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CISDI NEWSLETTER

Issue 1: January 2022



CISDI's first heavy rail universal mill rolls into action

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- CISAI Tech creates China's first 5G+AI-based intelligent management system



Technology and Solutions Partner for the Global Metals Industry

☉ FULL-PROCESS SERVICES

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

☉ FULL-FUNCTION SERVICES

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

☉ FULL-LIFE-CYCLE SERVICES

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



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Messages from CISDI heads for 2022

From the chairman of CISDI Group ▶

To our customers and partners around the world

As CISDI staff, our customers and partners around the globe commence what we hope will be a peaceful, safe and prosperous New Year, on behalf of the company I extend my best wishes to you all.

We experienced a difficult and challenging 2021. As we responded to a once-in-a-century pandemic and jointly worked to resolve global breaks in the logistics chain and bottlenecks in trade supply, we took the opportunity to broaden our outlook on future trends in the steel industry.

Since 2021 we have opened a new chapter in our five-year strategic development. We have drawn up a working plan for applying new tech and services to help steel enterprises around the world out of difficulties as they meet emerging challenges.

The progress made could consolidate our strengths and give us greater impetus to transform and upgrade.

Today our motto remains unchanged - we aim to be a preferred and respected technology and solutions partner for the global metals industry.



We remain committed to opening up, and to innovation and learning.

Through concerted company-wide efforts and with the support of our partners, CISDI has scored tremendous results in its annual marketing and revenue, with staff safety earmarked as priority.

Dynamic growing economies were seen in the sectors of corporate intelligence, green and low-carbon, manufacturing process re-engineering, core equipment and new energy.

Breakthroughs in these sectors renewed our resolve and impetus.

We are continuing to provide total solutions to steel enterprises in China and around the world.

Following successful application at Formosa Ha Tinh Steel in Vietnam and Baosteel Zhanjiang in China, our total solutions embracing master plan, designs and EPC-based constructions at Zenith Nantong Steel in East China are scheduled to turn all plants operational in 2022.

This coastal greenfield benchmark will

employ green, smart and optimal methods to produce 10 million tonnes of optimum long products a year.

We have made big strides in our development of low-carbon products. Our ultra-low-carbon blast furnace ironmaking expertise which is projected to reduce 20 to 30 per cent of carbon, is about to be supplied to multiple plants in China. Our first AutoARC™ electric arc furnace is already in operation at Pangang Changcheng Special Steel.

Continued advancements have been made in efficiency enhancement and intelligent transformation. CISDI Shuitu Cloud industrial internet platform 2.0 saw its first implementation at China's Yongfeng Lingang Steel, the first to be based on a unified, full-process plant applied platform.

Core equipment constitutes a significant foundation for achieving steel's transformative progress. Major implementations of our core equipment - the universal mill for long products rolling and the 3-roll cross tube mill - were achieved at multiple Chinese lines in the past year, showcasing our ever-growing integrated capabilities from research and development to design, manufacture and supply. In addition, our spare parts supply service for Western customers bloomed again.

During the pandemic, CISDI HQ and its overseas subsidiaries worked together to improve localised management, maintaining and expanding partnerships as a result. Thanks to global sourcing efforts, our local supply chains were able to serve more projects in China and beyond.

New orders came in from India, Vietnam and Indonesia and other affected markets in the

Belt and Road Initiative.

I greatly appreciate the long hours our engineers have put in. It was their perseverance and skill that smoothed process control and ensured high-standard operations.

The trust, consideration and support of our customers and friends was a beacon of hope in hard times and I believe that by working together we will achieve a happier, greener and more successful 2022.

CISDI is determined to embrace deeper integration with the rest of the world. We will strengthen our innovation-driven developments and find solutions to current and future issues.

Only through innovation can we reap the technological developments which will guide us in times ahead. Our focus is on green, low-carbon and intelligent innovation and making China's steel sector greener and more efficient.

2022 is the Year of the Tiger in the Chinese Lunar Calendar. In Chinese culture, the tiger symbolises bravery and strength. To meet the challenges facing humanity and sustain steel development, we must do everything necessary to optimise solutions for our customers.

We pledge to act with the courage and strength of the tiger.

Xuewen Xiao
Chairman
CISDI Group

From John Lester and CISDI UK ▶▶



We wish all our customers, suppliers, partners, friends and colleagues across the globe all the very best in 2022.

We greatly appreciate the time and effort spent by everyone with our team from the UK throughout 2021 and the difficult times faced by all. Social distancing has brought about new ways of working and we thank our customers and suppliers for adapting to work together in this environment.

We look forward to continuing and strengthening our friendships and

supporting each other throughout 2022.

We will take all the opportunities to grow and develop our business and at the same time growing and adding value to the businesses of our customers. We believe the New Year will be bright and we look forward to a safe and prosperous year ahead.

In the UK we are fully supporting CISDI Group in the development of green steel initiatives and look forward to bringing a sustainable future to our industry.

From Yong Liu and the HQ's overseas business division ▶▶



2021 kept us apart and posed ever more challenges to our overseas marketing and implementation.

International travel restrictions, distance-working and video conferencing have become the new norm. We greatly appreciate the support and trust shown by our customers, suppliers and partners during the pandemic.

We worked with our offices around the world and our local partners to meet our customers' needs and fulfil

our contractual commitments.

We are more united than ever because of the challenges we have worked through, and will take every opportunity to grow our business and at the same time add value to the businesses of our customers in a greener and more sustainable manner.

Thank you all for your support and trust. I wish you a very prosperous, safe and happy 2022.

From Hatee Ram Pattanayak and CISDI India ▶▶



The year 2021 proved to be a time of revival as cases of COVID19 declined.

The Indian market steered through difficult early months and saw an investment boom in steel sector projects during the latter part of the year.

CISDI and its subsidiary CISDI India stayed responsive and kept all forms of communication open for

ongoing projects (at TSK, JSW and Aarti) and upcoming projects (AMNS, JSW, JSPL, JSOL, JSL, TSL, Vedanta & others).

Regardless of their distant locations, engagement with clients in India continued uninterrupted during the ongoing COVID19 crisis.

Modern engineering tools, simulation packages, remote commissioning systems and communication channels, developed in-house by CISDI's research wing, enabled customers' queries, issues and targets to be dealt with on time.

Team of experts, working remotely 24-7 from CISDI China, ensured the delivery of equipment and services for

remote commissioning for our Indian clients.

CISDI is emerging as a renowned and trusted brand in India for steel process technologies, solutions, equipment and services.

CISDI and CISDI India are grateful for orders awarded by JSOL (JSPL) in 2021.

Our Indian team will continue to facilitate CISDI's aspiration to widen its footprint in India and be an active partner in India's drive to enhance its crude steelmaking capacity to 300 mtpa by 2030.

We look forward to more opportunities to serve India's large and medium-scale steel producers in 2022.

From Shihong Ma and CISDI Malaysia ▶▶



In 2021 we stayed committed to combating COVID-19 and forged a stronger relationship

with our customers in Southeast Asia.

Despite travel restrictions, we kept in close contact with overseas customers and partners.

Solid preparations have been laid for 2022. We will continue marketing and sales in ASEAN steels and will strengthen communications with old and new customers from Malaysia, Indonesia, the

Philippines and beyond.

With regard to our Belt-Road projects, ASSB, Wen'an and Gunung steel supplies and construction work will move forward and our training programmes at these projects will enable more local people to gain skills and qualifications for jobs.

We wish all friends and partners in ASEAN a happy, peaceful 2022.

From Xinbin Liu and CISDI Vietnam ▶



Our special thanks go to Formosa Hà Tĩnh Steel and Hoa Phat Steel for their ongoing support in 2021, a year beset by COVID-19.

Their support meant projects progressed smoothly and started up on-time. We hope our strong relationship

continues and pledge ever-attentive service from CISDI.

We also thank our other clients, partners and friends and wish everyone good health, good luck and much happiness in 2022.

From Xin Yan and CISDI Brazil ▶



In 2022, CISDI Brazil will be striving to open up more of the South American market and provide a portfolio of high quality services.

The year will definitely see stronger solidarity in boosting post-COVID economic recovery.

We hope to meet with more clients and partners to build on existing relationships and promote China-Brazil business links.

Wishing all our clients and partners a safe and happy 2022.

From Jing Zhang and CISDI Turkey ▶



19 epidemic for the duration of 2021.

However, our team kept busy, participating in construction and commissioning supervision in Turkey and travelling to Ukraine to carry out design reviews with customers, ensuring their projects progressed to plan.

The gas holder project at Isdemir's steel plant in

Turkey was a standout example of how the CISDI teamwork with the customer to overcome numerous difficulties, solved problems and achieved successful start up.

In 2022, CISDI Turkey hopes to continue working closely with customers and friends, overcoming challenges and achieving greater growth and progress.

CISDI Turkey, like many of our friends and customers, was affected by the COVID-

World's first IGBT-based green EAF is up and running

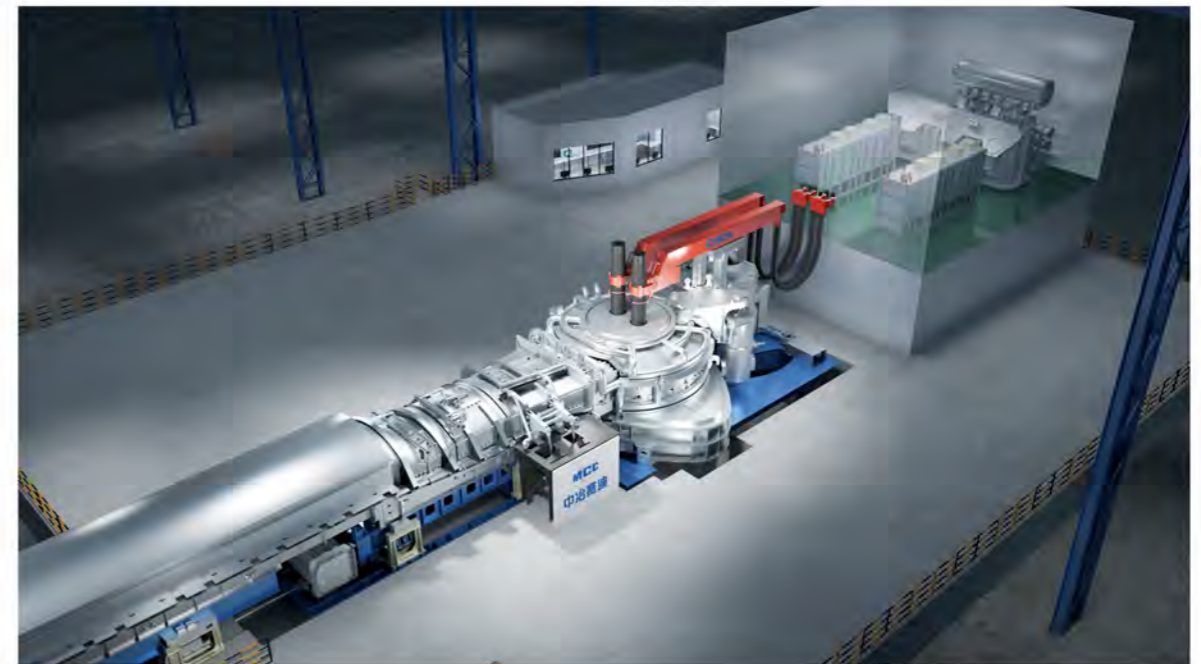
CISDI's innovative AutoARC™ is a major breakthrough for Mini-mills

The groundbreaking green energy CISDI-AutoARC™ is operating successfully at Pangang Changcheng Special Steel in Sichuan Province.

This super-efficient and green electric arc furnace is the world's first for applying an IGBT-based flexible DC power supply. Its

melting operation at Changcheng Special Steel is stable and hitting smooth tapping targets.

It sets an industry precedent for green, efficient and cost-effective Mini-mill production.



A model of the CISDI-AutoARC™

CISDI-AutoARC™ is a world-class green, efficient product which meets low-carbon and energy-conservation production requirements

The electric arc furnace is a key element of the Mini-mill process, which uses two thirds less energy and produces two thirds fewer carbon emissions than an integrated process with BF-BOF at its core.

The Mini-mill has become a critical route for transforming steel processes to green,

sustainable levels.

Researched and developed by CISDI, AutoARC has achieved major breakthroughs in critical process, equipment and control expertise while providing total solutions to full-scrap-charged electric arc furnace melting, traditionally a high and inefficient energy-consuming process.



CISDI's green, efficient electric arc furnace has been started up and put through one heat at Pangang Changcheng Special Steel.



CISDI-AutoARC™, operating stably at the plant

IGBT enables CISDI-AutoARC™ to operate with higher efficiency

CISDI's super EAF is applied. It features innovative insulated gate bipolar transistor based flexible DC power supply, dual cathodes plus air-cooled, feeler-pin bottom anode equipment and control system.

Melting efficiency is increased, resulting in a power supply output response speed of 0.1

millisecond, a grid-side power factor of less than 0.95, a voltage and current fluctuation ratio of lower than 3 per cent, and an entire power supply loss controlled to within 3 per cent.

The IGBT flexible DC power supply expertise has solved the following problems experienced with existing EAF systems:

- ⊙ Large impact on the grid
- ⊙ Output voltage and poor current regulation and weak resistance against impact
- ⊙ Failure to recover busbar's capacitance
- ⊙ Inadequate protection for power supply over-voltage and over-current.



CISDI engineers implement ex-works testing for the installation of the IGBT unit at an EAF

The upgraded super electric arc furnace is showcasing remarkable KPIs

The conventional 40-tonne AC EAF has been transformed to a cost-effective, green production unit.

The benefits:

- ⊙ Reducing tap-to-tap cycle time by 15 minutes per heat
- ⊙ Reducing electricity consumption by around 50kWH per tonne of liquid steel
- ⊙ Decreasing electrode consumption by 1.7 kilograms per tonne of liquid steel
- ⊙ Reducing carbon dioxide emissions by over 40 kilograms per tonne of liquid steel.



The air-cooled, feeler-pin bottom anode, to be installed at an EAF

The successful application at Changcheng Special Steel will advance China's own EAF tech to the levels achieved by its world-class partners.

CISDI will continue to focus on building full-process digital, smart steelmaking. Its Mini-

mill total solutions, featuring high efficiency, low consumption, eco-friendly and intelligent operation, will be a driving force in China's pursuit of ever-higher standards for steel production.

CISDI's first heavy rail universal mill rolls into action

A major step for China's rail network



The CISDI-supplied UMCD Universal Mill, installed at Yongyang Special Steel

China can now manufacture the rail products it needs to create the country's high-speed railway lines, rather than relying on imports.

Yongyang Special Steel in China's Hebei Province is now able to produce heavy rail sections, thanks to a new line recently

created with CISDI's expertise.

The line is the first of its kind in China and is operating successfully.

CISDI provided all critical process, equipment and control tech.

The line applies CISDI's two-stand reversing Breakdown Mill and three-stand reversing Universal Mill.

Main products produced are premium rails and beams to China's national standard, European and British rail standards and crane rail standard, mineral sections, H sections, I beams, channels and angles.

Total production capacity is expected to be 900,000 tonnes a year.

Yongyang's heavy rail production line features world-class technology and equipment levels, thanks to CISDI-developed, designed and manufactured critical process, equipment and control systems. Features include:

- ◎ Groove design for various complicated product cross sections and relevant screw-down process
- ◎ New-generation BDCD Breakdown Mill
- ◎ Hydraulic, closed housing UMCD Universal Mill
- ◎ RSCD standardised portal horizontal straightener and cantilever vertical straightener
- ◎ TCS-based intelligent roll gap control for the Universal Mill
- ◎ HPC automatic hydraulic position control
- ◎ AGC automatic roll gap control
- ◎ Automated, unmanned rolling control for the main rolling line.



The BDCD Breakdown Mill, delivered by CISDI to Yongyang Special Steel, is operating smoothly



CISDI's equipment, successfully started up at Yongyang Special Steel

The hot-tested bar was a shaped mineral steel section – U section (U29), featuring an irregular shape and requiring a complicated process.

The first rolled U section resulted in qualified section dimension and surface quality.

All process, equipment and electric and automation systems performed perfectly, so hot testing was followed by trial production.



The straightener in operation at Yongyang Special Steel

Fact File

Yongyang Special Steel is located in Handan City in China's Hebei Province. It produces special steels sections and quality steels:

Special sections – light rail, heavy rail, mineral section, crane rail and U-shaped section

Special steels – flat section for automobile leaf springs, high-strength hot-rolled flat for

the automobile sector, tubular stock for medium and high-pressure boilers and petroleum casing tubular stock.

The company's first Chinese-made light rail rolling line went operational in 2020 with a Universal Mill at its core. CISDI supplied critical process, equipment and control.

CISDI makes a foothold in the Vietnamese market with its smart stockyard expertise

Order comes in for green yard at Hòa Phát Dung Quất



The stockyard at Baosteel Zhanjiang's 12-million-tonne steel plant has the world's highest level of intelligence and eco-friendliness

It features state-of-the-art clean production, digital management and unmanned operation.

CISDI is to build a new stockyard for the Hòa Phát Group in Vietnam.

The yard, at its Dung Quất Plant, will be built to an EPC mode and feature smart, eco-friendly levels.

Supporting a large coastal steel complex, the integrated stockyard will be able to receive around 17.25 million tonnes a year.

It will consist of two model-C ore yards, one model-C coal yard, one model-B blending yard, one flux piling yard and relevant access facilities.

Major facilities feature 21 large stackers and reclaimers and 112 belt conveyors whose length will cover a total of 31 kilometres.

The order, won thanks to CISDI's unique

expertise and tailored solutions for steel sectoral requirements, represents a breakthrough for CISDI in Vietnam and a major step forward in the company's growing reputation overseas.

CISDI has been a pacesetter for boosting China's stockyard sector to smart, green standards. More than 200 patents have been awarded to its stockyard technologies and the company has chaired the preparation of national standards and regulations for stockyard tech and equipment.

CISDI has the Number One market share in global stockyards at 10Mtpy steel complexes. Over 70 per cent of the world's smart, green stockyards have been designed and built by CISDI.

China's first special steels wire-rod modular Finishing Mill is a smooth operator

A CISDI-supplied modular Finishing Mill, the first of its kind in China, is operating smoothly at a high-speed wire-rod rolling line at Pangang Changcheng Special Steel.

All production indicators have hit design requirements.

Its successful implementation expands the company's product portfolio, while upgrading China's core equipment.

It brings CISDI's modular rolling mill into the advanced manufacturing sector for the high-speed rolling of special steels.

The mill replaced a BGV finishing mill, featuring a transformation from original centralised control to modular control, for the highest-grade special steels wire-rod rolling line.

CISDI took technological leadership for the high-speed rolling area and supplied four CDMC250 modular mills, hydraulic and lubrication systems, electric drive and basic automation system and carried out technical assistance.

Partnering with the client and the construction company, CISDI's team supported the equipment installation and cold testing in a



The special steels wire rods produced



China's first modular Finishing Mill is now operational at Pangang Changcheng Special Steel's high-speed wire-rod rolling line. It was supplied by CISDI.



The finishing mill rebuild area of the high-speed wire-rod rolling line



S-curved transport system

tight, 25-day schedule.

The first hot testing was the successful single pass of a 13.5-millimetre dia. wire rod. The mill has since been operating stably, producing multiple specifications from 6mm, 7.0mm and 7.5mm to 11.0mm and 13.5mm. All mass production achieved performance indicators.

An exemplary achievement for a mill transformation of this type, CISDI's team focussed on deep integration through the development, design, manufacturing and commissioning procedures and implemented strict full-process quality control.

Fact File

Pangang Changcheng Special Steel is China's major high-end, special metal products base. Its products are used by national defence military, aerospace and high-end equipment manufacturing sectors.

The high-speed wire-rod rolling line featuring CISDI's modular Finishing Mill is designated to

produce complicated steel grades and specifications.

Its main product grades are high-temperature alloys, titanium steel and titanium alloys, bearing steel and stainless steel, all of which have to meet very high accuracy and surface quality standards.

Top award for CISDI's green stockyard at Baosteel



Baosteel's Ironmaking Plant has become greener thanks to its new eco-friendly stockyard

CISDI's green upgrade of a stockyard has been awarded a prize for achieving outstanding improvements in environmental protection, production efficiency, operating costs and social and economic benefits.

CISDI Engineering Co designed the green stockyard and CISDI Engineering Consulting Co. provided the upgrade services.

The award-winning stockyard is located at Baosteel's Ironmaking Plant. Multiple patented yard products and a total solution have dramatically improved the plant's green credentials.

CISDI's ECIA green, intelligent stockyard with standardised model B, C and E has been built for the storage and feeding of raw materials required in the ironmaking process.

Marked results have been recorded:

- ◎ Around 25 per cent reduction of yard space
- ◎ Total conveyor belt length reduced by around 10 per cent
- ◎ Around 100 process flows streamlined
- ◎ Unorganised flying dusts and water pollution eradicated
- ◎ Savings of around US\$15.77 million in operating costs.

The win marks a major achievement in eco-friendly, intelligent stockyard construction in China. CISDI has been playing a trailblazing role in leading the country's stockyard tech advancements and ensuring it no longer has to rely on foreign imports.

Baowu Maanshan Steel's BF "A" blows in, breaking two records

Bi-segmental sliding replacement and dry dedusting offline assembly tech applied

CISDI broke two Chinese steel records in its innovative, ultra-fast revamp of Masteel's first 4,000-cubic-metre blast furnace.

The plant was shut down for just 85 days while the furnace, which had operated since 2007, was rebuilt and upgraded to smart green standards.

The two segments of the furnace proper were dismantled and slid out of the furnace to make way for their replacements.

The new dry dedusting system was assembled offline to achieve modular installation to the designated position.

A first for China, these innovative rebuild technologies were applied and enabled the

furnace to blow in after only 85 days of shutdown - 15 days ahead of schedule.

CISDI took on technical leadership and critical equipment supplies. Its team took just 15 months to complete all designs, beating its record for previous similar projects by eight months, and creating a strong position for commissioning and blowing in.

CISDI, a leader in fast revamp core tech, applied a 3D digital design method to create optimised solutions.

The rebuild means the modernised furnace "A" will operate to smart, long-campaign, high-output and low-consumption standards.



Masteel's BF "A" has been upgraded with CISDI's fast-revamp tech

Shandong Steel Laiwu's intelligent twin BOFs go into action



Laiwu Plant's integrated steelmaking control centre brings centralised, intelligent control to reality

The phase I steelmaking project to transform old production units at Shandong Steel's Laiwu Plant is hitting its targets.

CISDI has provided two KR hot metal desulphurisation systems, two 120-tonne BOFs, two argon-blowing and wire-feeding stations and two LFs on an EPC basis.

Both BOFs went into operation together, the first time this has been achieved in China.

Each furnace features a number of intelligent tech applications and equipment and sets the pace for China's full-process intelligent steelmaking sector.

The modernised steelmaking shop has undergone a successful green, intelligent transformation, thanks to:



CISDI's team remained onsite, giving constant technical support as Laiwu's steelmaking is transformed to green, intelligent levels

- ⊙ Patented SACS tech equips the BOF with a 4-point linkage suspension system
- ⊙ Gas cooler plus ring filler dehydrator tech for BOF primary dry dedusting
- ⊙ CISDI-DMI-AC digital electrode regulation system for the LF.



The two BOFs, both built by CISDI, are operating in sync at Shandong Steel's Laiwu Plant

In addition, for the first time CISDI modernised the conventional BOF central control building to an integrated intelligent control centre, achieving the following results:

- ⊙ Reduction in the number of operational posts and workers
- ⊙ Integration of workshop logistics management, automatic slag skimming, BOF one-touch production and automatic tapping systems
- ⊙ Smart coordination of the intelligent overhead crane and robot

⊙ Intelligent steelmaking processes from desulphurisation to melting and refining.

The plant transformation will involve the application of internet of things, cloud computing and other advanced technologies for data acquisition and storage throughout production. All factors will be involved - equipment, energy, quality, cost and safety.

Despite severe challenges posed by the pandemic and the local weather conditions, CISDI's team ensured efficient process control and the project was meticulously planned and constructed to a high standard.

Baosteel's refurbished COG holder 1 gets outstanding results

CISDI has re-designed a coke oven gas holder at Baosteel, successfully resuming its inspection and restart.

The original gas holder was an import, which was assembled by CISDI and went into operation in 1985. With a volume of 120,000 cubic metres, it was polygon-shaped and oil-sealed.

It was revamped in 2000 and continued to operate for over 20 years, but its guide wheels for the piston and anti-rotating members became heavily worn. Performance deteriorated due to a seriously over-inclined piston and instrumentation and automation systems becoming outdated.

CISDI is an inspection and maintenance specialist for a full range of gas holders equipped with membrane seals, cylindrical and polygon oil seals and has established a full assessment and inspection technology system.

Baosteel and CISDI teamed up to work on detailed,

targeted solutions and decided to replace all outdated imported devices with Chinese-made.

One major replacement project focused on the gas holder's seals. The critical equipment is composed of around a thousand components and parts involving thousands of dimensions.

CISDI cross-checked all the materials, quantities and dimensions of the components and parts to be replaced and ensured all new devices matched perfectly.

The refurbished gas holder has exceptional sealing qualities - zero leakage of carbon monoxide has been achieved. Piston operation is stable and much faster. Its inclination has been corrected from the original 165mm to 20 mm and advanced monitoring and enhanced safety have also been achieved.



The COG holder 1 at Baosteel has been refurbished with Chinese-made core equipment and is operating with remarkable indicators

CISAI Tech creates China's first 5G+AI-based intelligent management system



CISAI has successfully put a 5G plus AI tech based steel interfacing management system online at Baosteel WISCO

CISAI Tech, part of CISDI Group, has successfully put a 5G plus AI tech based steel interfacing management system online at Baosteel WISCO in China's Hubei Province.

The first of its kind in China, the interfacing management system applies 5G and artificial intelligence tech to the steel sector.

Taking advantage of 5G network's large bandwidth, short time delays and wide connectivity, it breaks ground in high-quality data transmission at mobile and edge ends in complicated industrial conditions.

Five applied settings have now been implemented at WISCO's hot metal and liquid steel interface management - for real-time positioning and tracking, equipment online monitoring, transport control, edge computing data return and railway crossing safety control.

The system will enable autonomous/unmanned hot metal transportation between the ironmaking and steelmaking plants, which will further enhance the plant's productivity and safety and achieve cost savings.

China's first steel "Information High-speed Railway" put online

The CISAI Tech-built 5G+AI intelligent interfacing management system has achieved the first and largest operation of an Information High-speed Railway at a steel enterprise.

CISAI launched in June 2021 and by the first week in November that year, it had upgraded intelligent systems for WISCO's five blast furnaces, four meltshops, 20 hot metal transport locomotives, 67 torpedo ladle cars, 100 open-top ladles and 12 level crossings, and had built an

intelligent control system for the plant's 400-plus rail lines.

Intelligent transformation brings about marked optimisation – a 20 per cent reduction in manpower, a 10 per cent increase in hot metal transport efficiency and a 10 deg C decrease in hot metal temperature drop at the hot metal and liquid steel interface.

A direct economic benefit from more efficient transportation is estimated to be around US\$ 6.30 million.

iSmartMC interfacing management system enables flat management and intelligent scheduling

CISAI has developed an iSmartMC interfacing management system to enable flat management in hot metal, transport and liquid steel procedures and intelligent scheduling of hot metal production. The integrated information tech applied platform covers all flows and all factors at the interface.

Intelligent model and algorithm and intelligent information collection methods address the issues often experienced at a conventional interface – offline management, inaccurate and delayed collection of production data, unlinked communications between upstream and downstream procedures, unsmooth scheduling and limited transport efficiency.

On a daily basis, a furnace operator places an order via a simple click of a mouse when the blast furnace is about to tap, immediately, summoning an autonomous locomotive loaded with a hot metal ladle to



The intelligent control centre for WISCO's hot metal and liquid steel interfacing management

the taphole.

The ladle aligns itself with the taphole and receives hot metal. The autonomous locomotive then drives to the downstream steelmaking plant, all rail line switching and railings operating automatically.

PanGoLIP smart industrial logistics platform - the interfacing brain

CISAI has developed a PanGoLIP smart industrial logistics platform, based on full-process intelligent tracking and status management.

It is the interfacing's intelligent scheduling system and works like an AI brain – performing core automatic functions in hot metal distribution, path planning, microcomputer interlocking control, crossing opening and closing, and performance result generation.

WISCO has a history of over 60 years and its railways and crossings between the ironmaking and steelmaking plants are complex. Interfacing management requires



A screenshot of WISCO's intelligent scheduling system at hot metal and liquid steel interface

highly complicated settings for implementing intelligent control.

5G plus tech lays a solid foundation for autonomous hot metal transport at the interfacing and also makes transmission of mobile and edge data easier

CISAI's 5G plus tech application at WISCO has helped to upgrade the plant's hot metal and liquid steel interfacing intelligence.

The highlight 5G tech and its applications are:

- **5G plus integrated positioning:**

The locomotive positions at various conditions are tracked in real-time and can be precisely controlled and intelligently coordinated. Regional production management levels have been greatly improved.

- **5G plus crossing safety control:**

Railings at the rail crossing are automatically opened and closed. A video view of the crossing is uploaded to the locomotive system. Safe crossings are ensured.

- **5G plus online monitor of equipment status:**

The locomotive's sensor dynamically uploads its data to the control system, providing data support for implementing intelligent ops management.



The green, intelligent hot metal locomotive, travelling on the railway at WISCO, with multiple 5G plus tech applied

FTIV – innovative tech for ladle code tracking and identification

FTIV – industrial fault tolerance visual identification tech - was developed by CISAI for WISCO's hot metal ladle.

A breakthrough in encoding and decoding technology, FTIV combines QR code-based identification with deep learning. Accurate identification is achieved even in complicated, unfavourable conditions such as bad weather or poor light.

Correct identification of the ladle code is required throughout its application process, from the receiving of hot metal to its transportation by rail and its handling at the steelmaking plant. It is an important part of the hot metal and liquid steel interfacing process.

However, conventional identification methods can be marred by long-term exposure to high temperatures, heavy



The FTIV, an innovative product for identifying hot metal ladle codes, has been applied successfully at WISCO

dust and hot metal splashing, leading to inaccurate readings. CISAI's FTIV can correctly identify the ladle code with up to 60 per cent of staining present.

Coordinating with 5G edge computing data return, the FTIV performs with greater efficiency and saves operating costs.

CISDI-WISCO innovation wins gold in national 5G application contest

CISDI-WISCO's 5G plus interfacing management system has won first place in a national 5G application contest.

The awards, held by the Ministry of Industry and Information Technology, described it as an "innovative application and practice at a 5G plus fully-connected steelworks".

This is the second time CISDI's intelligent developments have been recognised by the industry. Its Shuitu Cloud industrial internet platform was awarded first place at national industrial internet contest

The company's platform and product is playing a leading role in advancing digital transformation and building smart steel factories throughout China.

Aligning hot metal and liquid steel production tempo and output and the scheduling and dispatch of hot metal are key challenges at the ironmaking and steelmaking interface. Solutions encompass production organisation, scheduling control, operational process, production equipment and transport routes.

CISDI's 5G plus AI interfacing management solutions have helped WISCO achieve its major goal of improving interfacing productivity.

They feature in WISCO's 5G plus industrial internet demo park, which is comprised of intelligent logistics, production control, digital equipment, energy and environmental management, quality control and intelligent security.



The twin blast furnaces at Baosteel Zhanjiang (each in 5,050m³)

We are experts in world-class critical technologies and equipment for large blast furnaces.

Our fast-revamp and intelligent ironmaking expertise creates greener and more economical, high-performing blast furnaces which run with longer service life.

In the last decade we have designed and built 27 large models around the globe.

Our references for furnaces of 4,000m³ and over account for around 50 per cent of the global blast furnace market and are showing highly competitive technical and economic indicators.



Design and core equipment supply for a 5,050m³ blast furnace rebuild at ArcelorMittal's Ukraine plant



Design and core equipment supply for blast furnace 2 at TATA Steel Kalinganagar Plant, the world's largest new blast furnace under construction (volume 5,870m³)