, saving 1,650,597 kJ/h thermal energy or 450 tons of standard coal per year.

"The whole device can be installed either new or through a renovation of the original flue without affecting production and featuring a short construction period," the R&D manager explained, adding that a customized design can be provided so that the flue gas flow rate into the heat exchanger is adjusted to achieve a balance between recovered heat and users' demand.

Events & Fairs

Exhibitions and events remain vital channels for Sinosteel E&T to communicate new innovations and technologies with our customers in the past decades, though most were canceled or postponed due to the COVID-19 pandemic. Nevertheless, Sinosteel E&T took the chance to be present at the 20th China International Metallurgical Industry Expo as a member of China Baowu Group, in Shanghai, and showcased achievements at the virtual Economic and Cultural Forum and Expo for China-Turkey 50th Anniversary of Diplomatic Relations.

EVENTS & FAIRS

The 20th China International Metallurgical Industry Expo: Sinosteel E&T Enjoys Tremendous Popularity

Shanghai

May 26-28, 2021

The 20th China International Metallurgical Industry Expo was successfully held at the National Exhibition and Convention Center (Shanghai) from May 26 to 28, 2021, where Sinosteel E&T made its debut as a new member of China Baowu Group, presenting three thought-provoking and high-quality technical lectures packed with audience.

❶ An Eye-catching Booth

At Booth 4C05 in Hall 4.1H, China Baowu displayed its core products, technologies, equipment and solutions in the fields of green and low-carbon development, smart manufacturing, and high-quality materials under the theme of "Green Steel for a Better Life". The Booth used a variety of formats to present a green steel industry leader in a three-dimensional and vibrant manner, including actual objects, models, graphics, multimedia, and virtual reality.

Sinosteel E&T demonstrated the 2.3mtpa steel complex of Tosyali, Algeria, which features short-process and low-carbon production in the green technology area of the booth displayed, employing a dazzling sand table. This green and low-carbon modern steel complex, located in the Oran, northwestern Algeria, was contracted by Sinosteel E&T on an EPC basis and put into operation at the end of 2018. This large-scale plant has achieved efficient, safe, green, and low-carbon production thanks to the full adoption of Sinosteel E&T's green technologies. The ongoing supply of high-quality products ensures that the infrastructure in the surrounding areas is well supported.

- One 4mtpa travelling grate pelletizing plant constructed with proprietary technologies, which is the largest one constructed by a Chinese company. Its outstanding performance in raw material adaptability and environmental protection, coupled with the internationally advanced supporting equipment, enables energy-efficient, steady and green pellet manufacturing.

- One DRI plant with a capacity of 2.5mtpa, making it one of the world's largest DRI plants currently in operation. It achieves clean and low carbon production via recycling gas, reducing carbon dioxide emission per ton of iron by about 1.1 tons, using oxidized pellets as raw materials and natural gas as smelting energy.

- A 240-ton EAF, one of the world's largest electric furnaces in production in terms of capacity.

- Two double high-speed bar rolling lines: one with an annual output of 750,000 tons, primarily producing 8 -12 mm small-sized bars; the other with an annual output of 1.2 million tons, producing bars of 12 -32 mm. The application of Sinosteel E&T's rolling technology and supporting equipment allows a maximum rolling speed of 45 m/s and a much higher production capacity than was originally designed, achieving the goals of environmental protection, energy conservation, high efficiency and low cost.

❷ Three Thought-Provoking Technical Lectures

Sinosteel E&T's three technical talks became one of the expo's most popular attractions. Many passers-by, in addition to the professional visitors, were captivated.

The three lectures focused on the technologies for DRI, high-speed bar rolling, and traveling grate pelletizing to show what Sinosteel E&T has done in terms of forward-looking technology layout, R&D and engineering practice in green and low carbon production under China's carbon peak and neutrality goals.

DRI–Sinosteel E&T's contributions to low-carbon metallurgy

Jin Feng, Director of Low-carbon Metallurgy & Energy Department

Sinosteel E&T, being the first Chinese engineering and technology company to undertake gas-based DRI projects, has built two of the world's largest DRI plants, namely the 2.5mtpa DRI project of Tosyali Algeria and the 2.5mtpa DRI project of Algerian Qatari Steel (AQS), which both have been put into production. In addition, the DRI-based Mutún steel complex in Bolivia, which is contracted on an EPC basis and features short-process and low-carbon production, and the DRI project of HBIS Xuansteel are both under construction.

Through changing the structure of ferrite resources and process routes, using clean energy, applying steel-chemical co-production, and adopting CCUS, the promotion and application of DRI technology can directly act upon carbon reduction, a great contribution to the carbon reduction in the steel industry.

Based on the technologies of process equipment, engineering construction and project management, and the long-term and stable cooperation with partners such as Midrex, HYL, and scientific research institutes, Sinosteel E&T has pushed forward technology development and application, engineering implementation and technology iteration, and equipment upgrades in the field of engineering technology, promoting DRI to be applied in China in a coordinated manner and making due contributions to the steel industry.

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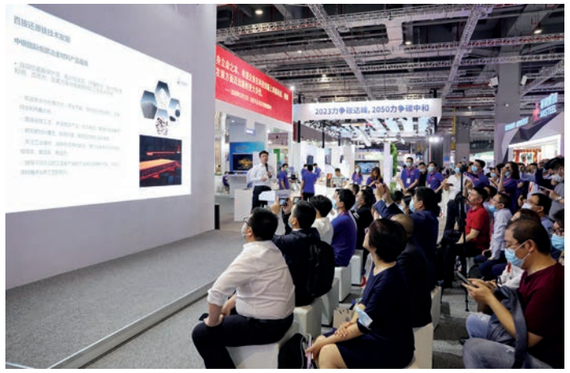
Core technologies and equipment for low-carbon & emission reduction in the field of rolling

Fang Zhenzheng, Deputy Director of Steel Making & Rolling Department

Since 2015, Sinosteel E&T has been introducing thermal mechanical control process (TMCP) for high-quality special steel and hot-rolled strip into the field of wire rod and bar mill, and successfully developed and put into operation intelligent flexible water cooling devices as well as 230mm, 265mm and 330mm series 45° top-crossed modular rolling mills with single drives or one-to-two drives. As a result, Sinosteel E&T now owns the TMCP layout as well as core technologies. Modular rolling mills, as the core technical equipment, offer cutting-edge technology, high product precision, high yield, low production costs and high productivity, among other benefits.

In 2017, Sinosteel MECC successfully put into operation 230mm single drive reducing and sizing mills for a high-speed wire rod line in Shanxi Jianbang Group. The maximum rolling speed reaches 105 m/s, 95m/s for 8mm wire rod coils, and 72 m/s for 10 mm. Furthermore, micro-alloy elements such as V or Nb is not added for 8 mm wire rod coils, and manganese concentration is only 0.6%. In 2018, Sinosteel MECC successfully upgraded TMCP for common bar mills in Shanxi Jianbang Group. In 2020, the company successively applied the technology to more than 20 rolling lines, including Valine LY Steel's double high-speed bar rolling project, the wire rod and bar mills at the Liuzhou Steel Fangchenggang Base (three high-speed wire rod lines, two common bar lines and two high-speed bar lines) and two single high-speed bar projects in Shenglong Metallurgical, bringing reduced costs and improved efficiency to customers.

In a climate where the steel industry is vigorously promoting carbon reduction, Sinosteel E&T stands out for its low-carbon and reheating-free direct rolling technology. Currently, the company is paying attention to further increasing the billet temperature, narrowing the temperature drop of billets, link up the CCM billet run-out rhythm and the rolling. Besides, without reheating, fuel consumption and carbon dioxide emissions are considerably reduced.



Traveling grate pelletizing technology -A green & low-carbon option

Han Jixiang, Director of Mineral Processing Department

Sinosteel MECC has developed the pelleting production lines featuring low comprehensive energy consumption, green and low-carbon operation, and high-quality products, using technologies such as 3D design, CFD simulation, and digital handover for EPC projects, as well as proprietary core equipment and material flow and energy flow recycling processes. The pelletizing production lines have a comprehensive energy consumption per ton of pellet of less than 18 kgce/t. High-quality raw materials can be provided for BFs and DRI on account of traveling pelletizing machines, making it one of the key technologies to help China's steel industry to reach peak carbon emissions and carbon neutrality, achieving high-quality development.

EVENTS & FAIRS

Sinosteel E&T's presence in the Economic, Trade and Cultural Development Forum and International Comprehensive Exhibition celebrates the 50th anniversary of the establishment of diplomatic relations between China and Turkey

Turkey

August 5-7, 2021

The Economic, Trade and Cultural Development Forum and Comprehensive Exhibition, hosted by the General Chamber of Commerce of Chinese Enterprises in Turkey and the Turkey-China Business Development and Support Association, took place at the International Convention and Exhibition Center in Ankara from August 5th to 7th, 2021. The events are to commemorate the 50th anniversary of the establishment of diplomatic relations between China and Turkey. A number of senior Chinese and Turkish officials and more than 50 China-invested member companies attended the exhibition offline and online. The exhibition covered infrastructure, communications, finance, transportation, energy, mining and other industries.

Sinosteel E&T took part in the online exhibition and showed its typical projects and leading technologies in the field of industrial engineering technology and services through photos, videos, brochures and other media.

Sinosteel E&T tapped into the Turkish market more than 20 years ago.

Sinosteel MECC won the contract of 750,000 t/a bar rolling mills in Turkey in1999, kicking off its voyage of oversea project contracting and turning Turkey as a significant destination for its international expansion. Since 2003, Sinosteel MECC has successfully contracted and constructed a number of engineering projects with international influence in Turkey, including a 3,050m^3 BF, a 300m^2 sinter plant and 2×65 coke oven batteries, which were the largest projects exported from China at the time and marked China's breakthroughs in large-scale BFs, sinter and coke ovens in international markets.

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EVENTS & FAIRS

Sinosteel MECC has had a string of triumphs in Turkey over the past two decades, thanks to its leading technology, superior management and service, and genuine communication approach. Through business exchanges and visits, Sinosteel MECC has maintained a close friendship with Erdemir, Tosyali, ICDAS and other companies.

Despite the pandemic that has wreaked havoc on the world economy and way of life, Sinosteel MECC and its Turkish partners continue their connection unabated.

Sinosteel MECC signed an EP contract with Tosyali Group in October 2020 for a 1,800mm hot strip rolling project, with a goal of constructing a low-carbon, energy-saving, high-yield, and high-quality product line that can adapt to various product specifications and steel grades. The project is the largest hot strip rolling project undertaken by a Chinese company overseas, and it is also Turkey's largest metallurgical investment project since 2020. In July 2021, Sinosteel MECC signed an EP contract with Erdemir Group to build a TRT system for the BF No.1 of Isdemir Steel in Iskenderun, which is the fifth TRT system constructed by Sinosteel MECC for the customer.

Sinosteel SEPRI Hosts the 2nd Metallurgical Safety Development Summit Forum

Wuhan, Hubei Province

October 28-30, 2021

From October 28th to 30th, the 2nd Metallurgical Safety Development Summit Forum 2021 was held in Wuhan by Sinosteel Wuhan Safety and Environmental Protection Research Institute Co., Ltd. (Sinosteel SEPRI), a subsidiary of Sinosteel E&T.

Themed "Implementing the New Production Safety Law and Pursuing Safe Development", the forum focused on metallurgical safety development. Over 300 representatives, experts and scholars from the Ministry of Emergency Management, local emergency management departments, China Baowu Group, Sinosteel E&T, University of Science and Technology Beijing, and more than 80 large steel enterprises and universities attended the forum. Other guests present include Zhong Shaoliang, Chief Representative of the Beijing Office of the World Steel Association, and Luo Zhiming, former Secretary-General of the Asia Pacific Occupational Safety & Health Organization.

Dong Da, Director of Sinosteel E&T, said that in recent years, Sinosteel SEPRI, oriented by the vision of "standard leader, intelligent safety, green and low carbon", has been devoted to become China's first-class consulting and technology provider of safety management and think-tank for local emergency management governmental divisions.

Dong Da, Director of Sinosteel E&T

Wu Qibing, Dean of Sinosteel SEPRI

Hou Qian, Division Chief, Ministry of Emergency Management of PRC

Xu Ke, Chief Engineer of Hubei Provincial Emergency Management Department

Zhong Shaoliang, Chief Representative of the Beijing office of the World Steel

Luo Zhiming, Former Secretary-general of APOSHO

Wu Qibing, president of Sinosteel SEPRI, pointed out in his speech that the metallurgical industry is essential to the national economy and people's livelihood, and matters in the individual safety and health as well as corporate property safety of more than 7,000 related enterprises and over 5 million employees across the country. As a scientific research institute with a history of 62 years, Sinosteel SEPRI has been working on the development of safety standards, technology and management system for China's metallurgical industry. "Currently, Sinosteel SEPRI is vigorously developing comprehensive technical service of lean safety, integrated management and control platform of intelligent safety, solutions for safety somatosensory training system, and safety risk assessment of new process for low-carbon metallurgy," Wu Qibing said, adding that they expect to provide supportive and comprehensive service for safety management and progress for metallurgical industry and enterprises.

Experts and scholars from steel enterprises, safety technical service providers and product manufacturers, as well as universities exchanged ideas, in an extensive and in-depth manner, about production responsibility implementation and development of intelligent safety technology and products of enterprises.

The forum was also live-streamed and watched by nearly 30,000 people.

BIM Drawing of Hydrogen-enriched Carbon Recycling Blast Furnace of Bayi Steel, undertaken by Sinosteel E&T

Sinosteel Engineering &Technology Co., Ltd.

Sinosteel Equipment & Engineering Co., Ltd. Headquarters
8 Haidian Street, Haidian District
Beijing, 100080, P.R.China

Tel: (8610) 6268 8188
Fax: (8610) 6268 8098
pr@mecc.sinosteel.com

Sinosteel Tiancheng Environmental Protection & Technology Co., Ltd Headquarters

Tel: (8627) 5990 8230
Fax: (8627) 5990 8230
xuyao@mecc.sinosteel.com
wangjintiancheng@mecc.sinosteel.com

Sinosteel Wuhan Safety & Environmental Protection Research Institute Co., Ltd Headquarters

Tel: (8627) 8653 2698
Fax: (8627) 8653 2698
zgsepri@163.com

Sinosteel E&T Departments

Low-carbon Metallurgy & Energy Department
low-carbon@mecc.sinosteel.com

Mining Department
liye@mecc.sinosteel.com

Mineral Processing Department
caopengfei@mecc.sinosteel.com

Coke Oven & By-product Department
maguoqiang@mecc.sinosteel.com

Iron Making Department
zhangkaijun@mecc.sinosteel.com

Steel Making & Rolling Department
fangzhenzheng@mecc.sinosteel.com

Equipment & Spare Parts Department
wangyu@mecc.sinosteel.com

Technical Support Department
lixinyong@mecc.sinosteel.com

Sinosteel E&T Worldwide Offices
International Marketing Dept.
global@mecc.sinosteel.com

Sinosteel Germany
luy@sinosteel.de

Sinosteel Indonesia
fengyilun@mecc.sinosteel.com

Sinosteel Brazil
chenzhihong@mecc.sinosteel.com

Sinosteel Bolivia
renjianhui@mecc.sinosteel.com

Sinosteel Russia
yuhaien@mecc.sinosteel.com

Sinosteel Turkey
lisong@mecc.sinosteel.com

Sinosteel Saudi Arabia
bailong@mecc.sinosteel.com

Sinosteel India
chenci@mecc.sinosteel.com

Sinosteel Malaysia
yundong@mecc.sinosteel.com

Sinosteel Pakistan
lilonggang@mecc.sinosteel.com

Sinosteel Ukraine
caopengfei@mecc.sinosteel.com
zhuqingnian@mecc.sinosteel.com

Sinosteel Magnitogorsk(Russia)
yuhaien@mecc.sinosteel.com

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