

NEWSLETTER

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CISDI

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An Engineering Service Provider Preferred by the Steel Producer

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We can provide:

Full-cycle Services:

From general layout to stockyard, ironmaking, steelmaking, rolling, etc.

Full Functional Services:

Offering consulting, engineering, EP and EPC services, etc.

Services throughout Life Cycle of Projects:

Satisfactory services in business planning, front-end loading, project implementation, startup and operation & maintenance.



CISDI

CISDI devotes to building a fully functional international engineering company that provides full life-cycle service for project, and becoming a respectable, learning-oriented, open and innovative company preferred by steel industry.

Development Strategy



Xiao Xuewen

Dear Readers,

Our heartfelt thanks go to all clients and friends at home and abroad for your strong support and trust in us throughout these years.

On the road to develop into an engineering-oriented international company backed by expertise, project management and financing solution, we'll persistently direct ourselves to markets, rely on scientific & technological progress and talents we possess, make best use of various resources to serve the interests of our clients.

Adhering to the quality policy of "Elaborate Engineering, Scientific Management, Render Services in Integrity to Clients' Satisfaction, People First & Permanent Improvement", we will make our commitment in providing you of quality services in high efficiency, live up to all the promises we have made to guarantee project quality, anticipate the needs and demands of our clients to meet their expectations, best serve our clients by offering first-class management, first-class technologies, first-class engineering and first-class services, and try in every effort to achieve a win-win situation with each and every client and cooperative partner.

Yours sincerely ,

Xiao Xuewen
Chairman of the Board
CISDI Engineering Co., Ltd.

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Xiao Xuewen Meets CEO of Harita Jayaraya

CISDI chairman Xiao Xuewen met with Gunawan hariyanto lim, CEO of Harita Jayaraya (Indonesia) on April 17, 2013. Both parties had amicable discussion, and Xiao said that CISDI has always paid high attention to the Asia-Pacific market where Indonesia is located, and that CISDI is willing to serve Harita

Jayaraya with its good technical expertise and management skills.

Harita Jayaraya (Indonesia) which was incorporated in 1951 is engaged in wood, oil palm plantation and palm oil processing, mining, real estate and trade.

China's First Electric Furnace Using Recycled BF Slag is Successfully Developed

CISDI's R&D outcome entitled "Electric Furnace using Recycled BF Slag" successfully passed the verification by relevant experts on March 19, 2013 for its novel design and high creativeness, which is the first one of its kind in China.

The electric furnace using recycled BF slag is large thermal processing equipment which can turn the low-value BF slag into high-value products. It consists of heavy mechanical structure, hydraulic system, water cooling system, HV/LV electrical equipment, instrument and automation system, computer control system, featuring huge structure and complex equipment.

It is implemented with hot BF slag charging to reduce the demand for electricity, contributing to higher energy efficiency and lower consumption. As a good process equipment for reuse of BF slag in more sectors, it is of great significance for environmental protection and resources recycling.



Electric Furnace Using Recycled BF Slag

Globo TV Interviews CISDI SV Personnel in Brazil

Globo TV, under O Globo Group, the largest media group in Brazil, sent reporter on March 21, 2013, to Volta Redonda, a town located 130km away from Rio de Janeiro, to interview the Chinese SV team working on UPV long products plant of CSN. The program was broadcast on April 12th, which opens a window for the local Brazilian to understand the lives of visiting foreigners.

During the 4-minute program, the reporter has interviewed with the reception staff, manager, taxi drivers who are in frequent contact with the Chinese experts.



TV Reports Playing Pingpong with Chinese Experts

BF#1, Meltshop and CCM in Nanjiang Starts Operation

With two years hardworking in challenging environment, the ironmaking and steelmaking plant in Nanjiang Steel Base built by CISDI on EPC basis was successfully put into operation. BF#1, converter and CCM #1 were started up in April, and converter & CCM#2 were started up in May.

The EPC order was awarded to CISDI in 2010, covering two 1,800m³ BF and auxiliaries, thermal power plant blower station, two 120t top & bottom-blown converters, two 8-strand billet casters, two co-injection hot metal desulphurization devices, two on-line argon-blown & wire feeding station and necessary supporting facilities.

Nanjiang steel base of Xinjiang Bayi Steel will reach 3mt/a capacity after ramp-up.



Baosteel Chairman Visiting the Site

Start-up of BF#1

Main Technical Data of BF#1

| | |
|-------------------------|---------------------------|
| BF Nominal Volume | 1,800m ³ |
| Annual Productivity | 2.2t/(m ³ · d) |
| Annual Hot Metal Output | 1.38mt/a |
| Coke Ratio | 410 kg/t |
| Coal Ratio | 150 kg/t |
| Slag Ratio | 400 kg/t |

BF#1 is implemented with bell-less top and serial-connected & close soft water circulation system, top-combustion hot stoves with high blast temperature, CISDI proprietary rotary drum slag granulation process, dense-phase pulverized coal injection and dry dust collection technologies.



BF#1

Start-up of Meltshop and CCM Plant

Process Data of Meltshop

| | |
|---|--------------------|
| Nominal Volume of Converter | 120t |
| Qty. | 2 |
| Converter Type | Bottom & top blown |
| Average Tap-to-tap Time | 35 min |
| Annual Output of Qualified Liquid Steel | 3.14mt |

Process Data of CCM Plant

| | |
|------------------------------------|---|
| CCM Type | Bow-type continuous straightening billet caster |
| CCM Qty. x Strand No. | 2x8 |
| Billet Sizes | 150x150mm |
| Casting Speed Range | 0.5~4 m/min |
| Steel Grades | Carbon structural steel, low-alloy steel |
| Annual Output of Qualified Billets | 3.05mt/a |

Converter #1 of Nanjiang Steel base (Xinjiang Bayi Steel Co. under Baosteel Group) successfully produced the first heat of liquid steel on April 11, followed by successful hot test run of billet caster #1.

On the morning of May 21, billet caster #2 successfully passed the hot on-load test run, with all 8 strands in operation for two-heat sequence casting. The initial casting speed is 1m/min. and the max. casting speed is 3m/min. All equipment was running

properly, without any rhomboidity or off-tracking during the casting.

Converter #2 successfully produced the first heat of liquid steel on the evening of May 22. The two desulphurization co-injection systems are currently under hot commissioning.

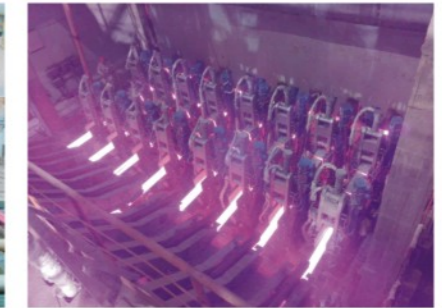
So far the two 120t converters and two billet casters in Nanjiang steel base have been put into operation.



Converter #1



Caster #1



Caster #2

Technical Highlights

- ◆ Top & bottom blown converter is installed, to be stirred with inert gas (nitrogen or argon, to be switched-over freely by PLC depending on requirements).
- ◆ Converter tilting device is designed with 4-point full suspension and torsion bar balancing & supporting structure. It is driven by AC Variable-frequency motor for step-less speed regulation. The device feature compact construction, smooth drive and reliable operation. The converter is designed for all positive torque.
- ◆ The connection between converter vessel and trunnion ring is bottom-suspended, featuring good absorption to heavy deformation, light equipment weight, low converter gravity center, good positive torque characteristics, simple structure and easy maintenance.

- ◆ Dry process is provided for primary dedusting system, which is integrated by CISDI, to clean and cool the high-temperature fume of converter, to recover LDG and save energy.
- ◆ The evaporative cooling system is designed with a combination of forced circulation and natural circulation to recover the steam. It is improved from conventional design by absorbing the advantages of imported evaporative cooling system to achieve higher operation reliability and longer flue service life.
- ◆ The movable hood lifting system is connected by ball-type flexible device for better safety and longer service life.
- ◆ Level II computer control system is implemented to allow basic automation and process automation, and the interface to L3 is foreseen.

The two billet casters are implemented with CISDI proprietary technologies and products, including:

- ◆ Ladle turret with lifting, weighing and cover manipulating function (with device for two covers manipulating)
- ◆ Large-size tundish with slag retaining wall
- ◆ Multi-function tundish car with lifting, weighing and traverse aligning function
- ◆ Continuous temperature measurement and manual temperature measurement for tundish
- ◆ Auto mould level control system by stopper
- ◆ High-frequency & small-stroke vibration of mould
- ◆ Auto control of water cooling
- ◆ Cut length measuring system by camera
- ◆ Electrically-returning torch cutter (utilities piping is elevated, without drag chain)
- ◆ Billet transfer car weighing
- ◆ Optimum cut length calculation and control
- ◆ Basic automation and process computer control system

Successful Test of Raw Material Handling System for JFE Ferrocoke Test Device



CISDI supplied over 300t package units

According to Sankei Shimbun dated April 22 and NihonKeizai himbun dated May 2, 2013, JFE Steel Corporation officially announced that all tests for material handling system of ferrite coke test device have been successfully completed during the pilot phase, with all desired purposes achieved. It is considered by JFE as the world's first trial of producing ferrocoke in vertical retort distillation furnace and also the first application trial in BF. For this material handling system, CISDI has supplied 300+ ton package unit including raw material bin, raw material transport, raw material weighing & heating, dedusting equipment and instrument.

CISDI was contracted by JFE Shoji Trade Corporation in September 2009 to supply the ferrocoke material handling system on EP basis. The project is intended to install 30t/d ferrocoke test device, and the total investment of JPY3.8 billion is half-half shared by Japanese government and JFE. The test device construction was started in March 2010, and some tests were started in March 2011. The full line has achieved 24-hour continuous operation for seven times within one month from April 2012 to February 2013, producing totally 2,100t ferrocoke.

The ferrocoke produced by this installation has been continuously charged into JFE blast furnace #6 in

Chiba at 10% of the coke quantity for smelting test from March 11 to 16, 2013, and the results shows that the BF has been running stably, and it contributes to less CO₂ emission (350,000t per year) and app. 10% cost reduction due to use of low-TFe ore. It can be used as substitute to 30% of coke and reduce the use of 20% high-adhesion coal to achieve less coking coal consumption and lower coke rate. JFE will make further development based on the existing test device to achieve 1,500t/d capacity by 2020.



Raw Material Heating Equipment



Ferrocoke Raw Material Handling & Storage Equipment

BF#3 of Anyang Steel Starts Operation



BF#3

BF#3 (4,747m³) of Anyang Steel designed by CISDI was successfully blown-in on March 19, 2013 and smoothly tapped in the morning of 20th, with all system and equipment running properly. The BF is designed to produce 10,918t hot metal daily.

BF#3 is a new blast furnace installed in existing plant area, for which CISDI has developed a

satisfactory general layout by making the best out of the limited space in narrow terrace.

The BF#3 is implemented with CISDI's bell-less top, serial-connected closed soft water circulation system, top-combustion hot stoves with high blast temperature, slag granulation by rotary drum, dense-phase coal injection and dry dedusting technology.

Technical Highlights

◆ BF Top

It is implemented with CISDI's novel bell-less top with parallel hoppers, featuring good tightness at high pressure and flexible burden distribution to allow full use of gas energy, spot distribution, ring distribution, sector distribution and spiral distribution. It also features smooth BF running, less wear parts and easy maintenance.

◆ Long-campaign Life

With CISDI proprietary technology of wearable throat armour with double-layer cooling construction, the BF campaign life can reach 20 years. The bosh is installed with copper plate for transition, contributing to logical furnace profile and smooth running. The BF is cooled by zone with cooling water, which allows adjustable water flow for different zone depending on the

furnace conditions. The thin-wall profile is logically designed to achieve long campaign life, high efficiency and good stability.



BF Tapping



Top-combustion Hot Stoves

◆ Environmental-friendly & Energy-efficient Slag Granulation by Rotary Drum

CISDI's environmental-friendly & energy-efficient slag granulation process with rotary drum is implemented. One separate slag granulation system is installed at each casthouse, which provides a good solution to the BF plant building and equipment erosion caused by detrimental steam emission at low level by means of steam emission at high level and natural condensation, contributing to system advantages of energy efficiency, environmental friendliness, low capital cost and operational cost.

◆ Top-combustion Hot Stoves with High Blast Temperature

Four top-combustion hot stoves with high blast temperature are installed, which are arranged in one row. Four big hot stoves, two small hot stoves, one plate heat exchanger, three heavy-duty combustion fans and two light-duty combustion fans are provided. The whole hot stove system is supplied by CISDI on EP basis, of which the hot stoves proper are jointly designed by CISDI and foreign supplier. The hot stove holes are built with leading assembly brick technology. The hot stove air & gas preheating system is implemented with efficient and durable plate heat exchangers to preheat the blast furnace gas, and two small hot stoves are installed in the front to preheat the combustion air, which can significantly extend the service life of co-preheating system and the blast temperature can reach 1,300°C when fired with 100% BFG. The hot blast pipe is designed with "low stress,



PCI Station

orderly constrained, controllable displacement and logical refractory design", which, in combination with the assembly brick technology for holes on hot stove proper, can eliminate the weakness of conventional top-combustion hot stove system.

◆ PCI

Full-auto and one-key operating PCI system provides full auto control of PCI operation, featuring simple operation, continuous & steady injection rate and small variation. With uniform distribution at equal pressure loss, the deviation of pulverized coal distribution at different tuyeres is limited within 5%. With dense-phase conveyance technique, the pulverized coal speed is controlled at 3~7m/s, and the solid/gas ratio at main injection lance is higher than 30k/kg. App. 35% nitrogen is recovered, so the nitrogen consumption by PCI system is significantly reduced. Full 3D digital design, optimized plant building layout and piping design contribute to higher efficiency and better quality of design.

◆ Dry Dedusting

To address the problems with conventional dry bag filter dedusting technology (i.e. high failure rate and poor operating stability), CISDI has been devoted to the development of proprietary new technology and process to improve the equipment service life while reduce the operating failure rate. The full-dry bag filter dedusting system for BFG designed by CISDI installed in BF#3 of Anyang Steel has been running properly, with all parameters reaching or exceeding the design.

Revamped BF Slag Treatment System in Yili Steel Succeeds in Hot Test

January 31, 2013 witnessed the successful hot test run of revamped slag granulating rotary drum supplied by CISDI on EPC basis for BF#2 of Yili Steel Co.

The project is implemented with CISDI's proprietary slag granulating rotary drum technology, which is the first installation of CISDI rotary drum in BF built by other suppliers.

The original slag granulation process for BF in Yili Steel was provided with blowing nozzle at the end of fused slag ditch to granulate the fused slag in the slag granulating ditch. The slag-water mixture from two blast furnaces were directed through slag granulating ditch into the common sedimentation basin where it is taken out by grab bucket of traveling crane. CISDI is invited by Yili Steel to provide tailored solution to its problem in poor working conditions and low working efficiency.

After analysis of Yili's requirements and investigation the blast furnace and granulated slag conditions, CISDI proposed to build a separate granulated slag ditch to ensure the rotary drum center level is much higher above the ground, and the rotary drum outlet water is directed through shallow-bottom drainage tank and ditch into the sedimentation tank.

In this way, it is possible to accommodate the rotary drum in the limited space and have relatively shallow foundation for construction on site.

With the rotary drum for BF#2 put into operation, the labor intensity is significantly reduced while the working environment and working efficiency greatly improved, winning high praise from Yili Steel.



CISDI Slag Granulating Drum Equipment



Panoramic View of BF#2 Drum before Startup



BF#2 Drum in Operation

■ Link: CISDI's Energy-efficiency & Environmental-friendly Slag Granulating Rotary Drum

CISDI's slag granulating drum features well-proven technology, compact and logical layout, good slag granulation quality and high level of automation. Due to high-altitude emissions and natural steam condensation, the blast furnace plant building and equipment corrosion caused by harmful steam

emission at low level (lower than BF top equipment) is completely eliminated. Currently CISDI has patent of this rotary drum process and reference of complete rotary drum equipment to cater to full range of BF slag granulation system. It has been successfully installed in Baosteel and Shuicheng Steel.

Order Awarded to Supply Control System Package for Two BF's in Baotou Steel

Including CISDI Proprietary HV Soft Starters

CISDI Electrical Technology Co., Ltd. was contracted by Baotou Steel in April, 2013 to supply the control system for two 4,150 m³ blast furnaces on EP basis, including CISDI proprietary products such as PLC/DCS equipment, UPS equipment and high-voltage solid soft starters.

On December 7, 2012, CISDI Electrical Technology Co., Ltd. was contracted to supply stockhouse for BF#1, 2, 10kV HV soft starter for main electrical room for Baotou Steel. The supply consists of 13 devices, with power ranging from 400KW to 3200KW.



HV Soft Starter

■ Link: SSD1210 Series Soft Starters for HV Motors

SSD1210 Series HV soft starters produced by CISDI Electrical Technology Co., Ltd. are applicable for soft starting, control, production and soft stop of HV/MV motors with 3-Phase AC 50~60Hz, 3kV~10kV, featuring high reliability, wide function, complete protection and easy operation. Its intelligent software and electronic circuit can allow current-limited soft starting, voltage ramp soft starting, pulse-jumping soft starting. It can be used with HV motors to make up high-performance drive system, which offers the most economical solution to the industry.

SSD1210 Series HV soft starter is installed with thyristor serial-connecting components, and each SCR component is equipped with a separate

overvoltage protection unit, and pressure & flow equalizing circuit to ensure the reliability of power components. It is typically provided with bypass contactor inside to form a complete solution without requiring additional equipment. The control core is provided with leading microprocessor for good reliability and stability. Soft starting is achieved by control of main circuit SCR trigger phase angle by CPU. By gradually increasing the motor-side voltage and current, smoothly increasing the motor torque, reducing the motor starting impulse current and reducing the impact upon grid and motor itself and the impact upon mechanical load, the equipment service life is extended.

Main Technical Data

| | |
|-------------------|--|
| Voltage Rating | 3kV ~ 10k |
| Current Range | 40A ~ 1000A |
| Overload Capacity | continuous 125%, 500% for 1 minute |
| Control Mode | current-limited soft start, voltage ramp soft start, pulse jumping soft start, soft stop |

CISDI to Provide Revamping Design for CCM of Yieh United Steel



CISDI inked the contract with Yieh United Steel in early February 2013 to provide overall planning and revamping for billet caster equipment.

Yieh United Steel Corporation (YUSCO), the subsidiary of E United Group, is Taiwan's first steel plant with complete process route of steelmaking, hot rolling and cold rolling, and is one of the largest stainless steel plants in Southeast Asia. YUSCO currently has one caster designed by a foreign supplier, which can produce slabs (1 strand) or billets (5 strands), covering stainless steel and carbon steel.

Aiming at higher product quality and variety, less operating cost and better equipment reliability, the caster revamping will cover following items:

- ◆ To replace with parabolic mold for wider range of product sizes.
- ◆ To install electromagnetic stirring device for better inner quality of billet.
- ◆ To increase the casting speed (max. 4.0m/min.), increase productivity and reduce operational cost.
- ◆ To revamp the oscillator to adapt to high casting

speed and quality requirements.

- ◆ To add nozzle fast-change mechanism, increase the number of heats in sequence, so as to increase the productivity and reduce the operational cost.
- ◆ To upgrade the cooling system, contributing to higher productivity and better quality.
- ◆ To add automatic mould slag device and automatic oil filling device to cater to various steel production requirements and automation control level improvement.
- ◆ To add marking machine for lower labor cost and higher automation control level.
- ◆ To add billet hooking machine and turnover machine for higher reliability of caster equipment performance.
- ◆ Partial revamping of hydraulic, automation and instrumentation system for higher caster operation reliability.

The revamping is intended for the core equipment of continuous caster area. After revamping, the caster can produce the billets more flexibly.

CISDI to Supply Φ800mm Bloom Caster for Sunan Heavy Machinery



CISDI Shanghai was contracted by Jiangsu Sunan Heavy Machinery Science & Technology Co., Ltd. on Oct. 15, 2012 to supply Φ800mm round bloom on EPC basis.

The supply will cover the revamping of 1st and 4th strand for existing R16m 4-strand round alloy steel bloom caster in the steelmaking plant to allow it to produce round blooms of Φ800mm and Φ700mm, as well as round blooms of Φ600mm and blooms of

320mmx340mm. The designed capacity after revamping is 120,000t/a round blooms.

The bloom caster will be implemented with dynamic secondary cooling water distribution, electromagnetic mould stirring, automatic mould level control, electromagnetic stirring at end of solidification and fast changing at machine head to produce high quality bloom at competitive cost.

The project is scheduled to start operation in 2013.

Order Awarded from PCK for Hot Mill Plant Design

Plant design for the world's widest hot strip mill



CISDI was contracted on May 14, 2013 by Chu Kong Pipe (Lianyungang) Co., Ltd. to supply plant design for its 3,352 mm hot strip mill.

The 3,352 mm hot strip mill is intended to produce the sheet/pipe for oil/gas storage & transport for marine engineering equipment, and is scheduled to start construction in this year. It will be the world's widest hot strip rolling line after completion.

The line will mainly produce pipeline steel for oil and gas. It can be used instead of plate mill to produce 3m wide coils.



Signing Ceremony of the Project

Baosteel Hot Treatment Line for 2,050mm HSM Starts Construction



The hot treatment line designed by CISDI for Baosteel 2,050mm HSM was started to construct on March 6, 2013.

The project is intended to provide heat treatment for cross-cut sheets at annual capacity of 105,000t, which will fill the gap of ultra-high strength sheet production in China.

Madam Chen Rongyan, CISDI vice president, attended the groundbreaking ceremony.



Groundbreaking Ceremony

Zhejiang Concord 1,450mm Cold Mill Achieves Mass Production of Thin Strips



April 3, 2013 witnessed the success of producing thin strips at high speed with heavy reduction by 1,450 mm 5-stand cold mills supplied by CISDI for Zhejiang Concord Shouxin Steel Co., Ltd. The line produced strip with min. thickness of 0.25mm using 2.5mm thick feedstock (grade Q195 and strip width 1200mm), featuring maximum reduction of 90%, rolling speed of 1,000 m/min, product thickness accuracy of $\pm 2\mu\text{m}$. The thickness over-tolerance during speed changing is less than 2%, and the sheet/coil shape and surface quality are good.

As the metal will get hardened during plastic deformation, the straight carbon steel will have a limit on the strain. Ultra-high reduction rolling technology allows rolling with near-to-limit strain, so it is possible to produce the same-thin gauges with even thicker feedstock, or produce thinner sheets with same feedstock. In this way, the feedstock for the cold mill can be more flexible and the procurement cost will be lower.

To ensure the product thickness control accuracy and final shape, the ultra-high reduction rolling is very demanding with aspect to mechanical equipment, process models, automation control and operation

skills, so it has always been a challenge in straight carbon steel cold rolling sector. The success of Zhejiang Concord 5-stand tandem cold mill in mass production of thin strips with ultra-high reduction marks CISDI's breakthrough in cold rolling equipment integration, process and control.

The 5-stand tandem cold mill is successfully implemented with CISDI's proprietary L2 models for cold rolling, high-precision thickness control technology and cold-rolled strip shape control technology.



Order Awarded from Yieh Phui for Continuous Annealing Line Supply



CISDI successfully beat other bidders after one year competition to win the order from Yieh Phui (China) Technomaterial Co., Ltd. to supply continuous annealing line #1 on EP basis.

CISDI is contracted to supply the main line equipment as well as erection and commissioning. The project time is 24 months from the contract effectiveness to the production of the first qualified coil.

The continuous annealing line is designed with

annual capacity of 500,000t, applicable for sizes of 0.23mm~2.5mmx800mm~1650mm. The oriented products are steel for high-end automobile and home appliances. The line can produce SEDDQ, DP, TRIP steel, with max. strength reaching 780MPa.

Yieh Phui (China) is a fully-owned subsidiary of E United Group in mainland China, and this annealing line is expected to reach the world leading level.

Wire Mill in Hanzhong Steel Succeeds in Hot Test



The single wire-rod mill supplied by CISDI for Hanzhong Steel on EPC basis successfully produced the $\Phi 6.5\text{mm}$ plain coils on January 22, 2013, marking the success in hot commissioning.

The line is implemented with no-twist rolling, micro-tension rolling, loop tension-free rolling, temperature controlled rolling in closed loop at high speed, 8-stand finishing mill plus 4-stand reducing and sizing mill. Equipment of NTM, RSM and Laying Head and upstream Pinch Roll are imported, and the max. guaranteed rolling speed is 112 m/s.

The line is designed with 600,000 t/a capacity and to produce plain coils of $\Phi 5.0\text{mm} \sim \Phi 22\text{mm}$ and rebar coils of $\Phi 6.0\text{mm} \sim \Phi 16\text{mm}$. The main steel grades to be

produced are quality carbon structural steel, electrode steel, cold heading steel, spring steel and bearing steel, etc.



Tube Mill

Xigang Heat Treatment Line #1 Succeeds in Hot Test



Heat treatment line #1 supplied by CISDI on EPC basis for $\Phi 258\text{mm}$ tube mill of Valin Xigang Special Steel Co., Ltd. successfully passed the hot on-load test on January 31, 2013, so far all ten production lines for $\Phi 258\text{mm}$ tube mill (from hot rolling to finishing) have been successfully built.

The $\Phi 258\text{mm}$ seamless steel tube mill consists of one world leading PQF tube mill and two supporting heat treatment lines, four pipe threading & special tube finishing lines and two non-destructive QA lines. It will produce high-end tubing and casing with premium thread (typically P110, Q125 steel) and high-pressure boiler tubes (typically T91, P91 and stainless steel).



Quenching Device

Order Awarded to Supply Gas Holders for Tangshan Ruifeng



CISDI won the order from Tangshan Ruifeng Steel (Group) Co., Ltd. recently to supply one 200,000 m³ BFG holder, one 80,000m³ LDG holder, one booster station and one dedusting system for gas holder area.

This is CISDI's first order from Tangshan Ruifeng Steel.

Link: CISDI Gas Holder Technology

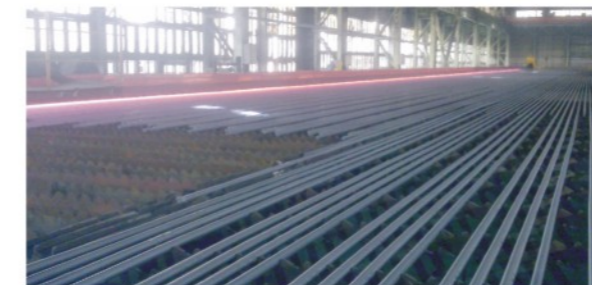
- ◆ CISDI's POC-type gas holder with full intellectual property is absolutely leading in high-pressure gas holder market.
- ◆ It has over 90% share in HP gas holder market in China.
- ◆ Ever-updating record holder in China: max. storage volume (300,000 m³), max. storage pressure (15kPa).
- ◆ Far leader in China regarding the gas holder design and fabrication technology.
- ◆ One-stage type rubber membrane sealed dry gas holder developed by CISDI in-house, featuring storage pressure up to 12.5 kPa, piston speed up to 7m/s, heavy throughput and low pressure variation.



Baosteel 300, 000 m³ Gas Holder Constructed by CISDI on EP Basis

Electrical & Automation

Modernized Bayi Steel Bar Mill Resumed Operation



optimization of three flying shear program and drive data to improve the knife positioning, cutting accuracy and yield; replacement of finishing swinging shear equipment to increase the cutting capacity; re-debugging;

As only seven-day shutdown is available for the modernization, it is challenging for CISDI to redevelop the rolling line program and replace the equipment in such limited time, but CISDI engineers have successfully accomplished the task.



The bar mill of Bayi Steel, for which CISDI provided drive automation revamping, resumed operation on April 1, 2013.

The bar mill was started up in 2005, which requires manual interference during rolling. To address this problem, CISDI was contracted to undertake: revamping of DC main drive for Mill #17, 18 (the former DC drive cabinet is replaced) and optimization of former DC main drive system data; modification to rolling line automation program and HMI program;

CISDI's Converter Waste Heat Boiler Leading the World

CISDI inked the contract with Qingdao Yuye Development Co., Ltd. in early March, 2013 to supply two CISDI's long-service-life converter waste heat boilers. This is the second order from Qingdao Yuye after CISDI supplied some spare parts for their waste heat boilers in 2011. So far, totally nine CISDI's long-service-life converter waste heat boilers have found application in reference plants.

The performance of converter waste heat boiler has direct influence upon the normal operation of steelmaking converters, and it is also very important for converter waste heat recovery to achieve negative-energy steelmaking and high energy efficiency. Though waste heat boilers have been used for cooling



Boiler Failure due to Poor Circulating Water Quality

Long-Service-Life Converter Waste-Heat Boilers

As found by wide investigations, it is common that the existing converter waste-heat boilers are short in service life. The upper cooling flue can only lasts for 6~8 years, while the movable hood and flue at mouth can serve only app. one year as they are exposed to severe conditions (splashing liquid steel, abrasion by fume), with frequent equipment failure, heavy maintenance and hidden operation risks.



Tail Section of 50t Converter Waste-heat Boiler

steelmaking converter fumes in the world, they are challenged by problems such as low designed efficiency, short boiler service life and difficult steam utilization.

To address these problems, CISDI has devoted to the studying on waste heat boiler core technology and eventually developed series of long-service-life converter waste heat boilers based on their wide experiences in design and commissioning. These products incorporate not only CISDI's proprietary calculation results of waste-heat boiler design software, but also several CISDI patented technologies.



Boiler Failure due to Non-uniform Circulating Water Distribution

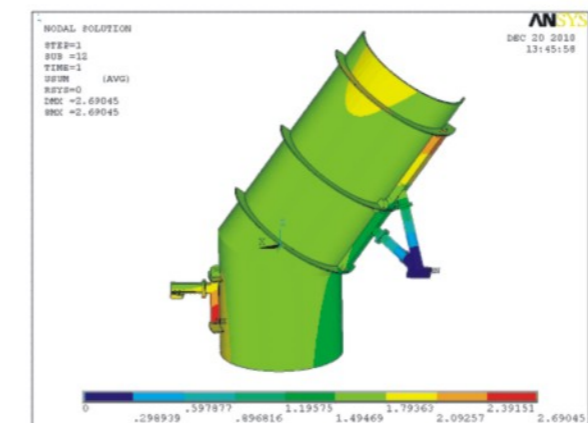
There are many causes for converter waste heat boiler failure and short service life. As found by CISDI's studies, the waste heat boiler failure are mainly caused by six factors, namely poor circulation water quality, non-uniform forced-circulating water distribution, safety of natural circulation, low-pressure steam dome operation, thermal expansion and stress fatigue. Besides, poor sealing of oxygen lance tip during waste heat boiler operation will also pollute the environment, and the leaked LDG is risky due to its CO content.

With years of unremitting efforts, CISDI team has found solutions to all above problems and developed series of converter waste heat boilers with long service life.

With respect to service life extension, CISDI applied flexible supporting structure and coned nitrogen sealing plug as proprietary technique in long-service-life converter waste-heat boiler design, which prevents the boiler failure due to non-uniform thermal stress, and prevents lance tip smoking by improved sealing.



Converter Waste-heat Boiler (Hood)



Stress and Deformation Analysis for Tail Section

Micro-superheat Recuperator

To address the converter waste heat boiler problem in hard steam utilization due to intermittent generation and variable flow, CISDI has developed core equipment – micro-overheat recuperator, which can deliver the steam (superheat of 5~20°C) steadily without extra heating by making use of recuperator pressure variation and enthalpy difference between inlet and outlet steam.

With this technology, the steam generated by waste heat boiler can be used directly in RH and VD, supplied to steam piping system or used for power generation in a more stable way instead of being exhausted into atmosphere.

Flexible Lifting Device for Movable Hood

As the movable hood has to be lifted/lowered during steelmaking due to process requirement, the inlet/outlet water circulation pipe for movable hood must be flexibly connected. The metallic hoses or metallic expansion joints used for the connection are not durable, so CISDI developed its patented product – flexible lifting device for movable hood, which can serve for over 5 years (100,000 services without failure).

For the converter waste heat boiler failure due to improper erection, poor circulating water quality, inadequate boiling out, deoxidization or chemical adding, CISDI has prepared "Instructions on Converter Waste Heat Boiler System Erection and Commissioning" from his wide experiences to avoid damage to waste heat boiler due to lack of experiences.



Micro-superheat Recuperator in Operation

Advantages in System Integration

Many equipment in converter waste heat boiler system fall into category of special equipment (i.e. boiler, pressure vessel) and the piping are pressure pipes, which must be designed, erected and operated according to relevant codes and norms. In addition, the system operation may have problems such as false over-high water level in steam drum, vibration of upriser and downcomer.



Flexible Lifting Device for Movable Hood

CISDI enjoys obvious advantages in converter waste-heat boiler system integration. All pipes are designed with special software for stress and vibration calculation to ensure logical pipe routing. Meanwhile CISDI has its proprietary control program to ensure the safety of converter waste heat boiler system during full auto operation and limit the false level within reasonable range.

CISDI has supplied over 50 converter waste heat boilers over past three years, including EP supply, EPC supply and core equipment supply.

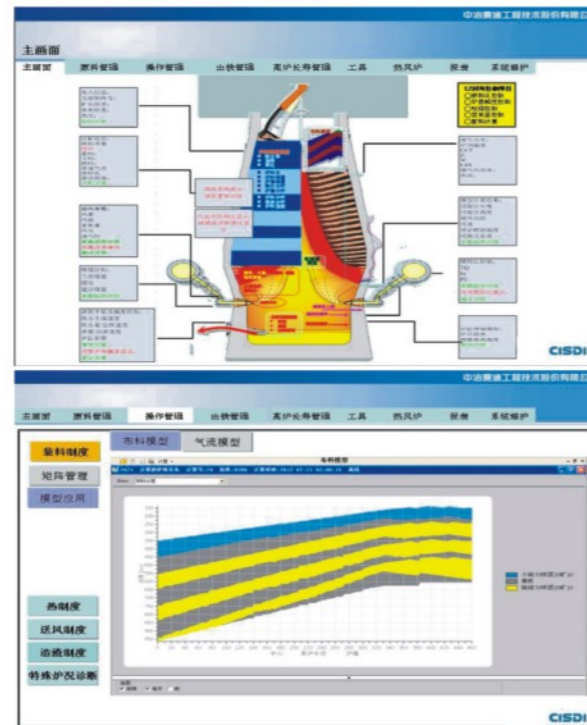
Operational Services for Ironmaking

Main Problems Existing in Ironmaking Plants

- ◆ Coke rate is yet to be further reduced, and the economic data is not desirable
- ◆ Variation in BF production conditions
- ◆ Relatively high failure rate in ironmaking process and equipment
- ◆ The operation and management system of ironmaking system needs to be standardized
- ◆ Lack of analysis and summary for various accidents
- ◆ The theoretical and operational skill of the operators need to be improved

Optimization Services Offered by CISDI

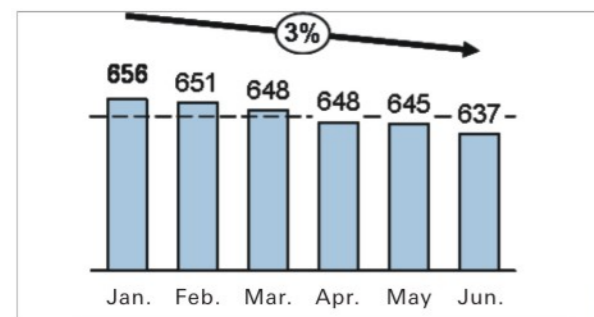
- ◆ To identify the problems by well-experienced expert team
- ◆ To improve the BF conditions
- ◆ To assist in solving the process and equipment problems
- ◆ To optimize and improve the operation and management system/standard, and provide training on regular basis
- ◆ To assist the owner in accidents analysis and summarization
- ◆ To implement BF expert system and models to ensure the BF stays in optimal conditions



BF Expert System

Benefits from Our Services

- ◆ BF overall coke rate, and hence BF operational cost is gradually reduced
- ◆ BF conditions are stabilized with significantly less variation
- ◆ The skill of management and technical personnel is improved, and the management and operation are standardized
- ◆ Huge amount of accurate data are available for supporting the BF operation
- ◆ Powerful technical platform is available for BF accidents analysis and summarization



BF Fuel Rate

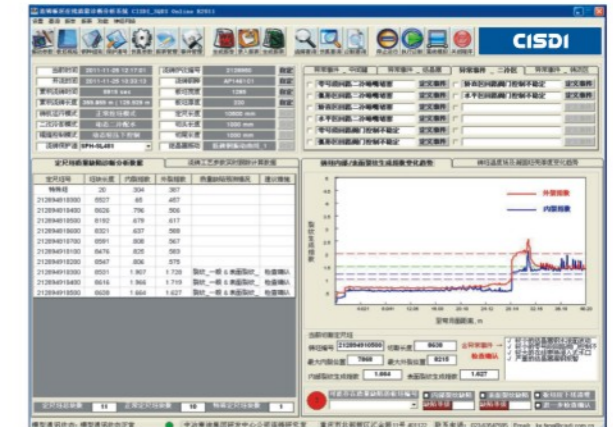
Operational Services for Steelmaking

Main Problems Existing in Steelmaking Plants

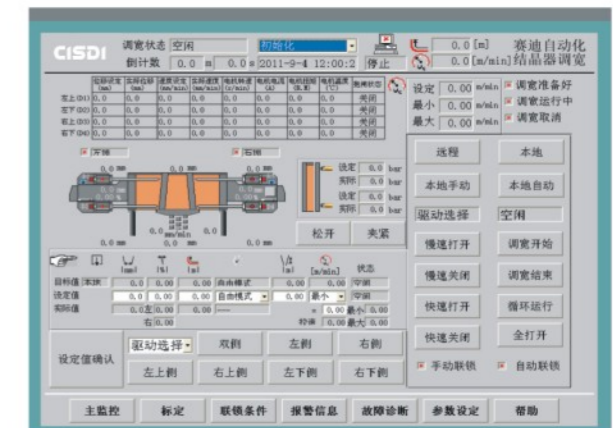
- ◆ Low liquid steel yield
- ◆ High electricity consumption per ton liquid steel
- ◆ High raw material consumption per ton liquid steel
 - (1) High electrode consumption
 - (2) High desulphurization consumption
 - (3) High aluminum particle consumption by RH
- ◆ Poor cast billet/slab quality
- ◆ High cost for segment maintenance
 - (1) Short roller service life and high oil consumption
- ◆ Long downtime for mould width adjustment during non-production period
- ◆ The billet/slab quality need to be inspected off-line

Optimization Services Offered by CISDI

- ◆ To improve the liquid steel yield by system implementation, to reduce consumption by reducing re-blow and optimizing oxygen blowing
- ◆ To reduce the electrode consumption by optimizing the power supply system and enhancing LF inlet temperature
- ◆ To save electric power by optimizing the tap-to-tap period and improving ladle preheating efficiency
- ◆ To standardize the desulphurization system and operation activities, and to improve the raw material management
- ◆ To optimize the cutting, segment, oil/grease system, equipment structure and maintenance system
- ◆ To implement soft reduction and on-line slab quality diagnosis model, on-line mould width adjustment



On-line Quality Diagnosis



On-line Mould Width Adjustment

Benefits from Our Services

- ◆ Significantly improved converter liquid steel yield (app. 2%)
- ◆ Several million of RMB can be saved from electrode consumption (based on 5mt/a liquid steel production capacity)
- ◆ The roller service can be extended by app. 60% and grease consumption reduced by app. 20% due to segment rollers and lubrication optimization. Over RMB 1 million can be saved from waste water treatment.
- ◆ On-line slab quality pre-assessment is significantly improved, and the final product quality is greatly improved. The caster availability can be increased by app. 3% due to implementation of on-line mould width adjustment.



Higher Liquid Steel Yield

Bayuquan Stockyard for Anshan Steel (Group) Co., Ltd.

Project Background

Bayuquan stockyard designed by CISDI for Anshan Steel is the first extra-large integrated stockyard in freezing northern China. It consists of material receiving from dumper, sample taking and preparation system, flux yard, ore yard, blending yard, coal yard, material supply system and defrosting system.

CISDI was contracted in 2007 to provide design for the stockyard, and the stockyard was built and put into operation in 2008.



Main Data

| | |
|--|------|
| ◆ Annual receiving capacity (10 ⁴ t/a): | 1928 |
| ◆ Footprint (10 ⁴ m ²): | 73.8 |
| ◆ Useful storage capacity (10 ⁴ t): | 266 |
| ◆ Stacking/reclaiming devices: | 18 |
| ◆ Qty. of belt conveyors: | 127 |
| ◆ Overall length of belt conveyors(km): | 24.3 |
| ◆ Iron output (10 ⁴ t/a): | 650 |
| ◆ Annual supply capacity (10 ⁴ t/a): | 1960 |
| ◆ Annual handling capacity (10 ⁴ t/a): | 1202 |
| ◆ Qty. of bays: | 14 |

Technical Advantage

- ◆ General layout, process route planning an overall design for large integrated stockyard
- ◆ Reliable mechanical equipment
- ◆ Highly automated control system
- ◆ Easy operation

CISDI's Scope of Supply

1. Feasibility study
2. Preliminary design
3. Construction drawing design
 - ◆ General layout
 - ◆ Civil works and architecture
 - ◆ Process design
 - ◆ Customized equipment design
 - ◆ Power supply & distribution design
 - ◆ Computer system
 - ◆ Auxiliary design
 - ◆ Fire protection design
 - ◆ On-site service for construction supervision



Stockyard for Greenfield Plant of Chongqing Steel

Project Background

Stockyard designed by CISDI for the greenfield plant of Chongqing Steel in Changshou is an extra-large integrated stockyard in middle and upper reach of Yangtze River, which consists of material receiving from dock, material receiving from dumper, auxiliary yard, ore yard, blending yard, coal silo and material supply system.

CISDI was contracted in 2009 to provide design for the stockyard, and its Phase I was built and put into use in 2011.



Main Data

| | |
|--|--------|
| ◆ Annual receiving capacity (10 ⁴ t/a): | 1869 |
| ◆ Footprint (10 ⁴ m ²): | 43.059 |
| ◆ Useful storage capacity (10 ⁴ t): | 157.37 |
| ◆ Stacking/reclaiming devices: | 11 |
| ◆ Qty. of belt conveyors: | 95 |
| ◆ Overall length of belt conveyors(km): | 22.129 |
| ◆ Annual supply capacity (10 ⁴ t/a): | 2129 |
| ◆ Annual handling capacity (10 ⁴ t/a): | 888.53 |

Technical Advantage

- ◆ Overall design for large-sized stockyard

CISDI's Scope of Service/Supply

1. Feasibility study
2. Preliminary design
3. Construction drawing design
 - ◆ General layout
 - ◆ Civil works and architecture
 - ◆ Process design
 - ◆ Customized equipment design
 - ◆ Power supply & distribution design
 - ◆ Computer system
 - ◆ Auxiliary design
 - ◆ Fire protection design
 - ◆ Construction service
 - ◆ On-site service for construction supervision

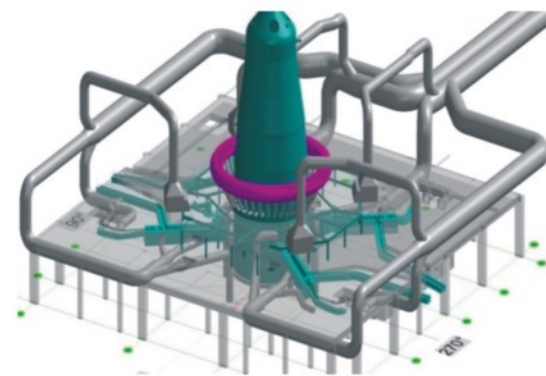
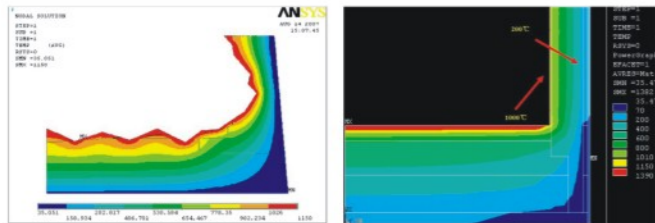


Blast Furnace Long-campaign Design and Furnace Proper Revamping Technology

CISDI boasts nearly 60 years of Blast Furnace design and construction experiences with more than 160 BF references. Backed up by construction practices of various types of BF and through comprehensive BF research, simulation analysis and experiment, CISDI has developed typical BF long-campaign and furnace proper revamping technology.

Elaborate Design, being Effective and Reliable

With advanced 3-D design and digital simulation, thanks to years of design practice, effective and reliable design is ensured to prolong BF life to 15 years or even longer.



BF Long-campaign Technology

| BF | Volume | Annual Hot Metal Output(10 ⁴ t) | Startup Time | Revamping Time | Operating Period |
|-----------------------|--------------------|--|--------------|------------------|------------------|
| Baosteel #3 BF | 4350m ³ | 325 | 1994 | 2013 | 19 |
| Baosteel #2 BF | 4063m ³ | 325 | 1991 | 2006 | 15 |
| Benxi Steel #5 BF | 2600m ³ | 161 | 2001 | 2016 (scheduled) | 15 |
| Panzhuhua Steel #4 BF | 1350m ³ | 83 | 1989 | 2004 | 15 |



Series of BFs in Baosteel with volume over 4000³ designed by CISDI



BF No.4 of PZH Steel Designed by CISDI

Rich Design Experiences

Design of Hearth Structure



- Large carbon-block structure
- Hot-briquetting small carbon block structure
- Ceramic cup structure

Design of Various Cooling Types



Copper cooling stave



Cast iron/cast steel cooling stave



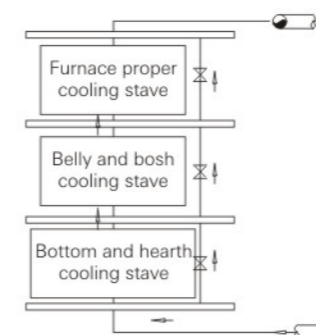
Trough plate cooling equipment



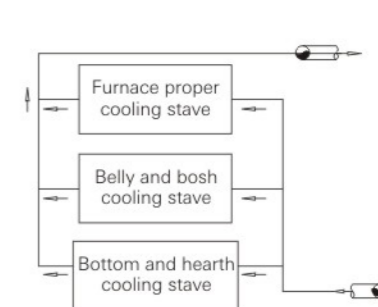
Fully cooling plate

Various Cooling Water Systems

Segmented cooling water system in series



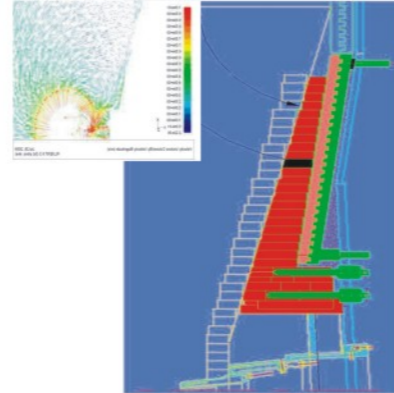
Segmented cooling water system in parallel



CISDI BF Proprietary Technology

■ Structure combining plate and stave

- Copper cooling plate features high cooling strength, forming stable slag skull, thus realizing smooth transition of BF inner profile.
- Copper cooling plate inserts deep into the shell, thus reducing impact on tuyere by burden and protecting the tuyere.
- After damage, the copper cooling plate can be repaired and replaced easily.



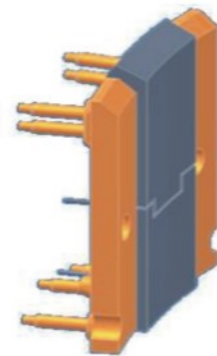
■ Traverse Cooling Stave Structure

- Traverse cooling stave can well avoid intensive opening on shell for common cooling stave.
- Cooling strength is more than 1.5 times higher than common cooling stave, thus enjoying longer life.
- The longest life record for traverse cooling stave is 19 years at the moment.



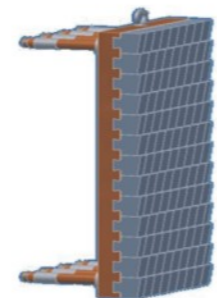
■ Throat Armor Structure

- Throat armor is designed as cooling equipment plus protecting plate structure. Cooling equipment will cool the protecting plate while the protecting plate protects cooling equipment from burden impact, thus greatly prolonging life of throat armor.
- It also features easy installation and convenient replacement.



■ Cooling Stave Inlaid Brick Structure

- The protruding part of inlaid brick will support the slag skull, reducing chance of slag skull fall, thus protecting cooling stave effectively and increasing service life of cooling stave.



BF Revamping Technology

As the customer hopes to realize shortest possible shutdown period and minimum production loss, CISDI has, in cooperation with related companies, made great number of research into furnace proper structure and BF revamping technology and applied a series of BF rapid revamping technology and BF expansion technology with CISDI features successfully.

■ BF rapid revamping technology

Typical revamping project-Baosteel No.1 BF Rapid Revamping

- Volume is changed from 4063m³ to 4966m³
- All equipment is domestic
- Combined copper cooling stave and copper cooling plate
- 3-section offline assembly of furnace proper
- Traverse and push-in, segmented assembly
- Revamping record in China, 78 days.



■ BF Expansion Revamping Technology

Typical project-Benxi Steel No.5 BF

- Volume is changed from 2000m³ to 2600m³
- Furnace tower is reused with volume expansion 30%
- The first thin-wall BF in China
- The first BF with copper cooling stave from bosh to stack in China
- Revamping period: 98 days

