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# CISDI

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5,870m<sup>3</sup> BF2 for TSK, India

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► **Full-Process Services**

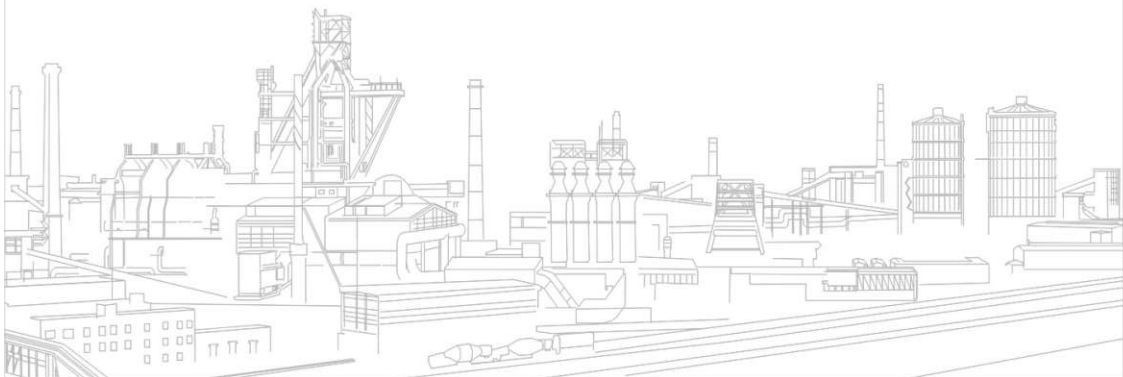
CISDI provides full-process services from the bulk material handling yard to the post-processing line of the hot mill.

► **Full-Function Services**

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

► **Full-Life-Cycle Services**

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



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## CISDI Group New Corporate Strategy



Consolidating world leading systematic solutions to the full processes of iron and steel industry, CISDI provides industry guiding solutions through consulting, driving its core activities of iron and steel engineering and urban construction which are realized through the synergy of engineering technology, advanced equipment, intelligent automation with IT and smart applications, combining big data and internet plus with a goal of sustaining the creation of values for our global clients.

CISDI Group announced early this year the readjusted corporate strategic orientations: to be the world's leading iron & steel engineering service provider and expert for urban development.

As an ever-growing engineering facilitator, CISDI is positioned as a global-leading iron and steel engineering service provider, a pioneer in the provision of metallurgical construction and

operation, and a central research institute for ferrous metal.

Through systematic solutions for the complete ferrous metallurgical processes, CISDI creates value for its global clients through the integration of technological process, equipment, EIC, smart and IT applications, combining big data and internet plus technologies.

In response to the trends in the global steel market for industrial transformation and upgrading, CISDI focuses on providing systematic and advanced technologies for restructuring, industry upgrading, intelligent and environmentally-conscious manufacture through the development of new technology, new process, new material and new manufacturing method.

CISDI Group has reorganized one of its core subsidiaries, CISDI Engineering, to enhance quality and service to its customers. With the concept of division by product, services and business features, CISDI Engineering is comprised of 5 major business divisions, namely, Consulting Business Division, Iron & Steel Business Division, Urban Construction Business Division, Structures Business Division and Water Resources Business Division.

Such business divisions require specialized management and are the production keys to the

entire Group, playing comprehensive roles in supporting our clients, project implementation and delivery. In particular, the Iron & Steel Business Division becomes a nucleus and staging ground of all the related specialties throughout the full iron and steel processes and project cycle, required to provide systematic solutions to clients. CISDI's other subsidiaries such as CISDI Shanghai, CISDI Thermal & Environmental Engineering and CISDI Electric Furnace Institute, together with CISDI Engineering's Iron & Steel Business Division, make up the major driving forces serving the iron and steel sector.

CISDI Group / CISDI Engineering					
Consulting Business Division	Iron & Steel Business Division	Urban Construction Business Division	Structures Business Division	Water Resources Business Division	Subsidiaries /Branches
Metal and Mining Business Section	Regional Manager Section	Market Development Section	Steel Structures Business Section	Water Environment Business Section	CISDI Shanghai
Urban Development Business Section	Chief Engineer's Office	Chief Engineer's Office	Concrete & Geotechnical Business Section	Industrial Water Circulation Business Section	CISDI Electric
Strategy and Industry Consulting Section	Marketing Section	Project Management Section			CISDI Equipment
System Optimization Consulting Section	Project Management Section	PPP Project Operation Section			CISDI Engineering Consulting
Overall Design Section	Operation Service Section	Urban Planning Institute			CISDI Architecture
Consulting Technology & Methodology Section	Bulk Material Handling Business Section	Beautiful Village Design Institute			CISDI Thermal
	Ironmaking Business Section	Architectural Design Institute			MCC Real-Estate Chongqing
	Steelmaking Business Section	Landscape Design Institute			CISDI IT
	Continuous Casting Business Section	Underground Space & Utility Tunnel Design Institute			CISDI Environmental Consulting
	Flat Products Business Section	Municipal Traffic Design Institute			CISDI Construction
	Tubular & Long Products Business Section	Bridge Design Institute			CISDI Property
	Utilities Section	Municipal Utility Design Institute			CISDI Construction Drawing Review
	Automation Business Section				CISDI R&D
					CISDI SFRE
					CNSE
					HCI
					CISDI Brazil
					CISDI Vietnam
					CISDI UK
					CISDI India, etc.

CISDI Reorganization of Main Business Divisions



## CISDI Group Global Presence

Continuing with its on-going global strategy, CISDI Group established its subsidiary in Mumbai, India in 2016 following on from its overseas operations in CISDI Brazil, CISDI Vietnam and CISDI UK. 2017 will see the opening of its operations in Turkey, Malaysia and America.



CISDI's Global Presence

### CISDI's overseas operations:

#### ● CISDI Engineering India Private Ltd. (CISDI India for short)

Opened in 2016, supporting CISDI's I&S and urban construction businesses in South Asia.

#### ● CISDI UK Limited (CISDI UK)

Opened in 2014, the Sheffield workforce supports CISDI's European and North American businesses.

#### ● CISDI Vietnam Office (CISDI Vietnam)

Opened in 2012, FHS-project based and teams at Kỳ Anh at Hà Tĩnh in Vietnam for backing CISDI's businesses in Indo-China Peninsula.

#### ● MCC-CISDI Projetos Industriais do Brasil Ltda. (CISDI Brazil)

Opened in 2010, the 1<sup>st</sup> overseas subsidiary of CISDI, at Belo Horizonte in Minas Gerais-MG, supporting CISDI's business development in Latin America.

#### ● CISDI Turkey Office (CISDI Turkey, under preparation)

To be opened in 2017, supporting CISDI's businesses in Middle East and North Africa.

#### ● CISDI Malaysia Office (CISDI Malaysia, under preparation)

To be opened in 2017, ASSB project based and teams at Kuantan for supporting CISDI's businesses in Southeast Asia.

#### ● CISDI USA Office (CISDI USA, under preparation)

To be opened in 2017, supporting CISDI's businesses in North America.

### JVs:

#### ● CN Steel Plant Engineering Co., Ltd. (CNSE)

Opened in 2009, joining NSENGI in Chongqing for consolidating services of post processing lines of flat products.

#### ● Hatch-CISDI International Engineering & Consulting Co., Ltd. (HCI)

Opened in 2007, joining Hatch Canada to compose HCI combining the advantages in technology, implementation, project management and the global network of both Hatch and CISDI.



CISDI UK



CISDI India Unveiling



CISDI Brazil

## CISDI Provides All-around Implementation of ASSB-MCKIP Projects



ASSB-MCKIP, General Plant Design by CISDI

The site commander of ASSB-MCKIP commented that by choosing CISDI, China's best engineering company, would be a guarantee for the startup target by the end of 2017.

On November 21<sup>st</sup>, 2016 construction of the ASSB 3.50Mt/a steel plant commenced, and the launching ceremony for 2x1,080m<sup>3</sup> BF's was held at Kuantan in Malaysia, symbolizing a holistic start of the ASSB projects.

ASSB is the initial program at the Malaysia-China Kuantan Industrial Park (MCKIP), an important opening cooperative link between China and ASEAN, highly emphasized and supported by the governments of both China and Malaysia. CISDI is utilizing its combined strengths to build ASSB as an environment-friendly steel complex, excelling in competitiveness in Southeast Asia and pushing forward the Belt & Road Initiative.

21 steel plant units are required at ASSB, namely, stockyard, sintering, coking, blast furnace ironmaking, steelmaking and continuous casting, kiln calcinating, bar and wire rod mills, section mill, gas storage and distribution station, captive

power plant, plant-wide utilities, mechanical repair, warehouse and integrated pipeline network. CISDI is contracted with general plant design, equipment package supply, logistics management and integrated management services. All are ongoing as scheduled.

The ASSB construction is challenged with local variable weather and heavy floods, typical for Kuantan within a subtropical zone. However, in face of those unfavorable conditions, the CISDI teams are sparing no efforts or energy dedicating their engineering design and project management expertise to make full use of any available time.



ASSB Site under Construction

## CISDI Delivered Core Equipment to TATA Port Talbot HSM

The customer acknowledged CISDI's competences in technology, project management, equipment manufacture quality control and operational performance.

TATA's current mill equipment has remained largely the same since its installation in the 1980s. Thus, this fleet has gone through numerous refurbishment activities to prolong the equipment lifetime. Unfortunately, the reaction blocks on the operator side of the mill had reached the point where refurbishment was no longer a solution and CISDI was asked to look at an improved design.

CISDI redesigned, manufactured and delivered the upgraded equipment in time for the short shutdown. Following the successful installation and startup in September 2016, CISDI received correspondence form TATA UK Port Talbot Project Team expressing their overall satisfaction with the performance of CISDI. The customer's feedback gave CISDI high praise for our technical solution, project management, equipment manufacture, quality control and operational performance. CISDI fulfilled all the customer's requirements at all different stages of conceptual design, detail design and manufacture.

Subsequently TATA UK appointed CISDI to conduct a systemic consulting on the entire HSM rolling line, including the complete diagnosis of the product orientation, specification, rolling quality and equipment. CISDI delivered the consulting report to help the customer's decision-making on future modernization.



Equipment as Delivered to TATA Port Talbot Mill by CISDI



# CISDI Promotes its World Class, Mega, High-Efficiency and Low-Consumption Blast Furnace Technology

**CISDI has built more than 20 BF's with volumes greater than 4,000m<sup>3</sup> across the globe, these "Mega BF's" have achieved advanced performance indicators and have been awarded prize at China's national technological progress.**

CISDI has been dedicated to the research and development of the core technologies of high-performance mega blast furnaces. For more than 20 years CISDI has built up its experience in the processes, design, equipment, intelligent control, construction and operation

supervision of mega BF's. The main technical performance indicators in all of its references have achieved world leading levels and have contributed significantly to setting the industry standard for large-sized blast furnace technological development globally.

## Innovative concept in upgrading design to target high efficiency and low consumption

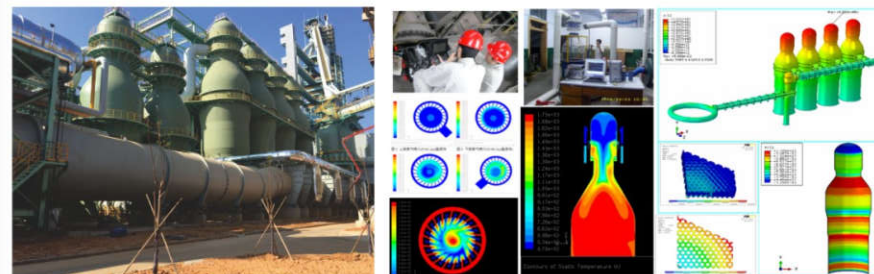
CISDI's approach to achieving high efficiency and low consumption focuses on controlling the bosh gas index within a reasonable range. CISDI is also the editor-in-chief of China's national standard "Code for Design of Blast Furnace Ironmaking". This technology provides a favorable basis for realizing a fuel ratio lower than 485kg/t and gas availability up to 51.5%.

The table below lists the typical indicators of a BF with which has the high-efficiency and low-consumption technology features.

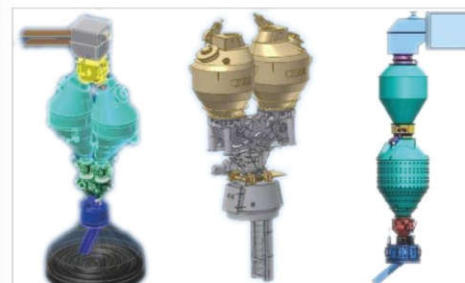
Item	Measuring Unit	Indicator
Productivity	t/m <sup>3</sup> d	2.20
Coke ratio	kg/t	300
Coal ratio	kg/t	185
Fuel ratio	kg/t	485
Gas availability		51.5%

## Tackling the bottleneck of core equipment for improving system energy efficiency

The core equipment has been successfully developed to overcome the bottlenecks in large BF's operation. Improvements in high-blast-temperature top-combustion stoves, high-volume no-bell top charging equipment, environmental-protection energy-saving granulating facility and dry gas cleaning system all contribute to this step change in the performance of mega BF operation.



Top-Combustion Stove for 5,000m<sup>3</sup>-level Blast Furnace  
(Blast temperature reaching 1,260°C~1,300°C by fully combusting BFG)



CISDI's New-Model No-Bell Top



Test Platform of 5,000m<sup>3</sup>-level BF (scale 1:1)



Environmental-Protection Energy-Saving Granulating Process for 4,000m<sup>3</sup>-level BF



Granulating Drum



Dry Gas Cleaning Process for 5,000m<sup>3</sup>-level BF

## Long-campaign technological control for entire life-cycle of a blast furnace

CISDI has pooled experience and wisdom in design, manufacture, construction, heat-up, production and maintenance of blast furnaces to develop a realistic, achievable, long-campaign technology. This technology enables the large BF to reach 15~20 years of campaign life. By implementing the technology throughout the full life-cycle of blast furnace, the Baosteel BF3 with a volume of 4,350m<sup>3</sup> achieved a 19-year campaign, with the tapping capacity of 15,700t hot metal per unit volume during the campaign, making it one of the world's longest-campaign BFs.



Baosteel Shanghai BF3  
(Average productivity 2.27t/(m<sup>3</sup>·d))



Study on Hearth Long Campaign Subject

## BF overhaul technology focused on saving investment, short outage period and superior quality ("3S") for green and efficient BF rebuilds

CISDI can accommodate its clients' expectations for short outages when overhauling the blast furnace by either regular or modular methodology. Both technological ways are directed to represent the most competitive BF with the minimum investment, shortest outage and highest quality.



Modular-based Short-outage Overhaul of A 4,000m<sup>3</sup>-level BF  
(taking only 78 days)

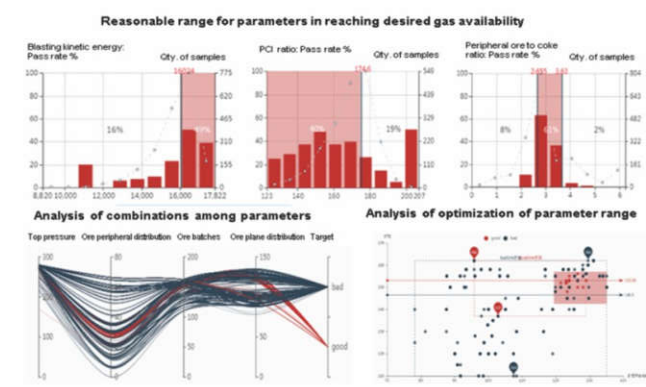
## Intelligent ironmaking with smart model and big data

CISDI has engaged in nearly 10 years of research and development in intelligent BF production management system, creating more accurate and practical models for improving the profile and thermal control.



Intelligent Production Management System for A 4,000m<sup>3</sup> BF

The ironmaking industrial big data platform is utilized for executing data mining and analysis and fulfilling the production optimization and cost reduction. CISDI is able to provide the technological services required by the high-performance big data platform and IT upgrading, and playing a leading role in transforming the traditional industry to intelligent manufacture based industry.



Mining of Key Operational Data in A Reasonable Control Range



## Applications

CISDI's high-efficiency and low-consumption BF technology has been applied to 20 mega BFs across the world, 16 of them in China, accounting for 75% of the domestic market. In the world arena, CISDI, as the pioneer among Chinese engineering companies, went head to head with overseas competitors and was awarded the order by Formosa Ha Tinh for 2 BFs with 4,350m<sup>3</sup> volume in Vietnam, JSW Dolvi BF1 with 4,323m<sup>3</sup> volume in India, TSK BF2 with 5,870m<sup>3</sup> volume in India as well as other influential projects. Over 60% of the new mega BFs of their kind planned outside of China in the last 5 years have been awarded to CISDI.



5,870m<sup>3</sup> BF2 under Design for TSK, India



Baosteel Zhanjiang 5,050m<sup>3</sup> BF

Due to the excellent contribution to scientific and technological advancement and industrial promotion, the BF technology was awarded the 2<sup>nd</sup> prize of China's national technological progress by the State Council and Ministry of Science & Technology, the highest honor to China's ironmaking industry recognizing CISDI's mega BF engineering.



Anyang Steel 4,747m<sup>3</sup> BF



Formosa Ha Tinh (FHS) 4,350m<sup>3</sup> BF in Vietnam



TISCO 4,350m<sup>3</sup> BF

## CISDI world leading consulting and overall design competence and full-process systematic solutions guided by consulting.

### Overall plans for Baosteel Zhanjiang and FHS

#### Brief of Baosteel Zhanjiang:

**Client:** Baosteel Group;  
**Location:** Guangdong;  
**Construction period:** May 2013 ~ July 2016 for Phase I;  
**Capacity:** 8.75Mt/a for Phase I;  
**Main configuration:** 5,050m<sup>3</sup> BFs, 350t BOFs, 2,250mm HSM and 4,200mm wide plate mill;  
**Main products:** High-end auto sheets, pipeline steel, cost effective.



Baosteel Zhanjiang Base in China, provides Baosteel with a world leading carbon steel plate base with modernized, eco-friendly and high-performance design from CISDI.

#### Orientation & services:

The biggest Greenfield steel complex in south China showcases CISDI's uniquely strong competitiveness;

CISDI Group has employed the combined tools of economic and technology consulting and simulation-based optimization, providing a reliable and advanced overall integrated solutions;

As of today, the economic and technical indicators at Zhanjiang Base have demonstrated to be the best of their kind in the world.

#### Brief of FHS

**Client:** Ha Tinh, Vietnam;  
**Location:** Ha Tinh Vietnam;  
**Construction period:** Dec. 2012 ~ Apr. 2017 for Phase I;  
**Capacity:** 7.0Mt/a for Phase I;  
**Main configuration:** 4,350m<sup>3</sup> BFs, 300t BOFs, 2,050mm HSM, combined bar & wire-rod mill, and wire rod mill;  
**Main products:** Coils, long products.



Formosa Ha Tinh Steel (FHS) in Vietnam, the only Greenfield steel complex outside of China in the last 20 years with a capacity of 10Mt/a

#### Orientation & services:

CISDI Group has delivered the overall technological solution and the economic and financial models;

Considering the client's needs first, CISDI provides one-stop services throughout the whole life cycle of the FHS project by means of overall process management and technology consulting.