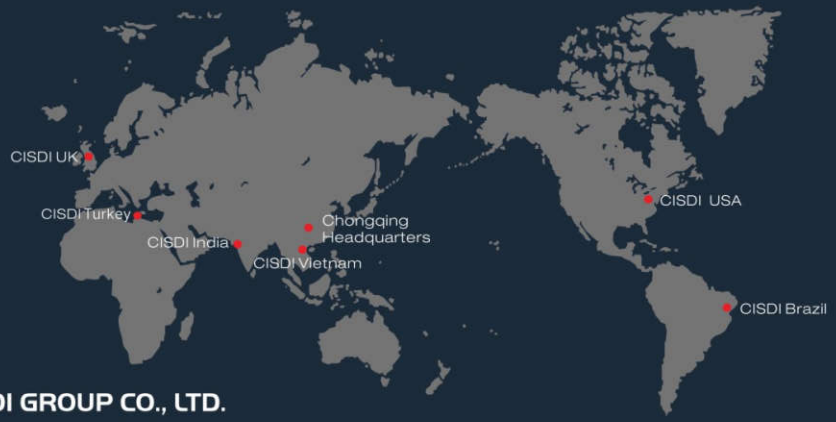


CISDI GROUP CO., LTD.

Chongqing Headquarters
Address: No.1 Shuanggang Road, Yuzhong District, Chongqing 400013, China
Tel.: +86 23 6354 5366
Email: OB@cisdi.com.cn
Website: www.cisdigroup.com.cn

CISDI UK
Address: CISDI HOUSE, 8 Furnival Rd, Sheffield, S4 7YA, UK
Tel.: +44 1142291067
Email: info@cisdi.co.uk
Website: www.cisdi.co.uk

CISDI India
Address: 503-504, 5th Floor, A-Wing, Galleria Building, Hiranandani Gardens, Powai, Mumbai, India. 400076
Tel.: +91-9702043402 +91 22-49701004
Email: yong.liu@cisdi.com.cn

CISDI Brazil
Address: Rua Pernambuco 1002, Sala 902, Bairro Funcionarios, Belo Horizonte, CEP 30.130151, Minas Gerais, Brasil
Tel.: +55 31 34638880
Email: hao.wu@cisdi.com.cn

CISDI Vietnam
Address: Thuy Hang Hotel, Ky Anh City, Ha Tinh Province, Vietnam
Tel.: +84 912485711
Email: haixiong.luo@cisdi.com.cn

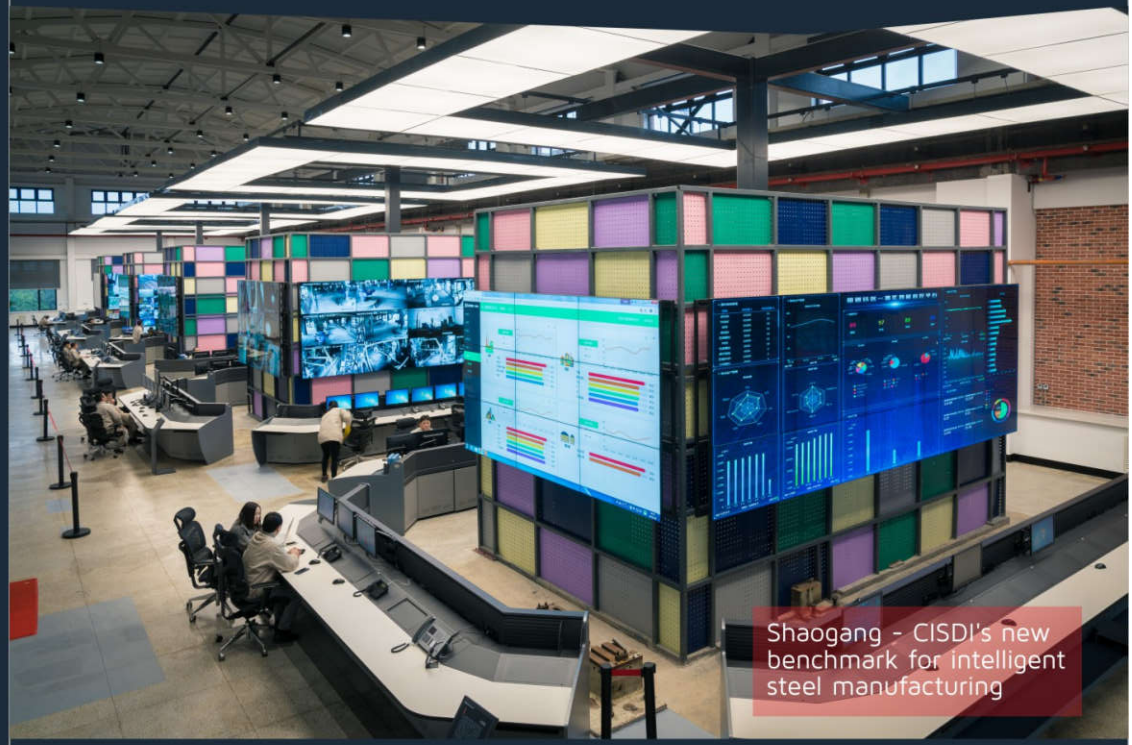
CISDI USA
Address: One PPG Place, Suite 3100, Pittsburgh, PA 15222.
Tel: +44 (0)114 229 1067
Email: info@cisdiusa.com
Website: www.cisdiusa.com

CISIDI TURKEY
Address:122,A3 Blok,Mashattan, MASLAK MAHALLESI, Istanbul, Turkey
Tel:+90-6340137287
Email:jing.zhang@cisdi.com.cn

Published By CISDI Corporate Culture Department

CISDI
NEWSLETTER

Vol. 2, 2019



Shaogang - CISDI's new benchmark for intelligent steel manufacturing

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CISDI

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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CISDI Group pledges growth and focus at its annual meeting

CISDI Group's 2019 annual meeting, staged at the company's headquarters in Chongqing

Pledges for growth were made when CISDI Group held its 2019 annual meeting.

The company met at its Chongqing headquarters to reaffirm its four main focuses - consulting-led steel engineering, IT and intelligent application, urban construction and energy conservation and environmental protection - and stated its main target this year is to enhance competitiveness for its clients both in China and around the globe.

The company is committed to the upgrade of metallurgical construction in China and will be pushing ahead with its goal of bringing intelligent and green technological applications to conventional steel engineering plants at home and around the world.

Said a company spokesperson: "We will continue leading China's steel engineering sector and bringing our pace-setting expertise to the metallurgical industry worldwide."

"We are continually developing new processes, materials and methodologies to bring greater innovations and value-creating capabilities to steel plant restructuring, industrial upgrading and green and intelligent manufacturing."

The spokesperson pledged: "We will strive to create greener, safer and leaner 'smart steelworks' by improving our intelligent manufacturing flow, system and products."

"CISDI is bringing its intelligent and information technology not only to steel businesses, but also to those in the urban and agricultural sectors. We aim to refresh business ecosystems by helping them to combine financial capital and market resources with intelligent tech."

During 2019 CISDI will aim to win new contracts in the urban construction sector with expert solutions which combine urban planning, industrial program and intelligence while promoting total process engineering consulting services.

The company is working on new breakthroughs in industrial energy conservation and environmental protection and is renewing its determination to bring its innovative products to market faster. CISDI has long been committed to solving waste water problems and developing treatments which can transform metallurgical solid waste and organic hazardous waste into smart energy and ultra-low emissions.

Overseas, CISDI will be further improving its global supply chain with better allocations of global resources, and searching for talent to strengthen the management teams at its overseas offices.

Danieli in relationship talks with CISDI

Heads from CISDI and Danieli meet to seek partnership opportunities

Italian metallurgical giant Danieli has been in discussions with CISDI with a view to partnering on global projects.

Danieli is based in Buttrio, in the north-east of Italy and has more than 25 divisions worldwide.

Its VP Georgios Ximeris and the executive vice-principle of its Chinese division, Chang Zhang, visited CISDI early this year, meeting with CISDI's chairman Xuewen Xiao and CEO Zhaohui Yu.

"Danieli, one of the world's top metallurgical equipment suppliers, and CISDI, a leading total solutions provider for the global metals industry, hope to combine their respective strengths to maximise services and value to clients", said Xiao.

Commented Mr Yu: "We believe a long-term mutually successful partnership based on trust and co-operation would enable both companies to go deeper into global markets."

Commented Mr Ximeris: "Danieli is ready for joining hands with CISDI, the active player in steel engineering, to develop an all-round products co-operation. We see prospects in mutual partnership."

Shaogang - CISDI's new benchmark for intelligent steel manufacturing

CISDI is implementing the EPC-based construction for Shaogang's Intelligent Centre, a benchmark of China's steel intelligence levels.

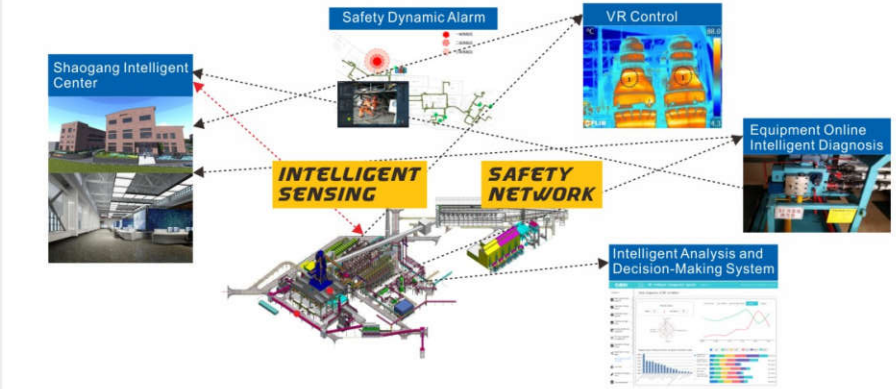
Shaogang upstream-BF integrated intelligent control platform

»» Critical technologies

- Data centre and big data platform
- AI-based math model
- Integrated intelligent control
- Big data-based production and dynamic optimisation of operation
- Systematic optimisation and production consulting
- Remote safety control
- Machine vision

»» Results and returns

- Reducing the 315 staff at the on-site central control room to 190 for the integrated intelligent control centre
- Increasing productivity by around 30 per cent
- Innovations in organisation, flow and management creating an annual economic benefit of $2.24 million USD
- Creating an annual economic benefit of $9.72 million USD from a cost saving of $1.5 USD per tonne of hot metal



Shaogang's Intelligent Centre was built turn-key by CISDI.

The Shaogang Intelligent Centre

The large-scale centralised control centre features a number of firsts for the Chinese metallurgical industry, from trans-procedure, cross-area and long-distance (over 5km) endless coordination to big data decision-making.

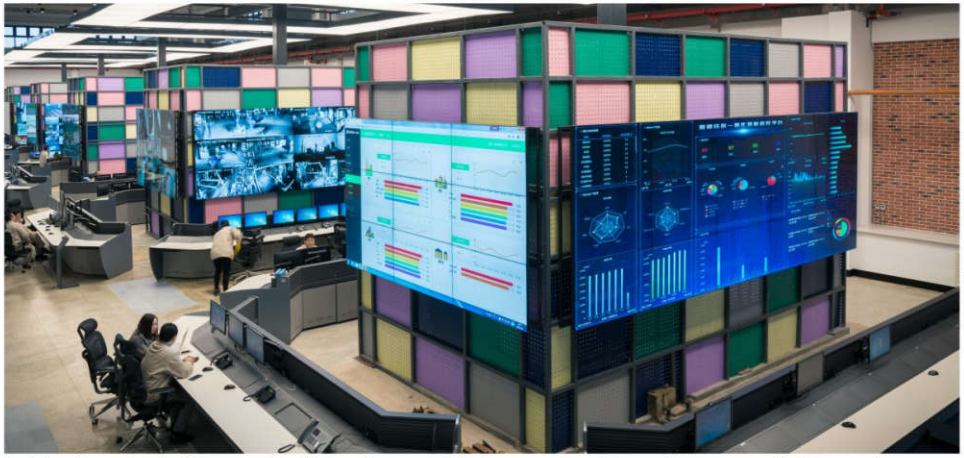
A host of intelligent and big data technologies have been applied and the centre is seeing unprecedented safety levels, coordination and high efficiency.

It is able to perform intelligent sensing, intelligent analysis, prediction and decision-making for plant-wide production and operations and will be capable of achieving the most advanced steel manufacturing levels in China.

CISDI's years of engineering and production expertise have gone into the project. Along with Shaogang, it amassed the steelworks' original internal intelligent manufacturing data and integrated it into the control and decision-making systems for ironmaking and energy media.

The centre was initiated in last September and put into full use at the end of December 2018.

Working areas reduced from 50 to 18: a transformation of management and organisation



An island layout at the Shaogang Intelligent Centre enables large-scale and long-distance centralised control

A streamlined and highly-efficient organisational structure has been created for the management of Shaogang's production. CISDI's solution – individual plant managing multiple working areas – is a systematic design coordinating flows, organisation, management and technology and integrating posts of working areas to a matrix-style management.

The original 42 onsite central control rooms have been eradicated and 50 working areas have been reduced to 18.

Greater safety for workers - whether on-site or 5km away

The plant's traditional operation room, pulpit and control room are located very close to the production site, making them high-risk areas.

Workers are exposed to hazards when detecting and solving problems on-site and need greater protection from the 3Ds – dirty, difficult and dangerous conditions.

A centralised centre which could control large-scale production from a distance was required.

Using its 60 years of electric and automation expertise, CISDI created a safe, reliable and stable operation system which features the four safety technologies – power supply, control, network and data. Video interlock technology sends alarms automatically to operators when an abnormality is detected.

Big data centre is a Chinese first

The CISDI-developed integrated intelligent control platform in operation

Shaogang's Intelligent Centre is the Chinese steel industry's first hyper-converged big data centre, acquiring 350,000 data zoomed from original mere 10,000 data.

The 350,000 data can support six software applications, 100 intelligent models and 150-sheet automatic reports.

The centre features a CISDI-developed ironmaking integrated intelligent control platform for data and results interconnectivity.

It acts as the steelworks' brain, functioning as an intelligent monitor and alarm, carrying out analysis and diagnosis and optimised decision-making.

The CISDI-developed intelligent energy media system, which integrates closely with production for simulating gas flows and tracking gas sources, has also been applied.

CISDI team is now dedicated to enabling energy media's intelligent control and developing master-procedure-based energy supply-consumption prediction model, energy intelligent analysis and optimisation model.

The ultimate goal is to realise autonomous balance, check, organisation and optimisation.

The intelligent energy media system is, in the final analysis, expected to meet the steelworks' higher and systematic energy conservation needs.

The intelligence liberates people from repetitive and laborious activities and the production and management technology enables them to work more creatively.

One central control room means endless coordination and greater efficiency

The platform indicating the functioning Shaogang BF-centred ironmaking integrated coordination

Shaogang now has only one centralised control centre, which incorporates 42 previous central control rooms.

Endless coordination is now achievable. The blast furnace-centred ironmaking integrated coordination and mass coordination between ironmaking and energy media have been formed. The traditional boundaries that exist in a steelworks' areas and procedures have been eliminated. Such coordination makes management and production more efficient.

Coordination - the results

◆ Coordinated control is realised between triple-flow-coupled energy and master procedure (the triple flows are mass, energy flows and logistics).

Ironmaking production involves around 90 per cent of secondary energy conversion while consuming around 40%. Data show a high-degree coordination and interaction between ironmaking production and energy media system.

CISDI's energy-master procedure integrated control system intensifies functions by mass-energy gradation, information fusion and coordinated control. It has created a new method for steel companies to improve systematic energy efficiency by fusing energy management and master procedure.

◆ Efficiencies have been enhanced – a 30 per cent increase in the efficiency of ironmaking personnel, and a 60 per cent increase in control system operational efficiency.

CISDI's team at work at Shaogang's Intelligent Centre

Operators monitoring the site production screens at the centralised control center

Fact file

Shaogang is part of China's Baowu Group and is located in the Guangdong province. It is China's most important shipbuilding plate producer and is a high-tech steel production enterprise.

Developed over 40 years, the Shaogang plant can produce six million tonnes of steel a year and is China's main supplier of plates, wire rods and bars.

Link: CISDI's Intelligent Ironmaking

Committed to developing intelligent ironmaking products, CISDI has created innovative solutions for flow, technology and management through big data, internet of things and artificial intelligence.

The company's intelligent products help solve technical issues and production problems, reduce hot metal costs and improve labour productivity. They create a new model of integrated ironmaking production.

Ironmaking Centralised Control Centre

Core values

The centralised control centre for Baosteel Shanghai's blast furnace

China's steel industry has welcomed a new first - the application of an integrated intelligent control platform and large-scale long-distance centralised control technology for ironmaking. Created by CISDI, the centre controls blast furnace ironmaking and its upstream procedures – sintering, coking and stockyard - and combines the work of dozens of central control rooms.

By re-defining a steelworks' organisational structure, the centre fulfills six roles – integrated control, intensive operation, root safety, standardised logistics, flow-based manufacturing and flat organisation.

Labour productivity can be increased by 20 to 40 per cent.

Highlights

By utilising internet of things, machine vision and artificial intelligence, the centre can remotely interlink with site production.

The centre can also render dynamic assessments on ironmaking production status, intelligently diagnose critical production problems and make accurate positions and scientific decisions.

Ironmaking Integrated Intelligent Control Platform

Core values

In response to issues caused by lengthy production procedures, the frequent variations of parameters and the influence of multiple factors, by focusing on flow control and KPI evaluation the platform keeps track of information (from stockyard to sintering, stockhouse and hot metal tapping).

The chemical compositions and lab properties of each batch of raw materials charged into the blast furnace can be evaluated.

The integrated ores proportioning model continues the big data analysis of raw materials batching and preparation, and effect laws on production.

Hot metal costs can be reduced by $7.5-15 USD per tonne, a dynamic control for winning the most competitive hot metal cost. The blast furnace can be kept running smoothly and stably with an optimised, scientifically proportioned supply of ores.

Highlights

Intelligent control of ironmaking production flow

Optimised logistics and supplies, enabling storage and production to interact

Employs big data mining technology to get the most competitive hot metal cost in a dynamic control

Screen shot of big data analysis for production

A screenshot of production status diagnosis

Intelligent Ironmaking Plant

Core values

Over 20 mathematical models, developed by using big data and blast furnace simulation, cover the entire ironmaking and upstream process flows, enhancing ironmaking production visualisation and digital levels.

As an example, intelligent ironmaking models in the blast furnace area have made production smoother. Fluctuations caused by operational misjudgments are now seldom seen. As a result, the fuel ratio has been reduced by 2 to 10 per cent and 2 to 3 per cent savings on gas volume have been achieved from using a hot stove combustion model. Accuracy of forecasting blast furnace heat is now at 89.4 per cent as a minimum.

Intelligent features

Blast furnace ironmaking plant

- Hot stove automatic combustion model
- Heat and hot metal Si content forecast model
- Operating profile optimisation model
- Cohesive zone model
- Intelligent control model for hearth long service life
- Molten iron digital control model
- Distribution optimisation control model
- Safe hot metal tapping model

The model for optimising coal batching at a coking plant

Screen shot of the sintering production monitor

Screen shot of the blast furnace digital control model

Searching the optimised profile via a mirror model

Coking plant

- Coke oven temperature intelligent control model

Sintering plant

- Excise control system
- End point control model

Ironmaking Industrial Data Centre

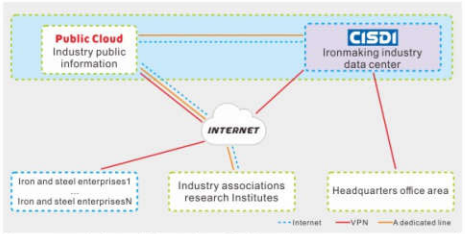
CISDI plans to create an ironmaking tech-ecosystem which will be an industrial-level big data center.

To that end, an industrial big data centre has been created on CISDI's open and integrated steel industrial internet platform.

The data for more than 10 blast furnaces, in China and overseas, has been switched to the platform.

When the tech-ecosystem is complete, it will provide steel enterprises with multi-dimensional benchmarks and information for diagnosis and decision-making.

As it can be seen from the data available from China, South and South-east Asia and South America, a sharing economy is now forming.



An external view of Tangshan Ruifeng's new green stockyard

The structure for CISDI's steel industrial internet platform

CISDI to take Masteel's stockyard green

Reference photopgraph: An aerial view of Formosa Ha Tinh Steel' s green stockyard, which was designed and built by CISDI. It is the world' s largest single-phase capacity integrated yard

Masteel has once again placed its trust in CISDI's transformational abilities.

Immediately after contracting CISDI to take charge of an intelligent upgrade, the company has entrusted it with the green upgrade of its primary stockyard bay 3.

Carried out on an EPC basis, work will be online and will not halt production.

The existing primary yard will be converted to a one-bay environmental-protection yard. Two sets of parallel full-gantry scraper stacker-reclaimer facilities will be installed.

The new yard will be able to meet the annual 16 million tonne requirements of the blast furnaces a year and will utilise CISDI's patented stockyard technology.

This will be CISDI's second reference for the upgrading technology, the first being at Baosteel Shanghai.

Fact file

CISDI's intelligent and eco-friendly stockyard creates an environmentally-friendly storage area for materials, cleaner production and a wealth of cost-saving benefits.

An intelligent management system allows the stockyard to operate unmanned, and also improves efficiency and reduces energy consumption.

The stockyard technology has been awarded a Japanese patent and a Chinese patent prize for excellence. Multiple benchmark references and performances have led to it being honoured in China's National Environmental Protection Science and Technology catalogue.

Construction starts at ElMutún - the steelworks set to transform Bolivia

The groundbreaking ceremony at the ElMut ú n steelworks in Port Suarez, Bolivia

The President of Bolivia, Evo Morales, shakes hands with Tao Li, the president of CISDI's Engineering Consulting Company

Construction has started at ElMutún, the steelworks set to change the future of Bolivia.

A ground-breaking ceremony has been held at ESM's site in Port Suarez, which has the world's largest single reserve of iron ore.

The new steelworks will have an annual production capacity of 150,000 tonnes, saving Bolivia $230 million USD a year in steel import costs. The plant is expected to drive the country's industrial modernisation and increase local employment.

The site's rolled products will meet 60 per cent of local demand and will mainly be used for local architectural projects.

A mineral separation plant, iron ore processing shop, DRI plant, meltshop and hot strip mill are being created.

The project is CISDI's first total process engineering consulting contract in South America.

CISDI is providing total process engineering consulting, with specific responsibility for project quality monitoring and certification of design, construction, trial production and operation for the steel plate production lines.

Artist's impression of the ElMut ú n steelworks

The project is scheduled to take four years. A 30-month construction period will be followed by 12 months of operations monitoring and a further three months' monitoring of ESM operations.

Under ESM, CISDI will co-ordinate closely with design, construction and supply parties providing technical and cost consulting and project management.

Present at the groundbreaking ceremony were Bolivia's President, Evo Morales, the minister for the Bolivian Mine Ministry, Cesar Navarro, ESM's chairman, Lara, and the Chinese ambassador to Bolivia, Yu Liang.