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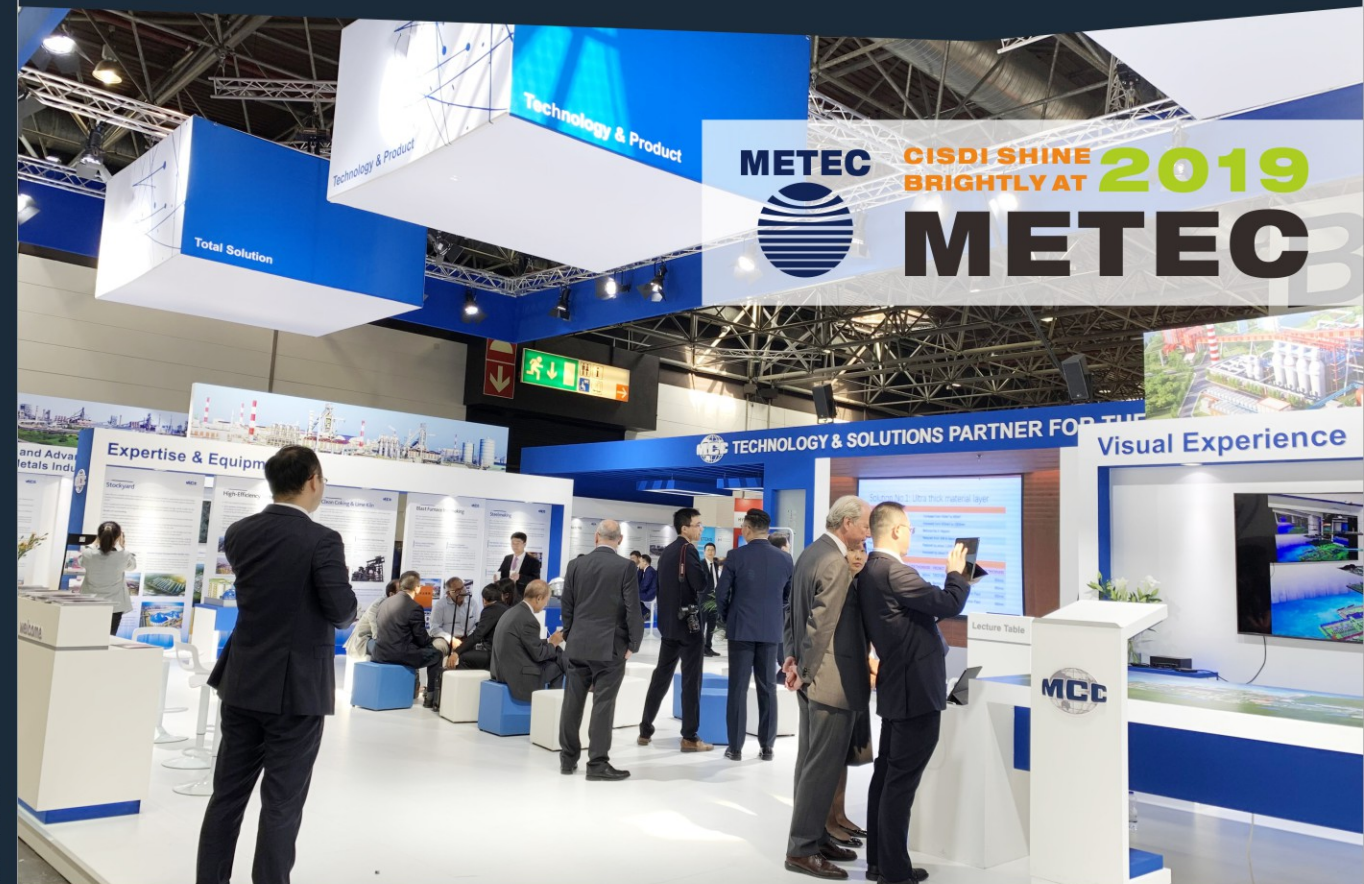
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CISDI

NEWSLETTER

Vol. 7, 2019



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- CISDI's message to METEC 2019 visitors
- METEC 2019 - a great place to showcase our skills, say CISDI bosses



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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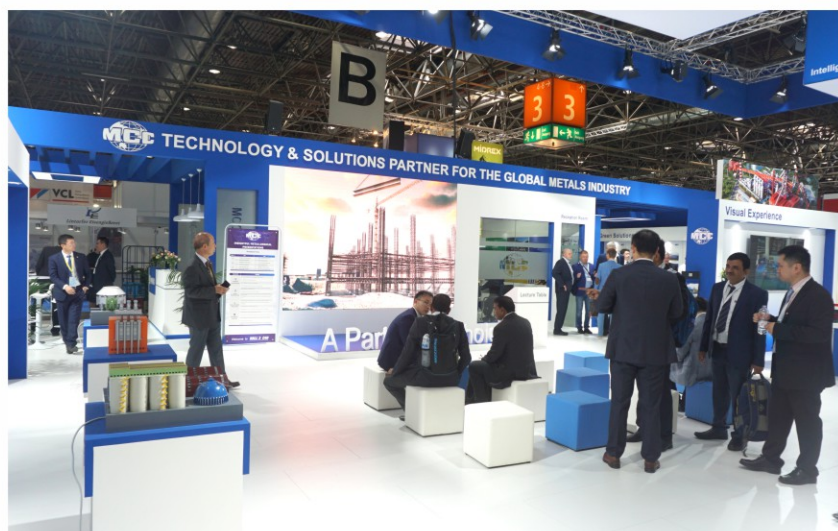
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CISDI shine brightly at METEC 2019

CISDI is committed to serving global clients with better technologies and solutions and improving their core competitiveness



MCC's stand at METEC 2019

CISDI and its parent company MCC shone at the Bright World of Metals, the 2019 event staged by world's most important trade fair for metallurgy and casting specialists.

The Chinese steel production and technology giants had a big presence at METEC 2019 in Dusseldorf, Germany.

Their 300 square-metre stand showcased their unique total solutions, full-process core

technology and equipment, and intelligent and green manufacturing expertise.

Numerous companies from around the world engaged in discussions on innovative new methods for steel transformation and upgrading.

The exhibition welcomed around 72,500 visitors from 118 countries over five days.



CISDI's chairman Xiao and his team meet with ArcelorMittal's vice president Dominique Vacher at METEC

Focusing on the future

CISDI chairman Xuewen Xiao led his team's presence at the fair, holding talks with leaders from TATA Steel, ArcelorMittal, InterCon, Interco, PSI and Mitsubishi, and other clients and partners.

Topics discussed focused on global and Chinese steel development trends, potential projects and ways of working together.

"China's steel enterprises are playing ever-more important roles in the global metals industry," remarked Zhichun Hu, vice-president of CISDI, who is in charge of overseas business.

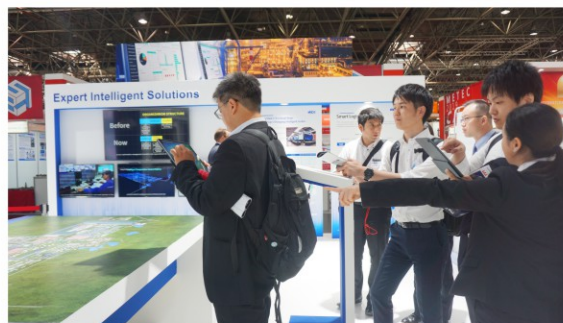
"We were pleased to meet many old and new friends from Europe, North America, South America, India, Southeast Asia and Japan at METEC 2019, and proud to hear them speak highly of CISDI's achievements in core technology and intelligence, and their confidence in our services."

Fruitful discussions were made with other steel enterprises, including JSW, JSPL, NLMK, MMK, Severstal, Erdemir, METINVEST, Nippon Steel, JFE, JSL, POSCO, Liberty, Gerdau, GUSA, SAIL and Essar.

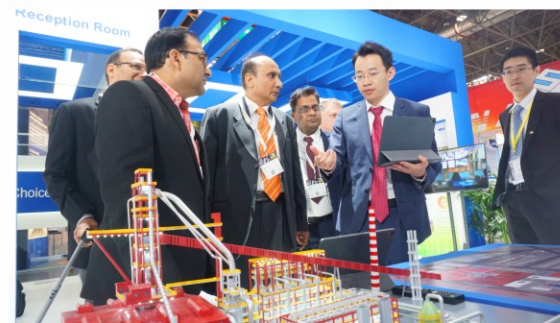


CISDI's chairman Xiao sits down to talks with TATA Steel's CEO and managing director T. V. Navendren at METEC

Visitors take a trip into augmented reality



Visitors immerse themselves in an augmented reality journey showing CISDI's general layout design based on plant-wide iron, energy and information flows



Augmented reality enabled visitors to learn about CISDI's digital delivery for a blast furnace

Augmented reality took CISDI's guests on a journey of exploration at METEC.

A dedicated AR experience zone enabled visitors to the company stand to see the entire layout of a steelworks and watch the flows of iron, energy and information passing around the plant - all by holding an iPad.

By harnessing three-dimensional animation, CISDI was able to illustrate swiftly and simply how a plant's general layout design is developed around these

flows, so that optimal economic, systematic and sustainable targets can be achieved.

CISDI's digital delivery was highly commended by the visitors, who got to see an AR panorama on CISDI's digital products for the world's largest blast furnace under construction.

The company's latest references and developments in intelligent and green manufacturing, total solutions, digital design and big data-based algorithms were also demonstrated.

"We showcased our unremitting determination to innovate and proved we are ready to embrace future challenges and opportunities to create cost savings and greater production efficiency for our clients."

Zhichun Hu, vice-president of CISDI.

Intelligent manufacturing solutions to create values for clients



A CISDI engineer explains to METEC visitors how the intelligent control centre functions

The hottest topic at METEC's Bright World of Metals was how intelligent manufacturing and Industry 4.0 would transform and upgrade the steel sector.

CISDI showcased several first-rate intelligent products and solutions, highlighting those already applied at Shaogang's intelligent integrated centre.

The centre has created a new BF-centred integrated production mode which has brought about not only a 20-40 per cent increase in productivity, but also considerable savings. It can run with 38 per cent fewer staff, hot metal costs have gone down by \$1.4-7.5 USD per tonne, and the fuel ratio for ironmaking has decreased by 2-10 per cent.

CISDI's intelligent and eco-friendly stockyard developments also took centre stage.

The company's expertise has helped Baowu Zhanjiang's 10Mt/a steelworks put into operation an intelligent and green stockyard, the first for a plant with such a high tonnage level.

The stockyard is capable of intelligent optimised decision-making on flows, and has an intelligent blending yard, unmanned stacking and reclaiming, a digital yard and 3D production simulation.

Since its startup in 2016, monitoring the one million square-metre stockyard plant has required just two operators who work with

remote technology.

Intelligent warehousing was also a popular topic.

CISDI demonstrated to visitors how it had built an intelligent warehousing system for Bayi Steel, which is part of China's Baowu Group.

Technology enables driver-less crane operation in complicated conditions and enables warehouse operations to be intelligently monitored and controlled, resulting in cost reductions, increased efficiency and workforce safety. In addition, the service life of equipment is being extended.

CISDI's smart logistics system also got its time in the spotlight. The system is built on industrial AI and a big data analysis platform and achieves numerous results, including improvements in real-time, accuracy, economy, efficiency and security.



CISDI's intelligence 'show zone' at METEC

CISDI's message to METEC 2019 visitors

WHO WE ARE?

CISDI, a technology and solution partner for the global metals industry, is:

- A core subsidiary of MCC under Minmetals
- Headquartered in Chongqing, China, and has a 61-year history
- A successor of China's backbone for the ferrous industry, Chongqing Iron and Steel General Design Institute, a trailblazer and leader of China's steel industry
- A technology and solutions provider chosen by global steel enterprises. The company lists 40 as clients
- A leading provider of the full-steel-process, total solutions from consulting to technological process, equipment, electric and automation, intelligence, information technology, operations management, big data and internet plus technology
- A pioneer in green and intelligent manufacturing solutions, focusing on restructuring, upgrades, new processes, flows, materials and methodologies
- A contributor to the Belt and Road greenfield steelworks in ASEAN, offering competitive, systematic solutions and expertise for developed countries' steel upgrading

CISDI STAR PROJECT

Baowu Group's Zhanjiang Steel, China (10Mt/a Greenfield)

China's Zhanjiang Steel is the world's most advanced low-carbon steel plate production base and one of the world's most efficient green steelworks.

CISDI built its Phase I over the last three years, completing the master plan, feasibility study, general layout design, main production plants and utilities design and construction. Ramp-up was swift and technical and economic indicators have surpassed designs.

Zhanjiang Steel's achievements are exemplary:

- A hot metal transport distance of less than one kilometre on the ironmaking – steelmaking interface
- A plant-wide iron utilisation ratio of more than 97.2 per cent
- An internal solid waste reutilisation ratio of 99.96 per cent.
- Low water consumption – 2.87 tonnes of fresh water per tonne of liquid steel



CISDI EXPERTISE

Consulting – leading metallurgy to even higher quality development

An expert consulting services provider, over the last decade CISDI has created outstanding results for some of the world's biggest steel enterprises – JFE, Baowu Group, TATA Steel, Gerdau

Acominas, Formosa Ha Tinh Steel and dozens more, providing services ranging from consulting to design, project management and production and operations management.

Financing feasibility studies:

CISDI's exacting assessment reports are carried out to the standards and international practices determined by top financial institutions.

Master plans:

CISDI provides expert master plans for the creation of steelworks which are highly cost-effective, performance-advanced and eco-friendly.

Project management:

CISDI's globally-sourced integrated supplier management and purchase system conducts digital and internationally-recognised EPC-based project management. It provides tailored consulting services for strategic decision-making, investment control, management of

design, procurement and construction and production preparations.

Systematic optimisation:

CISDI's toolkit of technology-economy analyses are able to study iron flow, mass flow, energy flow, information flow and emission flow among procedures, interfaces and process flows. MCC's systematic solutions achieve a dynamic and co-ordinated control of capital and running costs and enhance operation.

Operations management services:

CISDI's consulting expertise in operational diagnosis, evaluation and optimisation delves into a steelworks' systems and an individual plant's management and technology. CISDI provides practical solutions which improve quality and efficiency and consistently reduce operation costs.



CISDI STAR PROJECT

Formosa Ha Tinh Steel, Vietnam (10Mt/a Greenfield)

FHS is Southeast Asia's largest steel enterprise. It has achieved world-class economic and environmental indicators and product competitiveness.

CISDI is the technological lead for FHS's plan,

design, construction, supply and operations management.

China's 10Mt/a-level green steel system design and full-industrial-chain supplies were exported to the plant over a five-year period.

Full-process core expertise and products

CISDI provides full-function and full-life-cycle services throughout the steel process.

As a pacesetter for China's steel engineering sector, CISDI has provided patented technologies and equipment to clients in China and around the globe.

© Stockyard

Over the last decade, CISDI has undertaken over 170 stockyard projects, supporting around 500 million tonnes of steelworks production capacity,

accounting for over 70 per cent of similar projects around the world.

CISDI's patented ECIA stockyard design and technology creates enclosed storage, which is safer for the environment. The Brownfield stockyard can be upgraded to the ECIA without interfering with production.

◎ Blast furnace

CISDI has designed 30 per cent of the world's mega blast furnaces with volumes of over 4,000 cubic metres. It is a leading supplier of blast furnaces with vanadium-titanium magnetic ores and of blast furnace rebuilds with modular fast revamp expertise.

◎ Steelmaking

CISDI is an inventor of the world-leading 4-point linkage suspended BOF (SACS – self-adaptive constraint system). It has created the intelligent, unmanned locomotive for hot metal transport from ironmaking plant to steelmaking, has designed world-class compact hot metal-liquid steel interface arrangements and is an originator of CISDI-AutoARC™.

◎ Continuous casting

CISDI has a vast amount of experience, having supplied at least 600 casters of over 2,000 strands to an EPC mode.

Its strengths also run to the design and supply of high-speed special steel continuous casting technology for bloom and round billet, multi-strand billet continuous casting, near-net-shape heavy beam blank continuous casting and full-series slab continuous casting.

◎ Tubular products mill

CISDI has designed and built over 30 tube mills during the last 15 years – half of those created around the world during that period. Its expertise includes highly-efficient, high-precision 3-roll mandrel pipe mill package supply, high-response hydraulic servo roll gap control, a high-speed heavy-duty mandrel retaining system and online and offline tube heat treatment solutions.

◎ Flat and long products mill

CISDI's full-function flat and long product hot-rolling services span design to manufacture, construction, commissioning and operations management.

Record results are being achieved. Wide strip hot-rolling lines can be ramped up in as little as three months and the maximum output exceeds 6Mt/a. The product strength from CISDI-designed skin-pass mill and coil dividing line is China's first to reach 800MPa and a maximum of 1,500MPa.

CISDI has advanced the wire-rod rolling core process with its equipment and automation control expertise and 2-roll and 3-roll bar mill reducing and sizing expertise. High-speed work-piece charging technology can operate at 40 metres per second as a result.

CISDI's developments for breakdown mills and short-stress path-rolling mills, slab reheating furnaces and thin-plate heat treatment are enabling product quality to reach world-leading levels.

CISDI STAR PROJECT



Online rebuild of Baosteel Shanghai stockyard, China

Annual receiving capacity: approximately 50.95Mt/a

The enclosed rebuild of 13 stockyards has increased efficiency, reduced land coverage by at least 25 per cent and shortened the total length of belt conveyors by at least 10 per cent

Formosa Ha Tinh Steel's blast furnace 1 and 2, Vietnam

This project was China's first export of mega blast furnace expertise and equipment. CISDI lead on the EPC-based construction and technical assistance.



Baosteel Meishan 280-tonne CISDI-SACS BOF, China

Fully home-made, the largest tonnage of SACS BOF in China

METEC 2019 - a great place to showcase our skills, say CISDI bosses



Visitors from across the globe learned about our expertise

John Lester, MD of CISDI UK

"We were proud to be part of METEC's hugely successful 10th major international trade fair for metallurgical plant supplier and manufacturing companies.

Around 72,500 visitors from 118 countries were welcomed during the fair's five-day run. Surprisingly visitors from China and India were the largest visiting group, followed by Italy, Turkey, Japan, France and Russia.

There were around 2,360 exhibitors from all over the world, covering the entire international market and we were proud to be one of them.

The MCC stand was one of the largest at the event and we welcomed

representatives from almost all the top steel producers world-wide, including ArcelorMittal, Tata, Metinvest, POSCO, ThyssenKrupp and Liberty House Group.

CISDI exhibited many new technologies, including the new Centralized Control Centre featuring the latest Industry 4.0 technology.

In addition, we showcased our latest references in stockyard solutions, ironmaking, steel-making, casting and rolling.

All visitors were impressed with the array of technology and equipment on show and we look forward to the next event in 2023."



CISDI Team



We are ready to create a brighter future for global clients

Yong Liu, head of CISDI's overseas business department

"CISDI was in the limelight at METEC; I was delighted to meet almost all of the steel industry's global major clients and everyone visiting our exhibition stand wanted to hear about our technology, project and financing services.

CISDI is really making its presence felt on the international metallurgical stage - 40 of the world's 50 top steel enterprises have been our clients.

I believe they choose CISDI not only for the corporate brand and its expertise, but also as a sign they are welcoming of China's policy of

opening wider to the world.

As we go deeper into global steel markets, we have set up overseas operations in many of the world's steel hotspots. We are exploring business opportunities along the route of the Belt and Road Initiative in Asia and in Europe and America.

Our leading blast furnace expertise has won us bids for benchmark projects such as TATA Steel's 5,870m³ blast furnace and ArcelorMittal's 5,000m³-level blast furnace.



CISDI representatives meet an old friend from a client at METEC 2019



CISDI is to design and package-supply for ArcelorMittal's blast furnace 9 rebuild at the Krivoy Rog Steelworks in the Dnipropetrovsk region of Ukraine

We have extended our service mode from engineering to operations management and investment-construction-operation services and have brought about remarkable results at Formosa Ha Tinh Steel, ASSB Kuantan and GUNUNG Steel.

Our brand and our technology are getting more and more recognition from the global markets. Our core equipment supplies to TATA UK, Oyak Turkey and Gerdau Acomonias Brazil have been highly praised and we continue to consolidate partnerships and co-operation with Hatch, Mitsubishi and NSENGI.

Keeping up with research and following the market and the needs of clients is key to our success.

We will be making full use of China's national toolkit policies to develop our involvement in the international co-operation of production capacity, meeting the needs of BRI-route infrastructure construction

and economic development. But in addition, CISDI UK will be our bridge to business opportunities for steel upgrades and green, intelligent manufacturing in developed countries.

We have green technology solutions for sewage treatment, conversion of solid waste to energy and zero liquid discharge. Our intelligent manufacturing solutions improve productivity and reduce labour costs. Our unique consulting expertise creates systematic solutions.

For future overseas business, the focus will remain fixed on the BRI route and developed countries, but we will also be paying attention to the African market.

Our overseas offices will be recruiting from their local labour forces, we will be strengthening our communications with clients and partner and capitalising on global resources to provide a diverse range of optimised solutions to clients.



How five-flow systematic solutions enhance plant-wide competitiveness

Hong Dai, head of Metals Mining Business Dept. for CISDI's Consulting Business Division



CISDI is conducting a feasibility study report and plant upgrades for LPS Greenfield 10Mt/a steelworks, the largest steel complex to be built in Australia

Augmented Reality enabled me to take METEC visitors on a dynamic visual journey around Baowu Zhanjiang Steel.

Over 100 people marvelled at the experience and learned how CISDI had improved the steelworks' competitiveness by studying the plant's five flows - iron flow, mass flow, energy flow, information flow and emission flow - and designing a steelworks master plan around

them which would be more competitive, economical and better for the environment.

I used AR to take visitors on a 'tour' of the plant's general layout and through a dynamic simulation of the five flows and how they had been used.

During my AR demonstrations I received numerous interesting questions and comments.

A visitor from South Korea

commented: "How amazing! Can I try it? What are your core technologies?" and a visitor from Japan wanted to know the maximum water recycle ratio and the designed iron utilisation ratio.

An intrigued steelworks representative from India revealed its plant had never attempted to recover blast furnace gas and wanted to know how the company could benefit from gas recovery.

A visitor from Africa was particularly impressed and enquired how CISDI's technology could assist with the problem of low-quality ore grade at the location of their steelworks, and reduce production costs by using the five-flow concept.

A representative from a European steelworks wanted to know if analysis of emission flow could guarantee a reduction in emissions which would meet the environmental requirement.

More and more clients now appreciate the significance an optimised general layout design, or master plan plays when creating better values for steel.

In our opinion, pursuing cost competitiveness is crucial to the future of steel and CISDI's general layout design places it as top priority, from front-end planning to downstream designs.

We use a multi-dimensional analysis method to evaluate the systematic investment and propose an optimised design

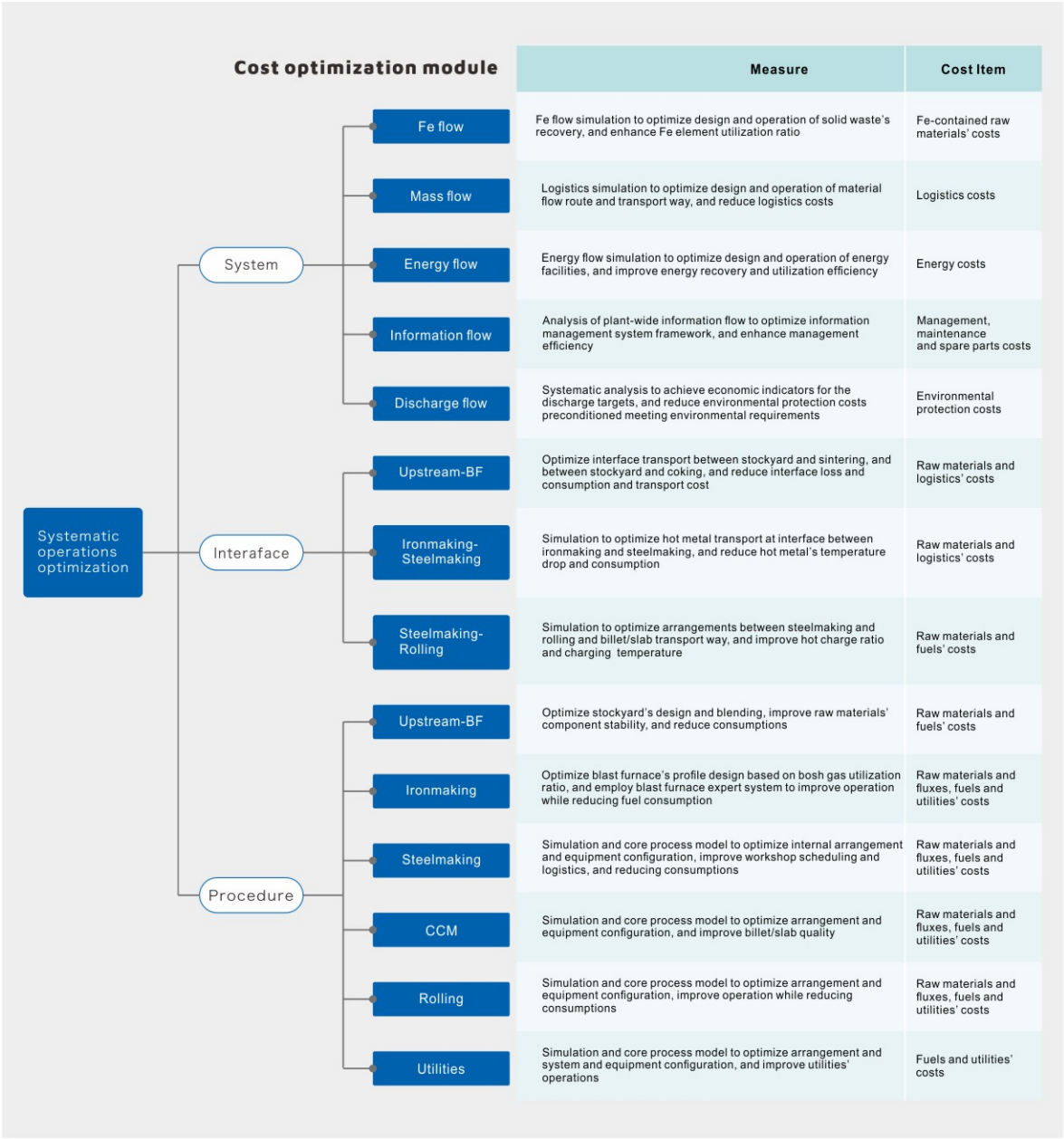
which will control the entire investment cost.

In addition, we study the plant-wide comprehensive cost, individual plant continuous cost and the influence important factors can have on costs.

We find out the variations in manufacturing costs per tonne of steel and the reasons for those variations. Based on those results, we then propose an optimised general layout which would enable the steelworks to run at its most cost-competitive production levels.

Green and intelligent manufacturing are other major commitments for the steel industry and given great emphasis in our general layout designs.

A CISDI' s representative operates the AR for the 5-flow expertise for Baowu Zhanjiang



A sketch of CISDI's 5-flow cost analysis and solution



BPR-based intelligent manufacturing is driving us forward

Gang Wang, vice chief engineer of CISDI Chongqing Information Technology Co., Ltd.

Almost all the stands at METEC showcased their intelligent expertise for steel manufacturing.

CISDI's intelligent manufacturing solution based on BPR (business process re-engineering) was a welcome addition, judging by the response from visitors and partners.

Today's world faces new challenges when it comes to resources, renewable energy and environment, and intelligent manufacturing has become crucial to steel upgrading.

Industry 4.0, the internet of things, big data, cloud computing and artificial intelligence have been developing rapidly, which is creating unprecedented opportunities for conventional manufacturing sectors.

Yet intelligent manufacturing is not as simple as installing a robot, a set of information-based management systems or a mathematical model for working procedures.

It involves the revolutionary, systematic engineering that integrates and coordinates production, management, technology and organisation. In other words, intelligent manufacturing entails an entire transformation of technology, management, organisation and finally the manufacturing mode.

By virtue of our 61 years of experience in steel engineering and our research and development results, CISDI has taken the lead in putting into operation the automation, big data, industrial internet, artificial intelligence and internet of things at the steelworks in a centralised way.

By December 2018, Baowu Shaogang, a pioneer of the world steel industry, had built an

intelligent integrated control centre for its upstream blast furnace procedures.

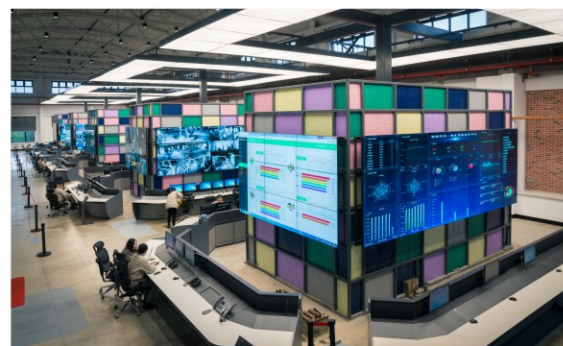
The centre is a consolidation of the plant's original 42 central control rooms and can implement a large-scale, long-distance (more than 5 km) and intelligent control.

The 350,000 items of data collected support the working of over 100 smart models and as a result, over 400 workers no longer have to work in risky conditions.

The intelligent centre has changed the traditional methods of production and decision-making. This has streamlined 60 per cent of production areas and reduced working posts by nearly 40 per cent.

It has re-engineered Shaogang, transforming it into a flat, leaner, more flexible and efficient organisation.

CISDI is now designing Shaogang's downstream intelligent integrated centre for steelmaking and rolling.



The world's first intelligent integrated control centre - Baowu Shaogang's upstream-BF centralised control centre



We are spearheading blast furnace ironmaking around the world

Can Xu, head of CISDI's Ironmaking Business Department



The digital design for a 5,000m³-level blast furnace, which was on show at METEC

Capturing the 3D model of a blast furnace on the Augmented Reality screen, I proudly told the crowd that had gathered: "This new blast furnace is the world's largest and it was made to our digital design."

As I detailed our ironmaking expertise for our METEC visitors, a representative from the company who own and operate that blast furnace was standing by me, feeling equally as excited and proud of the innovation that made it possible.

The fair was our first attempt at showcasing blast furnace's tailored, fast revamp expertise to a genre market. It may arouse interest from a number of overseas ironmaking plants.

Our world-leading projects - 5,000m³-level blast furnaces in India and Ukraine and a 4,000m³-level blast furnace in Vietnam - drew attention.

CISDI is consistently growing its ironmaking expertise.

Our high-efficiency, energy-saving and eco-friendly top-combustion stove and bag filter expertise has drawn global attention. Our patented blast furnace top and granulating drum expertise has broken the foreign monopoly.

Baosteel Zhanjiang's blast furnace with world-benchmarked indicators has built trust with clients and our tailored, dedicated services have further bolstered our clients' confidence to choose us.

Looking to the future, intelligent manufacturing has become an internal driving force for us, and we are deepening and accelerating our pace in the international steel arena.

CISDI's ironmaking team has always practiced the company's core value of creating values for clients, and we are striving to bridge any gaps in cultural backgrounds, and standard systems and project practices.

CISDI's autonomous locomotive, loaded with hot metal, traverses the railway crossing from ironmaking plant to steelmaking at Baowu Group's Zhanjiang Steel



CISDI's intelligent autonomous locomotive, a world first for the steel sector

All-weather perception, automatic coupling and accurate positioning in all conditions

The global steel industry's first intelligent and autonomous locomotive has been trialled successfully in China.

The single, heavy-duty hot metal transport locomotive, invented by CISDI, is running smoothly and stably at Baowu Group's Zhanjiang Steel plant in China.

When the autonomous locomotive system is operational it will make the transportation of hot metal cheaper and remarkably more efficient, improve working conditions and cut labour costs.

The transportation of hot metal from the ironmaking plant to the steelmaking plant, two closely-linked and important logistics and production systems, is fraught with difficulty.

Currently, the complicated

scheduling of locomotives and all procedures - coupling, parking, aligning, route-planning and ladle matching - have to be done manually and are fraught with problems and hazards.

A smooth transportation relies on the skill and experience of workers operating the vehicles. If an emergency arises, how swiftly they react can make a huge difference to safety and costs.

In addition, the interface between the iron and steel plants is noisy and the air is laden with dusts, and during bad weather the transportation car, fitted with a ladle holding hot metal at 1,500 degC, may have to run the gamut of rainstorms and typhoons.

CISDI's solution to this problematic process is an

intelligent, unmanned hot metal transport system.

Featuring a self-learning, self-adapting, high-precision control model, the locomotive has all-weather environmental perception and can identify obstacles in its path and act accordingly.

The hook between locomotive and torpedo ladle car connects and releases automatically and the ladle car is positioned accurately even in the most severe conditions.

This project integrates artificial intelligence and intelligent expertise with the industrial plant, setting the benchmark for further innovation-driven developments in the creation of an intelligent steel eco-system.

CISDI's Eco-friendly Solid Waste Treatment & Utilization Center



Baowu Group's Zhanjiang Steel Eco-friendly Solid Waste Treatment & Utilization Center, China

CISDI has successfully built the world's first Utilization Center for treating BF dust, BOF's OG dust, and other Fe- and Zn-bearing dusts at Baowu Group's Zhanjiang Steel, an important booster for creating an eco-friendly and cost-effective Greenfield steelworks by recovering Fe and reusing Zn from dusts, resulted in a metallization ratio no less than (\geq) 70% and a dezincification ratio no less than (\geq) 85%.

HIGHLIGHTS

CISDI trailblazing the rotary hearth furnace industry is

- Player with China's No.1 market share in this regard
- Provider of China's first overall plan and total solution to Fe- and Zn-bearing solid waste treatment
- Full life-cycle services provider from consulting to turnkey, operations management, and after-sales services

Two 200,000t/a Rotary Hearth Furnaces at Yanshan Steel, China
(Phase I started up in 2015, Phase II in 2018)



A 200,000t/a Rotary Hearth Furnace at Baowu Group's Zhanjiang Steel, China
(Phase I started up in 2016, ramped up within 1 month after startup, delivering DRI to twin 5,050m³ blast furnaces)



A 300,000t/a Rotary Hearth Furnace at Shougang Jingtang Plant, China
(to be started up in 2020)



Two 250,000t/a Rotary Hearth Furnaces at Baowu Group Shanghai, China
(to be started up in 2020)

