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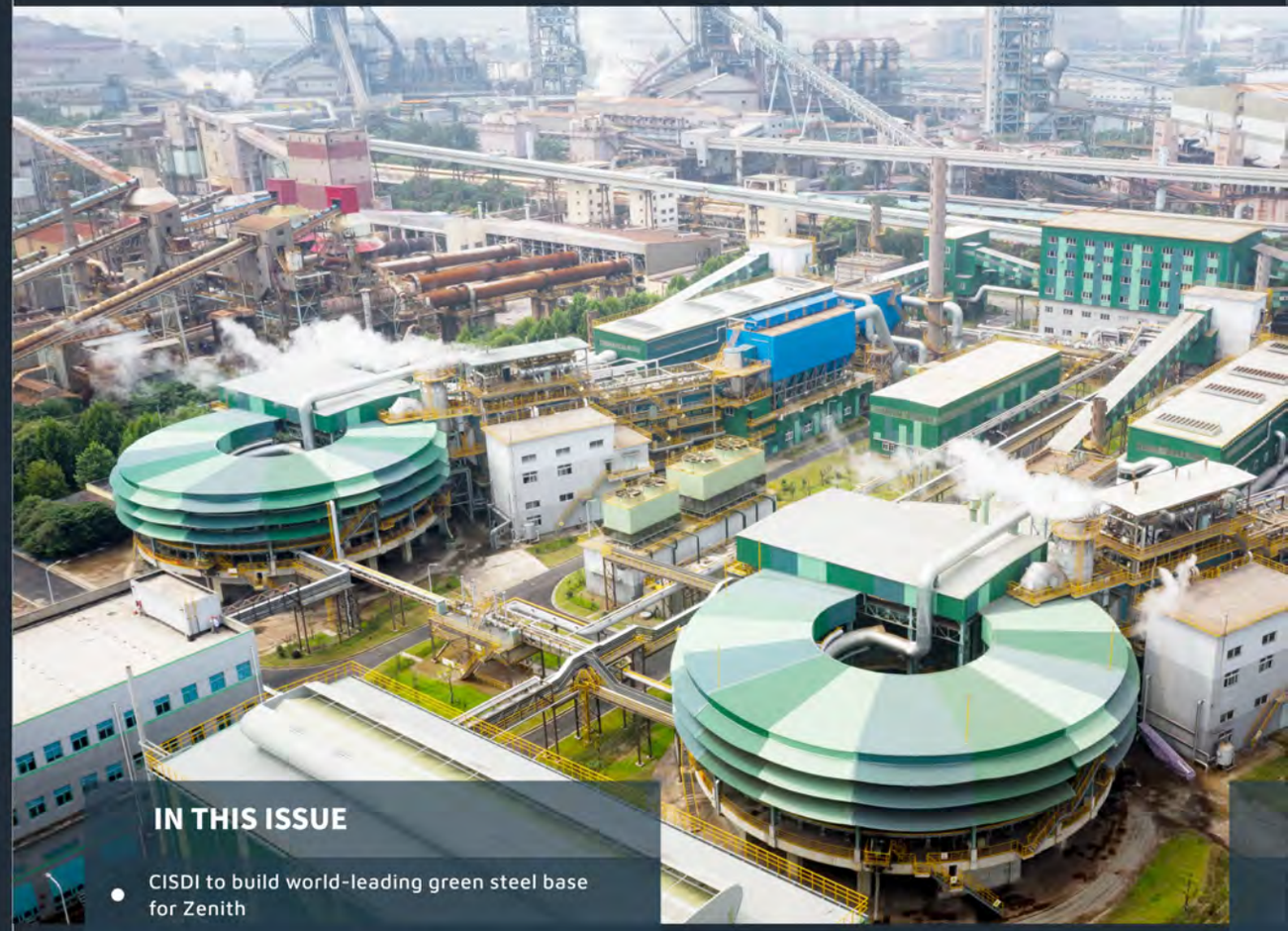

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- Baosteel Shanghai's RHF 2 goes into production
- Two CISDI inventions win world-class accolade
- CISDI's energy conservation and green tech expertise

Baosteel Shanghai's RHF 2 goes into production

CISDI

Technology and Solutions Partner for the Global Metals Industry

FULL-PROCESS SERVICES

CISDI provides full-process services from the bulk material handling yard to the final post-processing line of rolling mill.

FULL-FUNCTION SERVICES

CISDI provides standard and customized consulting, execution, and operations management services.

FULL-LIFE-CYCLE SERVICES

CISDI provides the FEED (front-end engineering & design), implementation, and production and operations management services throughout the entire project life cycle and provides continuous after care services and support.

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CISDI to build world-leading green steel base for Zenith

Hang Zou, the director of CISDI, and Guoquan Zhou, executive director and vice president of Zenith, are pictured signing the co-operation agreement to build a prime steel base

CISDI and Zenith Steel are joining forces to build a world-leading green steel plant intelligently manned by robots.

The steel base will produce world-class bars and wire rods in Nantong City in the Jiangsu Province.

To ensure world-leading competitiveness on costs, the highly energy-efficient plant will be built with a wide-range centralised control system, an intelligent manufacturing control platform and automation control system, all manned by highly-advanced industrial robots.

The steel sector giants signed a co-operation agreement at Zenith Group's HQ in Changzhou City in China's Jiangsu Province, hot on the heels of a strategic agreement signed in May.

CISDI will provide EPC plus management services throughout the construction process.

At the signing, CISDI's chairman, Xuewen Xiao, and Caiping Dong, the chairman and president of Zenith Steel, pledged to create a highly intelligent, energy-efficient, long products steel base with strong green credentials which would rival producers around the globe.

Fact file

Zenith Steel was established in September 2001 and boasts an annual production capacity of 12 million tonnes. With its business revenue exceeding $18.3 billion in 2019, the company's portfolio spans steel, modern logistics, foreign trade, education and sports.

Its core products are building steels, industrial bars and wire rods and hot-rolled strips. These products are widely used for rail tracks, automobile bearing and shipbuilding anchor chains and by the petrochemical, marine engineering, nuclear power and wind power sectors.

CISDigital to create a Factory of the Future for Yongfeng Steel

CISDI is to transform Yongfeng Steel's Lingang Base into a Factory of the Future, capable of green and intelligent production and manufacture.

The scheme will herald the first full-process, systematic application of CISDI's industrial internet platform at a greenfield steelworks, and will embrace numerous CISDigital upgrading products.

CISDI will also be providing top-level design and consulting services and intelligent production control software for Lingang Base's Phase I.

Lingang requires an intelligent, innovative and systematic technical framework to achieve flow re-engineering and improved organisational management.

Once transformed, it will become China's first greenfield intelligent steelworks based on a unified industrial internet platform, and will usher in remarkable improvements in quality and efficiency.

Based on the CISDigital platform, and by applying cutting-edge information technology, CISDI will interconnect Lingang Base's data links through all production procedures and management sections.

A plant-wide Data Highway will unify data acquisition, processing and storage, creating the essential conditions for data integrated applications.

Big data expertise will integrate Lingang's pan-ironmaking procedures, steelmaking, casting and rolling procedures and production controls to facilitate the following process, procedure and organisation fusions:

- Isolated data islands and separate levels are removed and the data are used as a production factor for creating values.
- A holistic lay-out for intelligent equipment management, intelligent mass logistics, intelligent energy management, safety control and intelligent applications.
- Integrated steel production, operation and

CISDI's president Zhaohui Yu and Yongfeng's president Qian Wang sign the strategic agreement to create a green, intelligent Lingang Base

control will be data-driven, enabling the entire workforce to continuously improve their productivity in a closed-loop management system and create a new, lean and smart production mode.

The chairmen of both companies, Xuewen Xiao of CISDI and Yongfeng's Feng Liu, attended the signing of the strategic co-operation agreement at CISDI's HQ in Chongqing.

"For over six decades, CISDI has been committed to creating innovative technology and engineering solutions which enable steel enterprises to become more profitable and sustainable," commented Mr Xiao.

"Our multidisciplinary, systematic integration expertise and intelligent manufacturing research and application strengths will create a future-oriented, highly efficient and intelligent Lingang."

Mr Liu stressed the need for Yongfeng Steel to step up and pursue high-quality developments.

"We are grasping this opportunity to build a green, intelligent and lean Lingang Base," he said. "CISDI has impressed us with its strength in engineering and intelligence and both companies are following the trend for intelligent steel production."

Yongfeng Steel's delegation also visited CISDI's research and development centre and expressed keen interest in a number of its developments - including the company's big data remote production diagnosis platform, integrated test platform for industrial software, Nudge+ smart office and the Qingzhu smart construction site.

It was also greatly encouraged by the team's energy conservation inventions and eco-friendly technologies and its research into nano materials and a ferrous metallurgical robot lab.

"We place great hope for the success of the Lingang Base on CISDI's talents, from the consulting, design and construction process through to research and application and operations management," commented Liu, who pledged further collaborative projects with CISDI in the future.

Baosteel Shanghai's RHF 2 goes into production

Baosteel Shanghai's RHFs in operation

CISDI has again proved its prowess in developing recycling solutions for the steel sector's solid waste.

It has now designed and supplied core equipment for two rotary hearth furnaces at Baosteel Shanghai.

Both production lines will recycle the iron and zinc content of dedusting ashes from the blast furnace, plus OG sludge left by the steelmaking process.

Metallised pellets produced from the RHFs have a much lower zinc content when they are returned for blast furnace smelting.

RHF technology brings substantial environmental benefits as well as economic; they protect water and soil in the surrounding area from pollution caused by traditional stacking.

Baosteel's RHF 1 went into operation in January and has already achieved its designed output of 250,000 tonnes a year.

RHF 2 has now been started up and is on target to achieve the same output.

CISDI now has over 50 rotary hearth furnace-based IIPR technologies and patents.

Milestone hit for Zhanjiang Steel's new blast furnace

Welding is completed on the last stove dome for Zhanjiang Steel's BF 3

A milestone moment in the construction of Baowu Group's Zhanjiang Steel has been achieved.

The stove domes for blast furnace 3 have now been completed, reports CISDI, who are package suppliers of the plant's blast furnace 3.

The four top-combustion stoves each have a volume of 5,050 cubic metres. A single stove is 48.70 metres high and is designed to reach temperature up to 1,300 deg C.

Delivery and assembly was carefully planned to enable pre-fabricated shell construction and minimise work required on site.

Stove shells for the lower-temperature sections were delivered in complete rings. Those for high temperature sections were annealed and delivered as complete sections. Annealing removes welding stress and ensures long service life for the stove.

This annealing and delivery process has previously proved challenging. Zhanjiang's success heralds a breakthrough in fast, reliable metallurgical construction and was achieved under extremely difficult circumstances.

The stove shells were manufactured at a workshop in Wuhan, the epicentre of China's Covid-19 pandemic.

CISDI's on-site supervisors remained on duty throughout the process, ensuring delivery of the shells ran to schedule.

CISDI to master-mind the transformation of Longgang Steel

CISDI is to create a master plan to transform Longgang Steel into a Smart Factory. It will be the first project for implementing mutual strategic agreement signed in April.

The Longgang project is being funded by the Xinghua Fortune Group and will see the combined expertise of CISDI and Xinghua Fortune brought into force.

Longgang is based at the Zhangping Steel Industrial Park in Longyan City in China's Fujian Province.

It is based on the Belt and Road Initiative, which boasts a thoroughfare connecting the coast and hinterlands and is seen as a driver for economic development in the region.

CISDI will provide the master plan for this 600-hectare project and be the backbone of support during its construction.

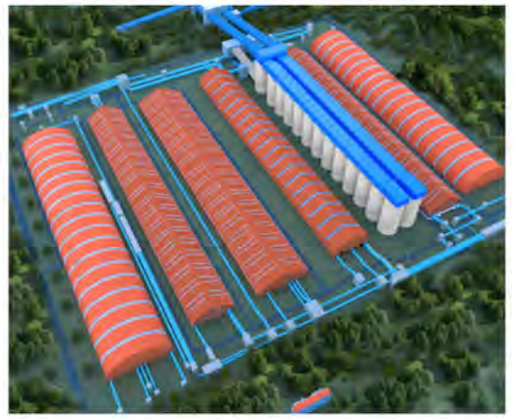
CISDI to supply Masteel's new coal silo system

Masteel is to build a new coking coal storage and batching system to meet the needs of its coking plant at the North Zone, which produces 3.50 million tonnes a year.

CISDI will package-supply the new system, which will feature a high level of automation.

The order includes 26 large silos, each with a diameter of 21 metres. Each silo has a storage capacity of 10,000 tonnes. CISDI will also provide the related input and output systems and a wagon dumper system.

Production will not be halted during construction, despite the anticipation of challenging situations posed by numerous complicated interfaces.



Artist's impression of Masteel's new coal silo system

New robot to become a helping hand in hazard zones

A temperature-measuring and sampling robot goes through testing at SFRE's EAF lab

A robot capable of temperature measurement and sampling has been successfully hot tested at SFRE's EAF lab.

The robot is kitted out with a visual identification system which enables it to recognise the furnace door, steel ladle and slag.

A visual interlock protects the measuring lance from interference and task objectives can be identified in real-time. The robot can be guided to make decisions on the optimal falling position for the lance.

Intelligent control helps the robot to bypass any obstacle on the route and enable it to measure and sample swiftly and reliably.

The robot is expected to be introduced at Baosteel Desheng Stainless Steel Co. and promises to be a valuable helping hand in carrying out safe, reliable temperature measurement and sampling of molten metals at high-temperatures, and in hazardous environments where dust levels are high and strong electromagnetic currents are present.

CISDI-built slab caster is hot commissioned at Jianlong

Slabs being cut by torch cutters at Jianlong Steel

A 1,300mm slab caster has been successfully hot commissioned at Jianlong Steel in the Jilin City of China's Jilin Province.

CISDI was the EPC-based contractor for this crucial upgrade, which will see the caster produce 2.50 million tonnes of slab a year - an additional 750,000 tonnes.

The caster has been running continuously and is heading towards production capacity.

It features a number of CISDI innovations for online hot width adjustment, dynamic soft reduction, 3D dynamic water distribution, slab quality assessment and gapless segments.

The rebuilt caster will be able to produce quality carbon structural steel, silicon steel, pipeline steel and high carbon steel.

Its casting speed can reach 1.8 metres a minute during normal production.

Two CISDI inventions win world-class accolade

Two of CISDI inventions have been hailed as world leaders by the Chinese Society for Metals.

Accolades have been given to CISDI's green, low-consumption and high-speed modular mill and its high-efficiency, high-precision reaction block and shifting unit for hot strip mills.

◉ Modular high-speed mill

It took multiple critical research projects to develop CISDI's modular high-speed mill - which puts conventional mills in the shade.

It features an inflexible rolling process, a high consumption due to idles and a heavy inventory for roll collars.

CISDI's modular mill has been applied successfully to bar and wire-rod mills in China and overseas, creating substantial economic and social benefits for Fujian Sanshan Steel, Yasheng Stainless Steel, Xinghua Steel and Liaosheng Steel in China, Sanjia Steel in the Philippines and Qunfeng Steel in Thailand.

The modular mill incorporates the following innovative developments:

- Individual-drive-based flexible rolling for wire-rod structural performance control
- Roll housing assembly coupling rigidity
- Critical component vibration
- Laying tube working curve and mechanical property model
- Rotor kinetics and dynamic speed compensation

A total of 27 patents (including nine invention patents) have been granted. Three patents have been applied for with the Patent Cooperation Treaty and 12 research papers have been published.

Modular mill for a high-speed wire-rod production line in China

◉ Reaction block and shifting unit for hot strip mills

The CISDI-supplied reaction blocks supplied to TATA Steel UK

To solve the high fault rate and unstable operation experienced during the hot strip rolling process, CISDI examined the influence of the reaction block and shifting unit on strip's profile control, carried out its mechanical-electric-hydraulic coupling simulation and offline simulation loading test and studied the verification method.

A high-precision reaction block and shifting unit has been developed and a verification methodology has been established for the unit's offline simulation, plus the hydraulic reaction block's dynamic, static performances and on-load mechanical property.

Offline simulation and verification ensures complete success for the unit's start-up and reduces the construction cycle by 20-50%, achieving savings of over 20%.

This advanced unit has been granted six patents, including three patents for invention.

Its star application abroad is the 80-inch hot strip mill at TATA Steel's UK plant. Production data shows a shifting positioning accuracy to within 0.5mm, a 60 per cent reduction in unit fault rate, a 1.4 per cent increase in yield and 35 per cent savings on operation costs.

In China, its latest reference is a package supply to Ganglu Steel's 1,450mm hot strip mill.

CISDI's energy conservation and green tech expertise

CISDI are experts in industrial waste control and energy conservation, which enable steel companies across the world to create high-quality green developments.

Its technologies for the recycling of gas and solid waste and achieving zero liquid discharge have created green credentials for major projects in China and overseas.

CISDI's intelligent environmental protection expertise and Environmental Butler services have helped enterprises succeed in their environmental impact assessments.

CISDI's demo projects are detailed below:

Fe-bearing solid waste treatment centre for China's Baowu Zhanjiang Steel

A world first, Zhanjiang Steel's solid waste treatment centre has solved the long-standing problem of dedusting ashes produced by the blast furnace, and the OG sludge waste left from the steelmaking process.

These solid wastes are now treated within the steel plant and will never be discharged. The RHF's operations indicators are now world-class, with a dezincification rate of 85-90 per cent.

This has been enabled via CISDI's rotary hearth furnace expertise.

A total of 50-plus core process and equipment patents have been granted to CISDI's inventions for RHFs.

Zn-bearing solid waste treatment centre for China's Shougang Jingtang Steel

CISDI's RHF technology has enabled Shougang Jingtang Steel to become a cleaner and more profitable operation.

The centre's RHF is now effectively transforming the Zinc-bearing dusts and sludge produced on-site into high-quality metallised pellets with a low content of harmful zinc and lead.

The metallised pellets are then recycled into the blast furnace ironmaking process. Due to their low zinc content, the pellets result in a smoother-running furnace with a longer-campaign life.

The plant's treatment centre has an annual treatment capacity of 300,000 tonnes.

Fe-bearing waste-to-energy centre for China's Baosteel Shanghai

Baosteel Shanghai's waste-to-energy centre is designed to recycle iron and zinc and other valuable elements.

It can recover around 20,000 tonnes of crude zinc oxide powder, 220,000 tonnes of iron and 350,000 tonnes of steam a year.

In addition, zinc-bearing dusts from the electric arc furnace are also treated. Pollution to water and soil in the local environment will never occur and remarkable economic and environmental benefits are being realised.

Wet electrostatic precipitator for China's TISCO BOF

Ultra-low emissions are being achieved by TISCO's BOF primary dedusting system.

The system's IIPR-based technology has reduced OG sludge from the BOF and outlet dust concentration is less than 10mg per cubic metre.

BFG dry dedusting for China's Fujian Sanbao Steel

Bag filters for dry dedusting are being built at the plant to give greater dedusting efficiency and longer service life.

This dry system does not require a water treatment facility, which removes the waste water and sludge pollution issues experienced by plants with wet systems.

ZLD for Hebei Jingye Group

CISDI's multiple critical pre-treatment and deep processing expertise has enabled the entire Jingye Steel Plant to operate with zero waste water discharge. All water resources are fully recycled.

Daily fresh water consumption is 30,000 tonnes less than before and each day, 36,000 tonnes of waste water is recycled.

All brine created from the process is used for blast furnace slag granulation and slag smothering during steelmaking.

ZLD for China's Baowu Zhanjiang

CISDI and Zhanjiang Steel have built the world's first integrated, centralised water control platform which services the entire steel plant.

Since its start-up in October 2019, the platform has created huge economic and environmental values for Zhanjiang Steel – a 1.5 cubic metre of outsourced fresh water consumption per tonne of slab, maximum recycling of waste water and a zero liquid discharge.

It is innovative on many levels:

Collected rainwater and water created by desalination of seawater can supply 66 per cent of the plant's fresh water requirements.

The rainwater collection system has reduced water costs by more than $2.82 million.

Zhanjiang Steel's own power plant is cooled by seawater. Dead steam is used to produce pure water. It enables a combined water and power process.

Production waste water is recovered, treated and used as fire control water.

Brine from the desalination system is evaporated and crystallised into industrial salts.

Kiln offgas DeNOx for China's Rizhao Steel

CISDI's total dedusting and DeNOx solutions have enabled Rizhao Steel to meet Ultra Low Emissions for particles and nitrogen oxide.

This high-performing dedusting and DeNOx system covers a small footprint, runs stably and gains a lot from cost-effective installations and low energy consumptions.

LDG holder for China's Baowu Zhanjiang

A new LDG holder is being built for Zhanjiang Steel's BF3 programme. In a volume of 120,000 cubic metres, the gas holder is of a one-stage Wiggins/PRC type, featuring a constant pressure, zero emissions and zero utilities consumption.

It will be operating alongside the two existing LDG holders at Zhanjiang Steel and a full recovery of LDG will be achieved.

COG holder for Turkey's Isdemir Steel

CISDI's IIPR-based, POC gas holder technology has been applied at the Isdemir Steel Plant.

The gas holder is being widely used to store coke oven gas.

Many positive results have been achieved, including a higher storage pressure, a better-performing seal with an extended service life, a more stable piston operation with a faster rising speed, and reduced operation and maintenance costs.

Substantial energy savings will be achieved, along with zero coke oven gas emissions.

Sludge treatment for China's Baowu Zhanjiang

CISDI has built China's first sludge treatment system for Zhanjiang Steel.

As a result, the plant has achieved its target of zero solid waste discharge, reduced its waste-to-energy requirements and reaped tangible social and environmental benefits.

Low-grade waste sludge is now collected, sorted, dried and treated for safe disposal or reuse.

CISDI's Consulting Expertise

Driving the Competitiveness of Steel Enterprises

CISDI's consulting services provide end-to-end solutions for the full life-cycle of steel projects, from planning and design to construction and operations.

The Core Concepts of CISDI's Consulting Services

Systematic approach: five-flow based systematic optimization of your process (mass, iron, energy, information and emission flows)
Systematic optimization guides all proposals and designs.

Economic: cost-effective investment and operations solutions to enhance your competitiveness

Cost efficiency is a priority in evaluating technical proposals.

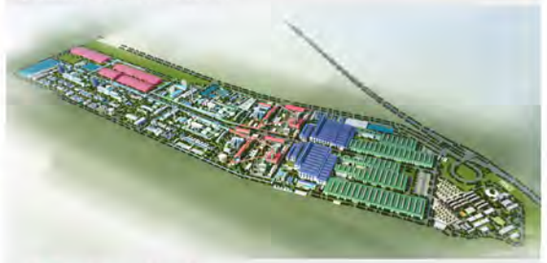
Sustainability: strategic analysis of raw material and fuel trends, plus steel sector developments, to enable sustained business growth
Sustainability is the foundation underpinning your proposals and designs.

Where CISDI's consulting total solutions have reaped results

Baowu Group's Zhanjiang Steel (10MTPA) plant in China's Guangdong Province
CISDI led Zhanjiang Steel's front-end planning, master plan and feasibility studies.

Results achieved
- Four revisions of feasibility studies reduced CAPEX by approximately 40 per cent.
- OPEX per tonne of crude steel approximately $42 lower than those achieved at Baowu Group Shanghai, a steelworks renowned for its outstanding overall competitiveness.

ASSB Steelworks (3.5MTPA) in Malaysia's Pahang State
CISDI systematically optimized ASSB's equipment configuration, general layout, logistics and energy system to establish ASSB plant in Kuantan City as ASEAN's benchmark producer of long products.



Results achieved
- CAPEX reduced by $22.6 per tonne of crude steel
- OPEX reduced by $13.8 per tonne of crude steel

Formosa Ha Tinh Steel (10MTPA) in Vietnam
CISDI implemented FHS's master plan, bankable feasibility study and integrated consulting services (ICS).

Results achieved
- Efficient project construction based on the master plan
- The bankable feasibility study was recognized by *Manual for the Preparation of Industrial Feasibility Studies* issued by the United Nations Industrial Development Organization. Market-specific models, methodology and tools were aligned with international practices
- Achieved CAPEX savings of around $84.7 million