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CISDI

NEWSLETTER

Vol. 4, 2019



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- Baowu Zhanjiang Steel's latest construction project begins
- CISDI showcases its intelligent manufacturing expertise at major Chinese exhibition
- CISDI to design and supply a blast furnace rebuild for ArcelorMittal
- ASSB's wire rod mill in pilot production stage

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Technology and Solutions Partner for the Global Metals Industry

OF FULL-PROCESS SERVICES

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

OF FULL-FUNCTION SERVICES

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





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Baowu Zhanjiang Steel's latest construction project begins



Zhanjiang Steel's groundbreaking ceremony

Baowu Group's Zhanjiang Steel plant has staged a groundbreaking ceremony for the construction of its blast furnace 3-centred systems.

Derong Chen, chairman of Baowu Group, announced the start of construction and Genghong Sheng, president of Zhanjiang Steel, hosted the ceremony.

Xuewen Xiao, chairman of CISDI Group, addressed attendees on behalf of the engineering companies involved in Zhanjiang's projects. "CISDI has been a trusted partner of the Baowu Group for the last forty years. We are both innovation-driven Chinese enterprises and have worked side by side on a number of game-changing projects both at home and abroad," said Mr Xiao.

"CISDI's strides in technological research and development have created new processes, new materials and new methodologies for the steel industry.

"We are applying green and intelligent manufacturing expertise and products to the construction of Baowu and will be making pace-setting contributions to maximise the company's competitiveness and further its pursuit of a top ranking amongst the world's steel giants.

"It will be the most advanced, most efficient and most competitive green steelworks in China, and a real showcase of the talents of all contractors involved in the build."

Zhanjiang's BF 3-centred systems will cost \$2.8 billion USD and will be created to full-process ultra-low emission standards, observing the principles of high efficiency, high quality, low cost and simplicity.

They will include a new sinter, coke oven, blast furnace, BOF, continuous caster, hot strip mill, cold mill and relevant utilities.

Blast furnace 3 is due to be blown-in during July 2021. On completion, annual hot metal production will have been increased by 4.02 million tonnes and liquid steel by 3.60 million tonne. Production of hot-rolled strips will be increased by 4.50 million tonnes and cold-rolled strips by1.66 million tonnes.

Zhanjiang Steel's annual total hot metal production capacity will amount to 12.25 million tonnes, liquid steel to 12.528 million tonnes and rolled products to 10.81 million tonnes.



Xuewen Xiao addresses attendees at the groundbreaking ceremony on behalf of the engineering companies who are working together on Zhanjiang Steel's BF 3-centred systems

CISDI's expertise in steel structures outlined in new reference book



Experts involved in the Steel Structures Design Manual take to the stage at the press conference

CISDI has released the fourth edition of its Steel Structures Design Manual, a comprehensive reference guide for China's steel structures theory and practice.

The updated manual was released at a press conference held at the company's headquarters in Chongqing.

It has been painstakingly created over the last five years by a group of experts from CISDI, its editor-inchief, China's Steel Construction Society, Tongji University and Zhejiang University.

Containing the most recent engineering and construction practices and the latest theoretical studies, this newly-refined reference book has multiple uses.

It can be referred to for the design, construction and processing of heavy and lightweight architectural structures, pre-stressed steel structures and combined steel and concrete structures.

The manual also features instructions on the seismic resistance, protection, evaluation, stiffening and restoration of steel structures, and can be referred to for typical calculations on material selection, structural system design, structural members, connections and nodes.

Its release will promote the application of new standards in Chinese steel structures and provide a valuable reference to young designers.

CISDI showcases its intelligent manufacturing expertise at major Chinese exhibition



CISDI's stand at the 2019 CMM Exhibition

CISDI's innovative total solutions for intelligent manufacturing received wide attention from steel enterprises and the press at the 19th China's Metal and Metallurgy Exhibition in Chongqing.

CISDI showcased its newest and most innovative full-life-cycle intelligent and information technology products and services.

New concepts for steelworks organisation, flow and management were showcased, alongside leading examples of CISDI's innovations for energy conservation and environmental protection, and advanced metallurgical technology.

CISDI's exhibition stand utilised LCD screens, a video wall and a virtual reality hall to demonstrate its intelligent applications for the intelligent stockyard, blast furnace ironmaking, steelmaking, rolling, energy and



CISDI's stand featured a wall of LCD screens

logistics.

The stand attracted leaders from some of China's biggest names in steel production, including HBIS, Laiwu and Anyang.

One representative of a Chinese steel company commented: "I am amazed at the wide range of CISDI's intelligent applications, in particular its solid waste treatment solution and its high-pressure gas holder. It is very evident the company is devoted to helping build a green, low-carbon and digital steel industry."

This year's CMM Exhibition covered over 40,000 square metres and featured over 800 participants. It attracted more than 100 suppliers of major machinery, 3,000 component suppliers and 35,000 visitors from the business communications sector.

CISDI to design and supply a blast furnace rebuild for ArcelorMittal

Ukraine is the latest destination for CISDI's teams

ArcelorMittal, the world's largest steel producer, has placed an order for the rebuild of blast furnace 9 at the Krivoy Rog Steelworks in the Dnipropetrovsk region.

BF9 was originally built in 1974 by a Soviet workforce and was one of the world's first mega blast furnaces, with a volume of 5,000 cubic metres.

The rebuild will optimise production and improve its competitiveness.

CISDI will modernise the blast furnace proper, plus the top and casthouse, and provide package-supply for the slag granulation system, cooling staves and plates, tuyeres and valves.

ArcelorMittal ranks as the only truly global steelmaker. It operates out of more than 60 countries, has 55 blast furnaces around the globe and has led the consolidation of the world's steel industry.

The company's presence in Europe, Asia, Africa and America gives the group exposure to all the key steel markets, and it is looking to develop positions in the high-growth Chinese and Indian markets.

ArcelorMittal purchased Krivoy Rog Steelworks in 2005 to strengthen its competitiveness in Eastern Europe.

CISDI has designed, package-supplied and built 172 blast furnaces of various volume levels across the world's steel hot spots – China, Brazil, India, Vietnam, Turkey and Malaysia.

Its unique high-efficiency, low-consumption mega blast furnace expertise has seen 27 successful references globally, boasting a world-leading energy consumption indicator.

Overseas, CISDI was contracted by TATA Steel in 2015 for the design of its Kalinganagar blast furnace to a volume of 5,873 cubic metres, plus some core equipment package supply.

This Eastern European 5,000-cubic-metre blast furnace order reaffirms the CISDI's strengths in blast furnace ironmaking.

Blast furnace expertise

CISDI's critical technology for high-efficiency, low-consumption, long-campaign and ecofriendly mega blast furnaces is a prime example of the company's expertise in related process theory, system design, core equipment and intelligent control.

CISDI's patented technology for blast furnace tops, hot stoves and slag granulating drums has broken through the technological monopoly long-held by its overseas competitors.

Today, 27 references have been achieved in

China, Southeast Asia and South America, accounting for over 60 per cent of new blast furnaces of a similar size created in overseas markets over the last five years. The market share ranks CISDI top on the list of global steel engineering partners.

Applications have demonstrated remarkable energy and cost savings - CISDI's technology can save 396,000 tonnes of standard coals and reduce carbon emissions by approximately 1.045 million tonnes a year, leading to an increase in profits of some US\$47.7 million a year.

Typical references for CISDI's high-efficiency, low-consumption mega blast furnace critical technology

Formosa Ha Tinh Steel's twin blast furnaces in Vietnam were built by CISDI to an EPC mode. Both have a volume of 4,350m³ – the world's largest single contractual volume of its kind



Baowu Group's Zhanjiang twin 5,050m³ blast furnaces in China are among the country's most advanced blast furnaces. Their critical technology and equipment was package-supplied by CISDI



TATA Steel Kalinganagar's 5,873m³ blast furnace 2 in India is the world's largest new blast furnace currently under construction. It is designed and partially package-supplied by CISDI



CISDI to supply hot stove to leading Brazil steelworks

CISDI has won an order to package-supply a new hot stove to the most advanced steelworks in Brazil.

CISDI Brazil, with support from the Chinese HQ, beat competing companies from Germany, Italy, Russia and Luxembourg to win the contract.

Companhia Siderúrgica do Pecém is a joint venture between South Korean steelmakers Posco and Dongkuk, and Brazilian mining giant Vale.

CSP is building a steel mill in the Pecém Industrial Complex in North-eastern Brazil. The US\$4 billion plant is the largest private sector project being developed in the country and is designed to produce three million tonnes of steel slabs a year in the first phase, which will be expanded to six million tonnes in Phase Two.

CISDI Brazil's marketing team has been stationed in South America for eight years, providing high value-added solutions to clients throughout the continent.

ASSB's wire rod mill in pilot production stage

The reheating furnace for ASSB's high-speed wire rod mill 2 has discharged its first hot billet, triggering the mill into pilot production.

The walking-beam reheating furnace has been built by CISDI on an EPC basis. Its rated hourly output is designed to achieve 140 tonnes, producing carbon steel, standard and cold-charged billets.

It runs on an air-gas dual regenerative combustion method and distributes a single row of stock billets. Its inlet and outlet roller tables enable side charge and side discharge of billets and its posts and beams are evaporation-cooled.

ASSB is now Malaysia's largest and most automated integrated steelworks. Since its full-process start-up last August, the site has achieved lower emissions than local standards and achieved ZLD targets and 100 per cent



slag recycling. The current production capacity has exceeded design expectations.

ASSB has become Malaysia's emerging foreign-funded enterprise. Products are oriented to Southeast Asia's demand for local building materials.

CISDI is ASSB's general designer and core equipment package supplier.

NEWSLETTER 2019 No.4 CISDI GROUP CO., LTD.

CISDI to supply new 3-strand slab casters for Ruifeng Steel

CISDI will package-supply 2-set 3-strand slab casters for Ruifeng Steel in Tangshan.

China's largest hot-rolled narrow strip producer and a key supplier in China, Ruifeng Steel is an integrated steelworks in Tangshan City in the Hebei Province. Its site carries out sintering, ironmaking, steelmaking, continuous casting and hot rolling.

Two new slab casters will each produce 200mm-thick slabs to a width of 900-1,230mm. Their annual production capacity

will total 3.10 million tonnes. The grades to be cast are carbon structural steel, quality carbon structural steel and alloy steel.

The 3-strand slab caster has been proposed in response to upstream BOF tonnage and downstream rolling demand.

A highly-efficient secondary cooling system, gap-free segments, butterfly ladle turret and other optimal process arrangement and equipment structures are proposed in the technical specification.

CISDI subsidiary wins titanium coil furnace orders from JISCO

Demand is growing for Xi'an MCC New Materials' expertise in titanium coils and stainless steel heat treatment.

The CISDI's subsidiary has won a contract to provide design, supply and technical assistance services for three titanium coil bell-type annealing furnaces for JISCO Hongxing Stainless Steel.

This order follows the subsidiary's supply of a similar annealing furnace in 2016, which is running reliably and to its designed technical indicators.

Xi'an MCC New Materials is a high-tech enterprise with a mixed ownership held by state-owned enterprises. Its specialism is the production of new materials and related electric and gas heater package equipment, in addition to high-temperature treatment devices for solid waste, energy conservation and environmental-protection heating package equipment, DC and induction heating power source, and electric and automation control systems.

The subsidiary is engaged in sales, development, design, manufacturing, installation and commissioning. Its expertise also incorporates consulting, technical assistance, and technology transfer.

CISDI to provide management services for Indonesian steel project

CISDI will provide management consulting services for two new steel projects in Indonesia for PT. Gunung Raja Paks.

The contract covers a new light section mill, a CSP, a medium section mill rebuild, blast furnace 2, plus two EAFs, a gas-fired power generation plant and a welded pipe line.

At the end of 2018 CISDI was contracted to supply equipment and non-standard design and technical assistance services for four of those production lines - the light section mill, CSP, medium section mill and blast furnace 2.



Representatives from CISDI and PT. Gunung Raja Paks are pictured signing the contract

CISDI's EIC package boosts successful CGL hot commissioning



A wide-angle shot of Zhixing CGL

Hebei Zhixing Pipe Making Company's continuous galvanising line has produced its first Grade A galvanised coils.

CISDI supplied electric, instrumentation and computer package products and assisted their hot commissioning, enabling start-up of the entire production line.

Construction of Zhixing CGL was phased over 16 months.

The highly-automated CGL is designed with a maximum inlet speed of 260 metres a minute, a process speed of 200 metres a minute and an outlet speed of 300 metres a minute.

Its annual production target is 300,000 tonnes of high-end, hot-dip galvaluminised products. The thickness range will be from 0.35mm to 2.5mm and the width range will be from 700mm to 1,260mm.

WISCO's stockyard to be rebuilt online

WISCO is to rebuild its steel stockyard to a more environment-friendly design

The online rebuild of the C3 yard, carried out by CISDI, will face numerous complications. Production cannot be interrupted, the schedule will be tight and safety and production quality have to be maintained.

CISDI's previous experience of similar tasks for other major steel producers will be brought into play.

The company's teams carried online rebuilds of Baosteel Shanghai's three model C yards and one for Baosteel Zhanjiang.

CISDI has constantly upgraded its intelligent unmanned stockyard expertise since it was first used at Zhanjiang and a number of innovative solutions have been found for WISCO.

Storage capacity will be increased, excess material recovery will be improved on, retaining walls will be added and maintenance trams will have better access to equipment.

CISDI will apply automatic scrapers, a clean transfer funnel and chute, and material buffer guide and seal devices. These technological developments are unique to CISDI and are based on DEM (definite element model), CFD (computational fluid dynamics) and DPM (discrete phase model) analysis means.

Before receiving the WISCO order, CISDI studied the raw materials to be stored in the yard and the existing logistics systems, and made multiple verifications on WISCO's capacity for handling bulk materials and its downstream product mix and sizes.

CISDI helped WISCO to work out an optimal and flexible plan for the entire stockyard plant, which can be developed not only step-by-step but also in a manner which accommodates output adjustments.

The improvements will be supplied as a packaged product.



Green Stockyard Expertise

CISDI provides intelligent, green and efficient stockyard total solutions to its clients around the world.

Its expertise has been applied at over 100 stockyards both in China and abroad. More than 40 are environmental-protection stockyards, accounting for 70 per cent of the global market share.

Its transformational stockyard projects at Baowu Zhanjiang, Formosa Ha Tinh Steel and Ruifeng Steel are stand-out examples of green storage, unmanned operation, intelligent management, energy and resource-saving and clean production.

CISDI's intelligent and green stockyard is a dually-patented product in China and Japan.

New milestone reached at Formosa Ha Tinh

Formosa Ha Tinh Steel in Vietnam has reported a successful hot commissioning of its first dry-quenching furnace, further boosting the steelworks' energy-saving and environmental protection indicators

CISDI built the coke dry-quenching project on an EPC basis, in addition to providing services to FHS's master plan, general design and feasibility study. CISDI has also carried out the engineering of the stockyard, and is responsible for blast furnace 1 and 2, gas holders and reheating furnaces.

CDQ is an environmental protection technology which uses low-temperature inert nitrogen to cool down the hot coke. The traditional method is wet quenching with water. The dry process enables the coke's sensible heat to be recovered and improves the final quality of the coke. In addition, pollution is reduced.

This is Vietnam's first CDQ project, and is supported by FHS and the Vietnamese government. A second dry-quenching furnace is scheduled to be hot-commissioned in May.

Each dry quenching furnace has been



designed for a capacity of 200 tonnes an hour, and will be supported with one 36MW turbo-generator and utilities.

Both furnaces can treat about three million tonnes of coke annually, and generate a maximum of 6x10°kWh of power.

The CDQ project is the last of 54 environmental awareness improvements FHS promised the Vietnamese government it would carry out during the construction of the steelworks.

CISDI successfully rebuilds TISCO's ageing caster 3



TISCO's caster 3 ejects its first stainless steel slab for the first cast

CISDI has successfully rebuilt TISCO's caster 3.

The 16-year-old combined square bloom and slab caster was not functioning correctly. Its secondary cooling control system had failed to apply the cooling model to control slab edge water flow. An unreliable regulating valve could not regulate water stably in the event of a low flow.

CISDI has replaced them with its unique secondary cooling dynamic control model.

Optimised design has also been implemented to solve a problem which was resulting in a

serious blocking of the caster's nozzles, and to improve the arrangement of the secondary cooling loops, instruments and spraying.

TISCO's caster 3 rebuild is shining example of how CISDI's secondary cooling dynamic control model can dramatically improve stainless steel casting, a sector which has been exclusively-dominated by suppliers outside of China.

After the rebuilds, on the first run, ferritic stainless steel OCr13R was cast successfully with a cross section dimension of 200mm x 1,235mm. A uniform distribution of surface temperature and a stable control of width were achieved. The first casting speed ranged from 0.9 to 1.05 metres a minute.

Analysis showed the slab's central segregation had reached Mannesmann 1 level, and its equiaxed crystal ratio had surpassed 60 per cent.

Since the first cast, slab grades OCr13R, 2Cr13, 430, 409, 20Mn23AlV, 441, 443 and 308 have been achieved.

Pilot test of CISDI's groundbreaking innovation for caster moulds achieves top results at SFRE

SFRE has recorded a metallurgical first.

The Chinese company has successfully staged the pilot run of a new servo oscillator for its electric-hydraulic-driven caster mould.

The oscillator is the first of its kind in the metallurgical industry in China and was researched and developed by CISDI.

The mould's oscillator is critical to the casting operation and requires a fast response, accurate positioning and high reliability.

Yet the three types of oscillator commonly used – mechanical eccentric wheel, traditional hydraulic servo valve and mechanised electric servo cylinder – are exposed to low accuracy. As a result, they wear out swiftly, have a short service life and consume large amounts of energy.

CISDI's new innovation, the electric-hydraulic direct driving servo oscillator, operates the servo motor, which directly drives the vibrating hydraulic cylinder.

Empowered with intelligent control, remote fault diagnosis, big data analysis and Internet of Things technologies, the oscillator can make online adjustments for vibration frequency, amplitude, deflection slope and other parameters. It uses 40 per cent less energy than traditional hydraulic servo oscillators.

The test run resulted in a vibrating deflection of less than 0.01mm, amplitude adjustments from 0 to 12mm, a peak vibration frequency of 420c/minute, and a position control accuracy to plus or minus three micrometres. Each of these results is improvements on industry averages around the globe (deflection 0.1mm, vibration frequency



CISDI's new servo oscillator for caster mould at SFRE

400c/minute, amplitude range 0 to 10mm).

SFRE's hot working centre tested HRB400E, Q235 and 55CrMnA grades and found the servo oscillator was running smoothly and stably for each. Cast strands had a good surface quality under a high-precision control. The vibration left little imprint on strands and the mould is now consuming less protective slag.

The servo oscillator makes both operation and maintenance simpler and can be applied to square and round bloom, rectangular bloom, shaped blank and slab casters.

CISDI is now investigating its potential for use by the military, new energy sectors, agriculture and other mechanical processes.

▶ The benefits of CISDI's 3D secondary cooling dynamic control model

The model ensures optimal strand temperature and high quality slab.

It automatically matches steel grades with proper control strategy.

Secondary cooling water flow and compressed air flow can be real-time adjusted to strand temperature.

From any duty position, operators are able to read strand's real-time temperature status and make optimisation decisions.



A screen shot of CISDI's model performing hot strand tracking

Intelligent, Efficient, Green & Clean Material Handling Technology

▶ Eco-friendly Stockyard Technology

CISDI has continuously developed ECIA-B, C, D, E, M series eco-friendly storage technologies with significant benefits, such as reducing dust pollution, reducing material loss, reducing land occupation, stabilizing production and reducing energy consumption etc.

Technical highlights:

- Q Reduce dust emission >95%
- Q Reduce material loss >85%
- Windbreak, rain-proof, anti-freezing and anti-lightning, stabilize production
- Enhance storage capacity, reduce land occupation 40%-60%
- Compact layout, smooth logistics, high Intelligent, etc.



ECIA-B/C/D/E type stockyard

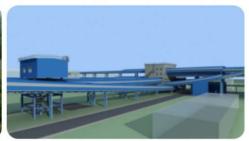


ECIA-M type stockyard

► Clean Production Technology

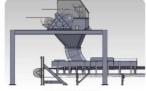
Clean production technology aims to offer targeted solutions to the problems such as dust emission, material scattering and leakage, environment pollution etc., which usually occur during the material unloading, conveying and transferring process. Through the application of the technology, the working conditions shall be improved, the OPEX shall be cut down and the labor productivity shall be raised.





Clean unloading

Clean transportation



Clean storage



Clean environment

Technical highlights:

- Whole process clean production and highly integrated, comprehensive solutions
- © Reduce dust emission over 50% and material spillage 90%
- © Extend transport equipment lifespan 50% and reduce maintenance work about 60%
- © Reduce lump material pulverization 20%

▶ Intelligent Stockyard Technology

CISDI has undertaken over 20 intelligent stockyard projects over last decade. Intelligent expertise enables accurate decision-making when scheduling material handling, creating autonomous stacking and transporting materials. Optimised logistics routes can be calculated and digital real-tiem inventory management means high efficiency, which will increase annual per capita receiving quantity up to 250,000 tonnes.



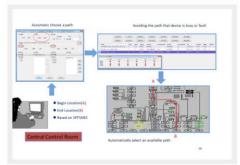
Exploded views of CISDI's unmanned stacker-reclaimer

Automatic generation of nuterial yeard map Material Print Material Prin

Digital yard system charts

Technical highlights:

- Optimizing operational flow and reducing over 50% operator training time
- Saving energy by 10% and shortening transport time by 10%
- An entire improvement of productivity by 30%, reducing mis-operation ratio by 90%
- O Increasing space utilization ratio by 15%
- 30% less management human power, 50% higher yard's statistics efficiency



The operational charts of an intelligent stockyard

▶ Eco-friendly and intelligent Material Yard in Coastal area

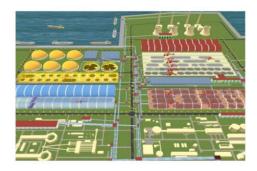
Project Profile:

Receiving capacity: 34.7 Mt/a
 Start-up time: 2015
 Storage capacity: 2.47 Mt
 Service mode: EP/EPC

O Storage area: 450,000 m²

Project Highlights:

- Phase one built in 2008 by CISDI with EPC mode, the first eco-friendly stockyard for metallurgical industry in China.
- © B/C/D type eco-friendly stock yard, withstand the strongest typhoon attack in 2015.
- Firstly adopt logistical simulation analysis & diagnosis technologies to save tens of millions
 US dollar for the project.
- O The first and most successful steel plant in China implementing intelligent stockyard technologies such as digital stockyard, intelligent logistics and unmanned stacking-reclaiming operation etc.





▶ Oversized Modern Stockyard Online Revamping

Project Profile:

 Q Receiving capacity:
 50.95 Mt/a
 Q Start-up time:
 2012-2019

 Q Storage capacity:
 4.38 Mt
 Q Service mode:
 E/EP

O Storage area: 675,000 m²

Project Highlights:

O China's largest & most advanced eco-friendly stockyard

Online revamping from 2012 to -2019 while production unaffected

O B/C/E type eco-friendly stock yard, reduce land occupation by 23%

O More compact, reduce length of belt conveyor by 10%

Operation cost saved tens of millions US dollar annually

O Material loss is reduced by over 85%





▶ Largest single-phase Eco-friendly Bulk Material Yard in the world

Project Profile:

Q Receiving capacity: 33.02 Mt/a
 Q Storage capacity: 4.78 Mt
 Q Service mode: E

O Storage area: 960,000 m²

Project Highlights:

O The largest and most versatile material handling plant (in one phase) in the global.

O B/C type eco-friendly stockyard, combined with clean production, recycling economy technologies and intelligent blending model and logistics flow process technologies.

The wasted in-plant mud and dust could be collected and homogenized to be the recycled material for sinter.

A large-span eco-friendly C-type coal yard, which has increased storage capacity by 120% unit area.





> The first completed ECIA-M stockyard in the world

Project Profile:

 Q Receiving capacity:
 10.10 Mt/a
 Q Start-up time:
 2016

 Q Storage capacity:
 0.25 Mt
 Q Service mode:
 EP+CM

O Storage area: 21,000 m²

Project Highlights:

O The first completed ECIA-M stockyard in the world.

- Q EP+CM, CISDI is responsible for engineering, key equipment procurement and construction management support, to ensure excellent performance characteristics and project quality.
- Q Extremely compact, only using 212m×97.5m storage area for 3.95 Mt/a iron-making production, save 70% land occupation.
- O Intelligent control and logistics, reduce operation staff about 50%.







MEET US AT



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