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CISDI

NEWSLETTER

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CISDI CREATES
DUAL FUEL
SOLUTION
FOR VIETNAMESE
REHEATING
FURNACE

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- CISDI's unmanned locomotive passes with flying colours



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 final post-processing line of rolling mill.

► **FULL-FUNCTION SERVICES**

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

► **FULL-LIFE-CYCLE SERVICES**

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

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CISDI HOSTS CHINESE EVENT TO BOOST ROLLING MILL INTELLIGENCE



Experts address the National Rolling Forum at CISDI

The latest research into new developments for China's rolling mill sector was top of the agenda when CISDI played host to the National Hot & Cold Rolling Technology Forum.

Sponsored by The Chinese Society for Metals and the Baowu Group, the August event focused on the advancing technology, creating greener and more intelligent rolling techniques and improving product quality.

Experts addressed intelligent manufacture, optimised production process, technology and equipment upgrades.

China's steel enterprises have been designing and building mills independently - using only its nation's strengths and expertise - for the past two decades. Their emphasis is now fixed on pursuing industrial transformation and upgrading via the

research and development of greener and leaner technologies and equipment.

CISDI delivered two keynote speeches at the forum to a 200-strong audience made up of experts and scholars from China's steel enterprises, universities and research institutes, engineering companies and suppliers.

Xie Erhu, CISDI's cold mill expert, gave an illuminating talk on the technological progress of the hot and cold-rolled plated strip mill. He discussed new trends in cold rolling development which are creating steel to increasingly stronger and thinner specifications.

Yu Mukui, CISDI's automation expert, focused on the intelligent era of mill automation and its positive impact on the smart stockyard and unmanned coil storage expertise, and debated future applications of big data for the steel sector.

CISDI chairman Xiao Xuewen told the forum: "CISDI Group is an innovation-driven provider of total solutions and advanced technology for the global metals industry. We work with clients to create a greener and more intelligent future and our information technology platform, intelligent products and expertise in digital design and delivery conform to the highest-quality trends in steel development. We are firmly committed to researching and developing new processes, new materials and new manufacturing methods."

CISDI TEAMS WITH SINOVAION VENTURES TO BOOST AI

CISDI has entered into a three-way venture to boost applications for artificial intelligence in the global steel industry.

The company has signed a cooperative agreement with Sinovation Ventures and its Artificial Intelligence Institute.

By virtue of technology, talents and commercialisation, CISDI and Sinovation Ventures and AI Institute will cooperate on projects, product development and technical services for smart city and agribusiness intelligent operations.

Sinovation Ventures is an established Chinese early-stage ventures firm, started in 2009 by a team led by Dr. Kai-Fu Lee.

With offices in Beijing, Shanghai, Shenzhen and Silicon Valley, Sinovation currently manages a portfolio of over 300 companies across the technology spectrum in China

and the U.S. worth an estimated \$1.7B AUM (assets under management) spread between six USD and RMB funds.

It is one of the first Chinese ventures firms establishing a presence and investment practice in the U.S., where it is backing start-ups at seed, Series A and Series B stages.

It evaluates projects on their merit for the U.S. market, and their potential to eventually enter markets in China.

It strives to become the best "go to China" partner for the start-ups, while also transferring collective learnings from its Chinese portfolio into its U.S. practice.

Its AI Institute is committed to speeding up the integration of AI+B2B technology and real world applications by leveraging leading technological and research capabilities around the globe.



The AI agreement, signed by CISDI and Sinovation Ventures

QINGZHU SMART CONSTRUCTION SITE BECOMES POPULAR



Screenshot of CISDI's Smart Construction Site in operation at a construction site

New benchmarks in China's engineering construction are set to be achieved via CISDI's latest 'intelligent' development.

Qingzhu is a smart construction site cloud specially developed for the construction sector.

By combining internet, big data and artificial intelligence with construction processes, it creates more efficient communication between all parties involved in engineering construction projects.

CISDI has already signed a Smart Construction Site partnership agreement with the China Metallurgical Construction Engineering Group Co, the largest buildings, public utilities and metallurgy construction company in China currently achieving revenue and new contractual volume targets of \$1.5 billion targets per annum for the consecutive seven years and is applying the system to 100 of its major construction sites every year.

A number of major Chinese construction companies are

also showing strong interest in Smart Construction Site, which applies IoT and big data technologies to achieve better communications and the green, digital, refined and intelligent management of construction sites.

An integrated command and management system can be built to closely link those governing the project government with the construction company's headquarters and its construction site team.

The linked system ensures construction management is real-time, safe, green and responsive.

CISDI's next goal is to achieve automatic, visualised and intelligent construction site management.

CISDI is now developing an AI-based building system and consolidating cooperation with building and construction partners for applying AI, BIM and video expertise for construction and related management.

LAIWU STEEL STOCKYARD STARTS REBUILD TO BE ENCLOSED

The rebuild of the stockyard at Laiwu Steel Yinshan's Section Mill Plant is now underway.

Located in Shandong, Laiwu is a 10 million tonne steel enterprise which produces optimum-quality H sections and pinion steel covering all the product specifications.

The rebuild, which CISDI are carrying out on an EPC basis, will totally enclose 13 stockpiles and five bays, a total floor area of 285,000 square metres.

At its widest point the stockyard will span 152 metres and will be the largest membrane-structured enclosed yard cluster in China's stockyard sector.

After the rebuild, all five yards will be totally enclosed. Additional space will also be created for future intelligence optimisation. Once the rebuild is complete, the stockyard's material handling capacity will be increased to meet the stock demand of the steel plant's downstream 2-set 265m² sintering machines.

Yu Zhaohui, CEO of CISDI, who attended the construction launch day, discussed in depth intelligence technology applications for Laiwu Steel with the company's CEO Luo Dengwu.

Mr Luo commented: "CISDI is contributing its wisdom to improve our steelworks' intelligent levels and will play a larger part in helping us to fulfil our environmental protection standards and production requirements."



CISDI's CEO Yu Zhaohui is pictured at the yard bay of Laiwu Steel's stockyard as the rebuild construction begins

CISDI CREATES DUAL FUEL SOLUTION FOR VIETNAMESE REHEATING FURNACE



The CISDI-built Hoa Phat reheating furnace has been dried off and is under hot commissioning

CISDI has created an innovative dual fuel solution for a 120-tonne-per-hour reheating furnace at Vietnam's Dung Quat Steel Joint Stock Company.

The dual-fuel solution is a major feature of Dung Quat Steel Joint Stock Company's full-process steel plant in Vitenam's Quang-ngai Province. The Hoa Phat Group have invested \$2.5 billion in the plant.

To improve reheating quality and bring about cost savings by reducing energy, LOI and emissions, CISDI created dual-fuel regenerative burners, evaporative cooling, combustion control and a number of other core technologies.

An optimum combustion system has been tailored to utilise different fuel supplies at various production stages. Blast furnace gas is used when available, and liquefied petroleum gas kicks in at other times.

CISDI's combustion solution works automatically and does not require modification to switchover fuels and has been highly praised by Dung Quat Steel and the Hoa Phat Group.

The furnace was built by CISDI Thermal & Environmental Engineering on an EPC basis and has now been dried off and has entered its hot commissioning stage.



CISDI's technical services team with their dual fuel reheating furnace

CISDI WINS PRAISE FROM RIZHAO STEEL



The BOF producing liquid steel for Rizhao

CISDI has received high praise from Rizhao Steel after delivering a high-performance BOF steelmaking plant.

Rizhao Steel is China's large private steel group. In addition to its skills in sintering, ironmaking, steelmaking, pickling, plating and tubular rolling, it is an enterprising producer of optimum-quality strip which accounts for over 70 per cent of China's rolled products output.

Rizhao Steel projects are critical to the transformation of China's steel production and CISDI has been involved in a number of highly advanced technological upgrades for the company.

CISDI was an active player in the construction of the world's most advanced ESP lines at Rizhao, which are able to produce ultra-thin sheets to a specification of 0.8-6mm x 900-1,600mm, filling the gap in Chinese endless strip rolling and production.

It was also involved in the modernisation of the main BOF steelmaking plant and two

300,000m³ blast furnace gas holders, both on an EPC basis, winning Rizhao's praise for its expertise and its painstaking attention at every stage of the process - from general layout to process route, technical proposal and equipment selection.

CISDI had carried out an in-depth analysis of the BOF plant's mass flow, energy flow, information flow and movement track prior to creating the most optimal production process.

The general layout and transport system was optimised to achieve the maximum benefit. High-tech design tools and innovation solutions were used in the design process and a full intelligent operation and management system was implemented. As a result, production and management costs have been reduced.

The BOF steelmaking plant was successfully hot commissioned despite multiple challenges posed by the weather and the financial markets. It was ramped up within a month of hot commissioning.



Aerial shot of Rizhao Steel's workshop buildings

SFRE-SUPPLIED RECOILING LINE IS HOT COMMISSIONED AT PANGANG



The hot-commissioned recoiling line for Pangang's 1,350mm tension leveler, supplied by SFRE

A 1,350mm tension leveler's trimming recoiling line has been successfully hot commissioned at Pangang.

CISDI's major equipment manufacturing base in Shaanxi Province, SFRE, independently designed and commissioned the line's automation system and package supplied mechanical, electric and hydraulic units.

The recoiling line is dedicated to the production of higher quality specifications and thinner specifications.

Annealed and leveled plain-carbon strips

ranging in thickness from 0.25mm to 2.5mm and from 700mm to 1,150mm in width will be processed by the tension leveler (stretcher-straightener) to improve both profile quality and trimming quality.

Boasting a high degree of automation control, the line's capabilities include automatic coil loading, weld tracking, opening of the over-weld straightener, coil dividing, whipping, re-threading and coil unloading.

The strip's surface, crops, coil dividing and oiling work will also be carried out on the new recoiling line.

YANSHAN STEEL PHASE II ROTARY HEARTH FURNACE DRIES OFF



An aerial photograph of the Phase I rotary hearth furnace for Yanshan Steel

The rotary hearth furnace for Yanshan Steel Phase II, the third of its kind built by CISDI for China's end-users, has been successfully dried off.

This is the second rotary hearth furnace built at the site by CISDI. Each furnace has an annual capacity of 200,000 tonnes, in accordance with the plant-wide iron-bearing solid waste output.

Work was carried out in two phases and stretched from 2014 to 2018. The first rotary hearth furnace was started up in 2015 and has been running smoothly for three years. It is working so well that the plant has achieved zero iron-bearing solid waste discharge. Technical indicators, energy consumption during each procedure and operation costs excel those of other plants in China.

Phase I's metallisation ratio of at least 70 per cent and de-zincification ratio of a minimum of 85 per cent are standout indicators.

These results are credited to CISDI contributed expertise in iron-bearing dust pelletising, drying efficiency, uniform

distribution, hearth atmosphere control, fast cooling and fume treatment.

Phase II, which was started up in August 2018, will consolidate the plant-wide iron-bearing dust treatment capacity and will continue the zero result in iron-bearing solid waste discharge.

CISDI is now a leading figure in China's rotary hearth furnace production. It has built three, including one for Baosteel Zhanjiang, and owns some 40 patents for rotary hearth furnace-related technology and equipment. It also holds two copyrights for process control and operation software, and instruction manuals for the full production process.



The Phase II rotary hearth furnace in operation at Yanshan Steel

MODERN NEW LINE IMPROVES OUTPUT AND SAVINGS AT XINJIANG BAYI STEEL



Rows of perfectly-produced chilled coils in the delivery area of the continuous pickling line and tandem cold mill workshop built by CISDI at Bayi Steel

A modernised continuous pickling line and tandem cold mill at Xinjiang Bayi Steel is now operational.

The first pickled merchantable coil was produced in early June and the first coil was rolled in early July, a process which saw all designed indicators fully achieved.

The line and mill is a combined line and replaces the original continuous pickling line and one tandem cold mill.

CISDI built to an EPC mode to achieve critical improvements in quality and efficiency, the new line can produce both pickled merchantable coil and chilled coil.

Output and yield have been improved substantially. Thin products can be rolled to just 0.2mm, product surface, profile qualities are greatly improved and greater varieties of high-tensile steel can be rolled. Xinjiang Bayi's new PL-TCM has an annual production capacity of a million tonnes - made up of 100,000 tonnes of pickled coils and 900,000 tonnes of chilled coils.

The pickled coils cover a specification range of 1.5mm-6mm×700mm to 1,550mm. Chilled coils can be rolled to a specification range of 0.2mm-3mm×700mm to 1,270mm.

DESIGN AND SOLUTIONS CREATED FOR ASSB MALAYSIA

CISDI is an innovation-driven technology and solutions partner for the global metals industry.

Its multi-disciplinary systematic integration and leading core technology play an important role in general design solutions for large greenfield steel complexes with an aggregate production capacity of 100 million tonnes a year.

By constantly introducing new theory, methods and tools into the traditional general design system, CISDI pursues the most competitive total solutions for companies setting new targets for

integrated projects and product quality.

ASSB is the first demonstration project at the Malaysia-China Kuantan Industry Park in the Belt and Road Initiative. It is all set to be the most cost-effective and advanced steel complex in Southeast Asia.

Its blast furnace 1, on which construction began in November 2016, was put into production Phase I in June 2018.

CISDI's general design and total solutions have already achieved success at Baosteel Zhanjiang and Formosa Ha Tinh Greenfield plants and ASSB marks another milestone.

General layout: the foundation for a competitive general design

The general layout at ASSB is linear, as proposed by CISDI.

This systematic, economical and sustainable concept was created after an in-depth exploration of external and internal conditions.

External influences included resources supply, product demand, the park plan, local policy, land formation, transport and meteorology.

Internal issues to be taken into account included the arrangement of facilities, the

interfacing of logistics and process flows, utilities and pipeline network.

A toolkit of technology-economy analyses was made for the control of CAPEX, running cost and cost competitiveness.

Thanks to the smooth, compact and economical layout, Phase I has achieved an advanced indicator of 0.68m² per tonne of liquid steel and a transport distance of 150 metres across the ironmaking and steelmaking interface - a solid foundation for savings on costs.



Multi-flow analysis: tapping the potential

Multi-flow analysis technology was employed to simulate production conditions and data throughout the plant and pursue the optimised indicators.

Material flow analysis explored the optimum combinations for layout arrangements and logistics systems. As a result, land use and logistics costs were reduced.

Iron flow analysis acquired information on metal flows during production and identified the potential to improve iron availability in procedures and interfaces and to use primary iron more efficiently. As a result, the utilisation ratio of resources could be maximised.

Energy flow analysis focused on the energy system and main production processes. Optimised measures were taken to reduce

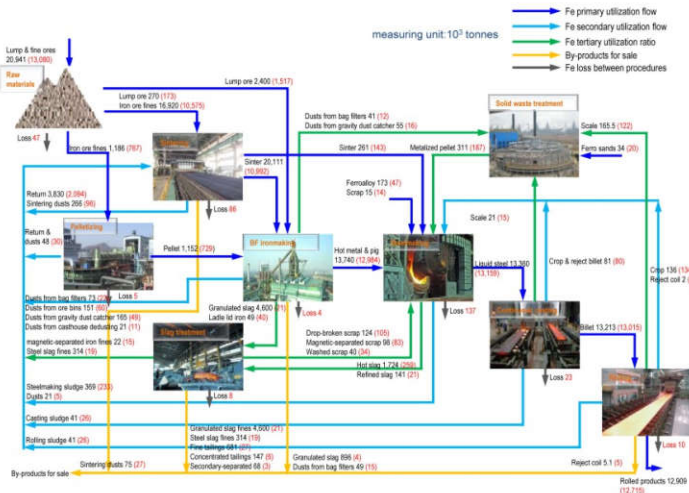
energy losses and improve energy efficiency, resulting in lower operating costs.

Discharge flow analysis highlighted emission points from source to end of the production process and worked out the most economical emission control proposals. As a result, a green steelworks could be created.

Intelligent flow analysis carried out a thorough evaluation of the plant and process units. Productivity, safety levels, product property, working conditions, automation levels, information technology applications and data availability were examined.

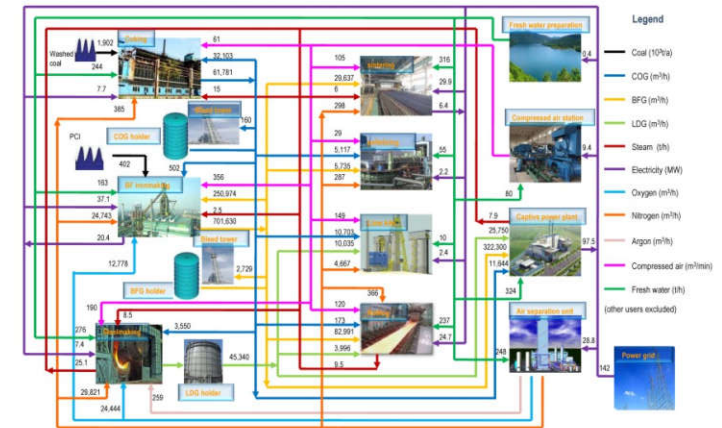
Its intelligent solutions reduced labour requirements, improved safety, increased product quality, productivity and production flexibility and reduced OPEX. As a result, an intelligent steelworks was achieved.

Fe flows: improving ferro utilization ratio and optimizing ferro byproducts availability



Energy flows: improving energy efficiency and reducing cost by analyzing both energy systems and main production technology and finding out energy losses in procedures

3 aspects: **Interface** — upstream-BF, BF-BOF, BOF-CCM-RM **System** — gas, steam, water, electricity, oxygen **Procedure** — ironmaking, steelmaking, rolling



Process control: guaranteeing an effective general design management

The ASSB steel complex comprises of 23 plants built by a dozen construction teams and hundreds of equipment manufacturers. This meant communications, coordination and management was going to be an enormous task.

A smooth construction process could not be achieved without a process control for technology, schedule, quality and cost. CISDI relied on specialised management and technology to provide one-stop full-process control services.

CISDI's master control solutions assist ASSB to keep quality, schedule and cost under control.



CISDI's technical services experts provide continuous consulting services to help the client implement a holistic, economical and refined management system.

CISDI's general design management has ensured the ASSB construction to be an orderly and optimised process.

Phase II plan: continuously enhancing competitiveness

Since the start up of ASSB Malaysia's rolling mill at the end of 2017, the competitiveness of its Phase I has been apparent.

CISDI is now working on the general design for Phase II, which on completion will lead to greater profits for ASSB.

More flexible accommodation capacity between procedures and a greater variety of products will result in gains to scale and cost effectiveness - and energy consumption per unit tonne of steel and labour productivity will be further optimised.



ASSB Phase I under construction

Other examples of CISDI's total solutions

CISDI has a wealth of experience when it comes to providing front-end consulting and general design solutions for some of the world's most influential steelworks.

Over the past decade, the aggregate

production capacity at CISDI-designed greenfield and brownfield steelworks has reached over 200 million tonnes. Steelworks producing more than three million tonnes a year account for over 60 per cent of the Chinese market.

Case 1: Baosteel Zhanjiang, China

CISDI's compact general layout, short and smooth logistics system and advanced process flow have played a major role in the achievement of world-leading technical and economic indicators at Baosteel Zhanjiang. In addition, CISDI's expertise has created a greener environment at the plant and brought about a substantial reduction in CAPEX and OPEX.



The Baosteel Zhanjiang Plant, which has an annual production capacity of 10 million tonnes

Case 2: Formosa Ha Tinh Steel, Vietnam

CISDI's tailored general design and economic and financial analysis model and integrated consulting management services are creating a green and lean steelworks for Formosa.



Formosa Ha Tinh Steel, which has an annual production capacity of 10 million tonnes

CISDI'S UNMANNED LOCOMOTIVE PASSES WITH FLYING COLOURS

An unmanned locomotive created for Zhanjiang Steel's workshop has made its first journey.

This complex hi-tech piece of engineering, capable of real-sense unmanned driving, will reduce labour costs while improving efficiency and safety.

The result of concerted efforts by Zhanjiang Steel's logistics department and experts in CISDI's Smart Logistics Team, the

locomotive is a tailored and smart solution to Zhanjiang Steel's technological railways.

It is capable of environmental perception and smart scheduling and its technology features include access control, automatic hooking, auto charge, equipment health detection and visual production.

CISDI is employing its intelligent platforms and technologies on numerous projects for Zhanjiang's intelligent logistics.



An unmanned locomotive pictured during its first driving test at the Zhanjiang Steel Logistics Park

CISDI's Big Data: ONE-STOP CLOUD PLATFORM FOR VALUE CREATION

- CISDI has developed a one-stop cloud platform for value creation for its customers, as part of its promotion of big data.
- The platform is oriented towards production data and data mining and can realise big data driving production and make accurate, scientific decisions.
- It is committed to helping enterprises improve quality and efficiency while shortening product development cycles and has been applied throughout the full process of steel production, from ironmaking to steelmaking and casting.



EasyRefiner, an artificial intelligence product with one-touch functions for data consolidation, cleaning, transfer and visualisation



EasyMiner, a data deep mining product which optimises indicators and finds quantitative solutions

Applications of intelligent manufacture in a Blast Furnace:



- **Productivity**
(output)
+30%
- **Fuel ratio**
(cost and environment)
-12%

Based on production data collected over a period of seven years of a blast furnace since blow-in, concerned with the raw materials, fuels, operation, status and economic indicators