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Rebuild commences at Baosteel Meishan Steel's outsourced coke and coal silos

IN THIS ISSUE

CISDI

TOTAL SOLUTIONS AND TECHNOLOGY PROVIDER
PREFERRED BY GLOBAL METAL INDUSTRY

Full-Process Services
CISDI provides full-process services from the bulk material handling yard to the post-processing line of the hot 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 through the entire project life cycle.

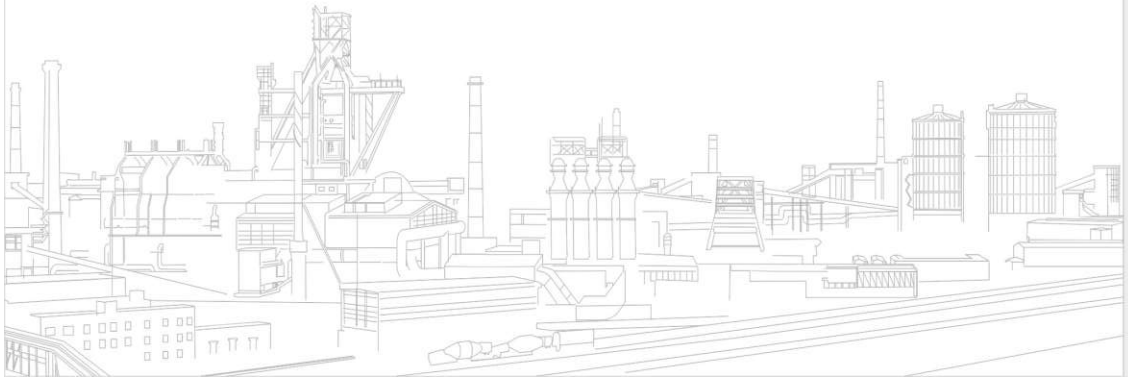


Table of Contents

Chairman Xiao visits Formosa Plastic Group and E United Group

August proved to be a month of strengthening important relationships with valued clients in Taiwan.

CISDI's chairman Xiao Xuewen paid visits to the headquarters of Formosa Plastic Group and E United Group.

At Formosa he met with vice-president Wang Ruihua, and the president and managing director of its Vietnamese subsidiary Formosa Ha Tinh Steel, Chen Yuancheng and Zhang Funing.

Xiao hopes to further strengthen business links following on from CISDI's vital role in the highly successful startup of Blast Furnace 1 at FHS on May 29, which is running smoothly and is one of the best-performing units of the complex in Vietnam.

Wang Ruihua expressed appreciation for CISDI's dedication, professionalism and client-focussed service on the project. He stressed that FHS has embraced CISDI not only as a project contractor but as a trusted partner, and his confidence that the two organisations would build on what was already a solid foundation.

A Formosa spokesman commented further: "It's proved it was absolutely the right decision to select CISDI to take on our first EPC project".

During the meeting with FHS leaders, Xiao emphasised the importance of Formosa to CISDI and detailed the research CISDI had been developing to improve sustainability at the plant in response to market needs.

With its 60-year engineering experience, CISDI can provide the highest quality services and create valuable results for its clients. The company's FDG-based big data system supports its operations management services and smart manufacture, which ably sustain the upcoming cooperation for FHS.

On August 9 Xiao met with Lin Yishou, founder of E United Group, to discuss proposals for a CISDI consulting service at E United Group's planned steel plant in the USA, a project which would draw on the expertise of CISDI's subsidiaries in the UK and USA.

Dalipal and CISDI pledge to take China's steel tube industry global

Chinese giants CISDI and Dalipal have pledged to combine their expertise and vision and take China's steel tube industry to new global heights.

Leaders from both organisations spoke of their joint ambitions on August 17 in Chongqing, at the signing of the EPC contract for Package 1 in the first phase of Dalipal Pipe Company's relocation and upgrade programme.

CISDI will be delivering the EPC for Dalipal's relocation to Bohai New Zone in Cangzhou, an area of reclaimed urban land in the Hebei province of Northern China.

Phase I of the project will focus on the building of a smart petroleum pipe production line, to enable Dalipal to produce 300,000t/a petroleum pipes (oil pipe stock, casing stock and pipeline pipe stock) in outer diameters ranging from Φ73.0mm~Φ159.0mm.

Package I will include the creation of a rolling mill and heat treatment line.

CISDI's EPC contract will focus on the main workshop building and its facilities - automation, information and smart management hardware and software systems, the main electric room, water treatment plant, compressed air station and dedusting facility.

At the contract signing, Xiao Xuewen, chairman of CISDI Group, stressed that the steel tube industry will be challenged by higher requirements in new process, new technology and new manufacturing methodology against the backdrop of national supply-side structural reform and advancement, and urged China's experts to explore business potential both at home and in the South American and Southeast Asian markets.

Stressing the tubular product expertise CISDI has amassed in its 60-year history of engineering services, Xiao expressed the desire to drive China's steel tube industry global by joining forces with Dalipal's enterprise, training and research institute,

Meng Fanyong, chairman of Dalipal, agreed he shared CISDI's vision to unite as research, development and application partners.

CISDI creates China's first stainless steel-enclosed stockyard

CISDI has devised another first for China's steel industry, cladding a stockyard in stainless steel to significantly reduce impact on the environment at the world's largest steel production plant.

The massive structure at the Taiyuan Iron and Steel Co. (TISCO) in Shanxi Province has been completely enclosed by stainless steel roofing boards, which along with existing wind and dust breaks brings the dust suppression ratio up to 96.75%.

Built by CISDI on EPC basis, TISCO's upgraded stockyard went into operation on August 11.

The enclosed area measures some 66,500m^2 and encompasses six banks of primary stockyard, an integrated stockyard and two wagon tipper areas.

The primary stockyard has been divided into three areas and enclosed by arc checkered steel structures, with a total enclosed area about 59,300m^2. Each building was designed with respective spans of 108.5m, 124.5m and 82.3m and a crown peak at around 48m to minimise impact on storage capacity.

Production was maintained during the construction, with CISDI working around significant problems, including limited construction space, a tight timescale, numerous working faces and interfaces and congested surrounding facilities.

Incorporated technology includes multi-cross-section large-span grid seamless stitching, sectionalised inspection, anti-collision stacker and reclaimer equipment, high-hardness sheet profiled pressing and installation technologies. A deep foundation pit was constructed close to the railway line.

Large-span checker steel structures were developed and made by TISCO from a new type of ultra-pure ferrite stainless steel sheeting which is longer-lasting and requires less maintenance than traditional enclosing materials, and is also lighter and more visually attractive.

CISDI and the specialised equipment maker worked on the development of the domestic stainless steel checker press together, and carried out numerous tests during the process.

It took only 110 days to build the checkers, 75 days to create the purlins and 54 days for sheets. Even the construction company set a new record, installing the roofing boards at a rate of 1,800m^2 to 2,000m^2 per day.

CISDI is committed to providing smart, green, clean and efficient solutions for its clients and has carried out engineering services at over 90 stockyards for at least 60 clients both at home and abroad, accounting for nearly 80% of the market. More than 30 projects led to the creation of environmental-protection stockyards.

Rebuild commences at Baosteel Meishan Steel's outsourced coke and coal silos

Baosteel Meishan Steel has commenced the rebuild of its outsourced coke and coal silos, which will enhance the plant's clean production levels and cut logistics costs.

Designed by CISDI, the work started on July 17 and will be completed by the end of 2018.

An outsourced coke long bunker measuring 150m by 20m and 26 coal silos with diameters of 21m and single storage capacity of 10,000t are being constructed, in addition to 2-set reciprocal wagon tippers and supportive facilities.

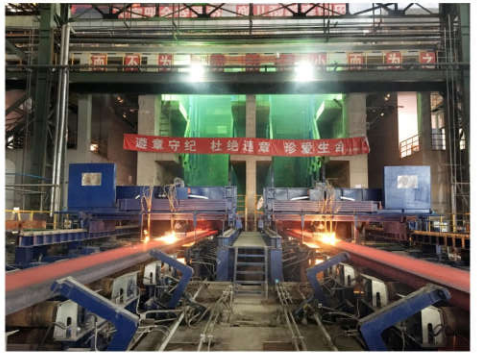
The project is a significant step in Meishan Steel's transformation to a green steel plant, which will eventually feature enclosed loading and unloading for the transport, storage and rotating of coking coal, anthracite coal and outsourced coke.

Donghai Special Steel Slab Caster 3 is hot tested

The Slab Caster 3 of Hebei Donghai Special Steel Meltshop 2 passed its final hot test on July 6.

CISDI undertook the package supply for the new 2-strand slab caster, which will improve product mix and quality and produce slabs measuring from 180mm, 200mm and 210mm by 900mm~1,250mm at a capacity of 2.30Mt/a.

CISDI's technology and package supply team carried out the design, supply and supervision of installation and commissioning.



CISDI wins contract for Yanshan Steel RHF Phase II

CISDI has won the contract to build the second phase of Yanshan Steel's rotary hearth furnace programme.

CISDI successfully carried out the first phase for Yanshan Steel, on EPC basis, from May 8 2014 to startup in June 2015 and achieved world-leading indicators.

Phase II aims to thoroughly treat internal Zn- and Fe-bearing dusts and achieve zero levels of waste and waste discharges of Fe, Zn and C.

Considerable economic and environmental benefits will result. Metalized pellets produced from the RHF can be used as high-quality auxiliary stock for blast furnaces or converters. And high-grade ZnO powder produced from the RHF can be sold for Zn melting stock.

Developed entirely by CISDI, the Phase 1 RHF is used for extracting Zn. This highly efficient equipment transforms metallurgical Fe-bearing dusts into resources in an environmentally-friendly way. It is able to treat 200,000t of dust from BFs and BOFs and produce up to 140,000t of metalized pellets, 5,000t of ZnO powder and 130,000t of steam.

The new contract with Yanshan Steel is the latest in a series of prestigious project wins for CISDI, most notably with Baosteel Zhanjiang and Rizhao Steel.

The company is renowned for providing optimised technological routes and systematic solutions to help clients maximise the use of internal resources.

Home to over 50 patented equipment and technologies in this field, CISDI can supply RHF, homogenizing and cold briquetting services and incorporate the recovery of Fe, Zn and C without solid waste discharge.

CISDI possesses multiple solid waste treatment technologies with RHF direct reduction at the core. Its RHF technology has achieved highly competitive operation indicators with a world leading de-Zn ratio of 85%~90% and metallisation ratio of 75%~85%.

Artist's impression of Yanshan Steel's RHF plant

RHF Phase I at Yanshan Steel

Baosteel Zhanjiang 2,300mm Slab Caster Project

Overview

Baosteel Zhanjiang 2,300mm slab caster, designed and supplied as a package by CISDI, passed the first hot test on May 15, 2016.

The 2,300mm slab caster package includes the world's largest (520t) ladle turret, mould online width adjustment, mould hydraulic oscillation, dynamic secondary cooling model, dynamic soft reduction model, automatic start of casting and other IPR-based technologies and equipment.

The segments and dummy bar were modified by CISDI from existing ones at Baosteel Luojing's 2xsingle-strand casters which had ceased production.

The Zhanjiang 2,300mm slab caster is designed for the mass production of ultra-high-strength machinery steel and high-grade pipeline steel.

It has achieved all set targets for efficiency, quality and low operational cost.

During the 15 months since startup, the slab caster has been running smoothly and stably and producing over 240,000t of qualified slabs on average each month.

The casting production is highly automated and runs with just six operators. The average energy consumption of 3kg standard coal/t • slab is much lower than the 7kg standard specified in the Code for Design of Steel Enterprise Energy Saving.

Baosteel Zhanjiang 2,300mm slab caster

Slab quality and status of Baosteel Luojing caster before relocation and modification

The original 2 x single-strand 2,300mm casters at Baosteel Luojing Plant, supplied by others, started up respectively in 2007 and 2009, and ceased production in 2012.

Both produced slabs with serious corner cracks from startup to stop. Except for low-carbon steel, the grades experienced corner cracks and almost all slabs required manual scarfing and could not be cleared of the corner defects without chamfering large rounds.

World's largest ladle turret, with a tonnage of 520t

Optimised design of Zhanjiang 2,300mm CCM

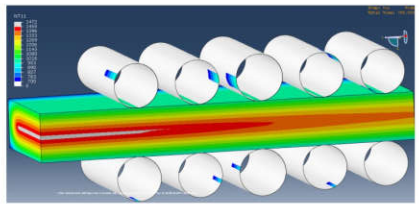
Baosteel Luojing's 2 single-strand casters were relocated to Zhanjiang Steel for modification. CISDI applied a series of pertinent core technologies and equipment to solve the rooted corner crack defects, including:

1) CISDI – dynamic secondary cooling model

The cooling model can accurately control slab temperature, avoiding over-cooling or over-heating, and ensure a stable temperature distribution on the slab surface during the casting process, avoiding the probability of corner crack.

2) CISDI – dynamic soft reduction model

The model works by making exact real-time calculations and tracking positions of slab final solidification end, determining the proper soft reduction zone and appropriate percentage and reduction. By so doing, the freezing liquid steel at two phases could be limited, to the largest extent, flowing inter-dentrictically. When the reduction is properly done, the slab could be compensated for the freezing shrinkage and thermal contraction, which plays an effective role in removing central segregation and central shrinkage that are taken as defects of slab.



Dynamic soft reduction control technology

3) Optimizsd continuously-bending and -straightening roller apron

The continuous bending model gives a continuously-changing radius of curvature. It eradicates errors that occur during the conventional multi-point bending-straightening curve process due to a reliance on basic radius.

4) Eraser of mechanical clearance of segments roll gap

The original Luojing casters were installed with hinged segments, however, the hinged points of the clamping mechanism engendered mechanical wear and clearance during operation. This degraded the precision of segments roll gap, and impaired slab quality. Aware of the phenomenon and its cause, CISDI developed a dedicated mechanical clearance eraser, which aligns the roll gap value measured by roll gap checking with the real gap datum in production. By removing the deviated roll gap, the segments show remarkably improved roll gap control precision and extended service life.

5) Optimised division of secondary cooling

The original Luojing casters had two cooling zones at the bending section and incorporated Segment 2 and 3 as one cooling zone. To modify the casters, CISDI made a simulation calculation and found the original cooling divisions could not satisfy all the grades' temperature reduction and recovery requirements. Based on that analysis, the Zhanjiang caster cooling zones were re-designed by CISDI. The bending section was divided into three cooling zones and Segments 1 and 2 were separated into independent cooling zones. In this way, the slab surface cooling rate and temperature profile could be controlled avoiding surface cracking.

Baosteel Zhanjiang 2,300mm slab caster segments

High efficiency, high quality but low cost

Zhanjiang's 2,300mm slab caster started up two months ahead of schedule and has now been in operation for over a year. Core technologies and equipment - dynamic secondary cooling model, dynamic soft reduction model, mould online width adjustment and automatic start of casting – have been in operation since the first heat and have performed reliably.

The following high-value-added products have been produced since startup: ultra-high-strength machinery steel, high-grade pipeline steel, high-end pressure vessel steel and high-grade shipbuilding steel.

Annual production is 2.80Mt/a or above with excellent slabs exhibiting zero corner cracks and excellent central segregation.

It is the best performing slab caster at Baosteel and one of the world's most efficient casters. The energy consumption indicator is averaging 3kg standard coal/t·slab, a world-leading level.

All targets - for efficiency, low operating costs and high product quality - have been achieved and have gained CISDI global recognition.

1) High efficiency

The slab caster is designed to reach an annual output of 2.75Mt and since startup has been running smoothly at an average casting speed ratio above 85%, averaging a monthly output of 240,000t of commercial slabs giving an annual output of up to 2.80Mt – representing truly world-leading operating performance.

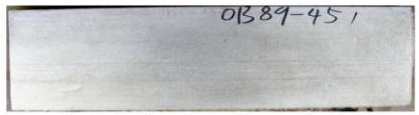
2) High quality

The pass rate runs as high as 99%, excelling at both internal and surface slab quality.

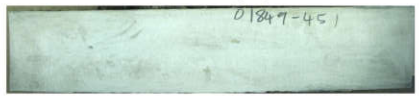
The problem of corner cracking has been eradicated at all production grades (low carbon steel, low carbon alloy steel, peritectic alloy steel, pipeline steel, medium-carbon alloy steel and high carbon steel).

The central segregation level for the above-mentioned grades is over C2.0/M25, without any occurrence of segregation B or A. Over 85% of all the grades reach central segregation levels of C1.0/M20 and over.

Low-carbon boric steel, with a sample size: 230mmx1,300mm, segregation: C05



Medium carbon steel, with a sample size: 230mmx2,200mm, segregation: M15



X70 pipeline steel, with a sample size: 230mmx2,300mm, segregation: M15

The following table lists the central segregation indicators of slabs produced by Zhanjiang 2,300mm CCM in the past year:

Central segregation indicators of slabs as produced by Baosteel Zhanjiang CCM in the past one year

Steel grade	CCM	Proportion of better than C1.0/M20 (%)	Proportion of better than C1.5/M25 (%)
Low-carbon steel	2,300mm caster	93.40	98.83
	2,150mm caster	92.64	98.60
Low-carbon alloy steel	2,300mm caster	89.90	99.33
	2,150mm caster	90.39	99.13
Peritectic alloy steel	2,300mm caster	93.61	99.42
	2,150mm caster	88.45	98.39
Pipeline pipe	2,300mm caster	88.82	91.45
	2,150mm caster	89.57	94.40
Medium-carbon alloy steel	2,300mm caster	86.00	94.24
	2,150mm caster	82.21	98.58
High-carbon steel	2,300mm caster	97.37	100
	2,150mm caster	not yet produced	not yet produced

3) Low cost

Creating cost economies is the ultimate aim of CISDI design. The high-level automation control system at Zhanjiang's 2,300mm slab caster has reduced the number of staff required to six per shift. The average output of slab per capita is 60,000t/a, a world-leading figure.

Utilities are another potential area for major cost savings. In a year of production, average energy consumption has been kept at 3kg standard coal/t • slab, far superior to the 7kg standard coal/t·slab specified in Code for Design of Steel Enterprise Energy Saving. This world-leading figure has been achieved by standout process design and a compact utilities arrangement, which reduce energy consumption.

Mould online width adjustment technology wins metallurgical S&T prize

A CISDI-led technological research and application has won an award for advancements in metallurgical science and technology.

Its development in slab caster mould online width adjustment technology picked up third prize at the awards on August 3.

CISDI set itself the challenge in 2010 and achieved it two years later. Its technological invention, the multi-disciplinary integrated online adjustment of mould width based on neural network technology, was initially hot tested at Xinjiang Bayi Steel's #1 slab caster in 2011, marking the beginning of its industrial application. This technology has since been used in Baosteel Zhanjiang and Shagang.

The mould width should be adjusted to meet the slab width specifications. Online adjustment of mould width attracts high attention in the industry because it contributes to mould life, reduces raw material loss and reduced breakouts; the equipment availability and metal yield can be hence improved while the energy consumption and production costs are reduced.

The technology has been licensed for four patents and is a world leader.


Online adjustment of a wedge slab in process at Xinjiang Bayi Steel

CISDI vacuum metallurgical technology is licensed 9 national patents of invention

Vacuum refining is a core technology used to improve the purity of liquid steel. Mastery of this technology enhances the capability of producing high-grade steel.

CISDI has created a number of breakthrough key technologies - such as the vacuum temperature measurement and sampling, steel ladle gas stirring, impregnation pipe, multi-functional top lance and ladle lifting - which reduce equipment costs and increase efficiency.

The vacuum refining technology package has been granted 9 patents of invention, leading the world's technological development. It benefits in remarkable shortening of the tap-to-tap cycle time and saving of operating cost while ensuring satisfactory smelting effect.

● Technology of steel ladle impulse bottom blowing of argon presented at Brazil's international steelmaking forum

It is common practice to use continuous gas stirring or small-flow gas stirring in the steel ladle; however, the former is subject to generating serious splashing of slag despite gaining good stirring effects, and the latter sacrifices the desired stirring effect for the control of splashing. To meet this challenge CISDI invented the impulse bottom blowing of argon into the liquid steel, which can be satisfactory in both aspects by using a large amount of gas for stirring from the bottom. In essence, it's a safe technology which helps alleviate corrosion on the ladle's internal lining and extends the ladle service life. The thesis regarding the technology and equipment was presented at the 43rd international steelmaking forum in Brazil.

● Integrated impregnation pipe improves RH refining efficiency

To improve RH refining efficiency, CISDI created integrated impregnation pipe technology. This expands the internal diameter of the pipe, increasing the flow cycle of liquid steel, shortens treatment cycle and extends the impregnation pipe's service life, all without changing the upper size of vacuum tank or thickness of refractory.

The technology is in operation at the Yingkou Steel 120t RH refining project and is enhancing liquid steel flow cycle from 68.7t/min to 96.2t/min with no addition of lifting gas flow. In addition, it is shortening the dehydrogenation cycle from the guaranteed 20 minutes to 12mins 22sec, and extending the service life of the impregnation pipe by 10 heats.

An additional CISDI development, a deep-bath vacuum tank, can be added to increase the quantity of liquid steel in the vacuum atmosphere and further improve treatment efficiency.

● Supersonic cluster annular top lance technology

To combat top lance problems which result in forced decarburization, malfunction of automatic ignition and ineffective combustion and heating, CISDI has developed the supersonic cluster annular top lance which is designed with an annular head structure - and breaks technological monopoly by foreign enterprises.

Such a creative top lance not only solves the problems but intensifies the oxygen blowing flow while buffering splashing, and improving the injection efficiency and combustion effect. The technology is presently under pilot operation at Chongqing Steel, providing a much better gas combustion effect and high efficiency of oxygen-blown decarburization. When blowing the same 150m3 oxygen, the new annular top lance can achieve 1ppm more carbon than the existing top lance at Chongqing Steel.

CISDI has also developed an infrared temperature measurement technology which is integrated into the new top lance, realising a continuous measurement of liquid steel temperature.

CISDI RH vacuum refining system is started up at Yingkou Steel

CISDI Equipment Co., Ltd.

- A subsidiary of CISDI Group, dedicated to equipment manufacture
- Established as CISDI's R&D pilot centre, core product manufacturing base and equipment manufacture and integration base
- Annual production of more than 30,000t of equipment and products
- Providing a life-cycle support for total equipment solutions
- Synergising the process from equipment research, development and design to manufacture, incorporating smart, information and control technologies in core equipment

CISDI's equipment manufacture center

Guofeng Steel's 5-stand tandem cold mill, designed, manufactured, installed and commissioned by CISDI

Jiangsu Chengde Steel 3-roll multi-stand pipe mill incl. sizing mill, a world first designed, manufactured and commissioned by CISDI