



CISDI GROUP CO., LTD.

Chongqing Headquarter

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 (0) 1142291067
Email: john.lester@cisdi.co.uk

CISDI India

Address: 503-504, 5th Floor, A-Wing, Galleria Building, Hiranandani Gardens, Powai, Mumbai, India. 400076
Tel.: +91 9702043402
+91 2249701004
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

NEWSLETTER Vol. 4, 2017



The Formosa Ha Tinh Steel site illuminates the night sky

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TOTAL SOLUTIONS AND TECHNOLOGY PROVIDER
PREFERRED BY GLOBAL METAL INDUSTRY

► **Full-Process Services**

CISDI provides full-process services from the bulk material handling yard to the 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.

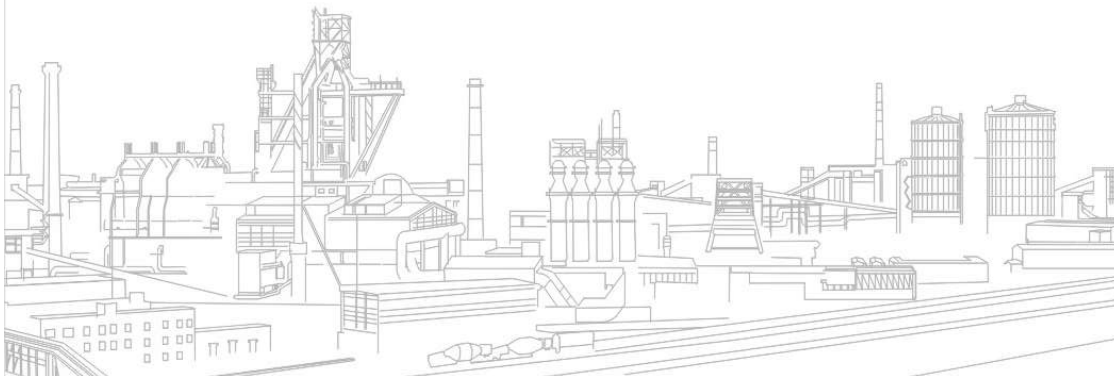


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Formosa Ha Tinh Steel Enters the Production Stage

The biggest and most ambitious steel complex in Southeast Asia successfully entered its production stage at the end of May.

The CISDI-built mega blast furnace at Formosa Ha Tinh Steel's £11 billion complex in Vietnam was blown in on May 29 and tapped hot metal the next day.

BF1 has now achieved normal operation levels and construction of the plant's BF2 is very close to completion.

CISDI was awarded the contract for both furnaces on an EPC basis and civil construction started in 2013.

Both BF1 and BF2 have an inner volume of 4,350m³ and have the capacity to produce a hot metal output of 3.197M/a, rivaling the production capabilities of the biggest mega

BFs in the world.

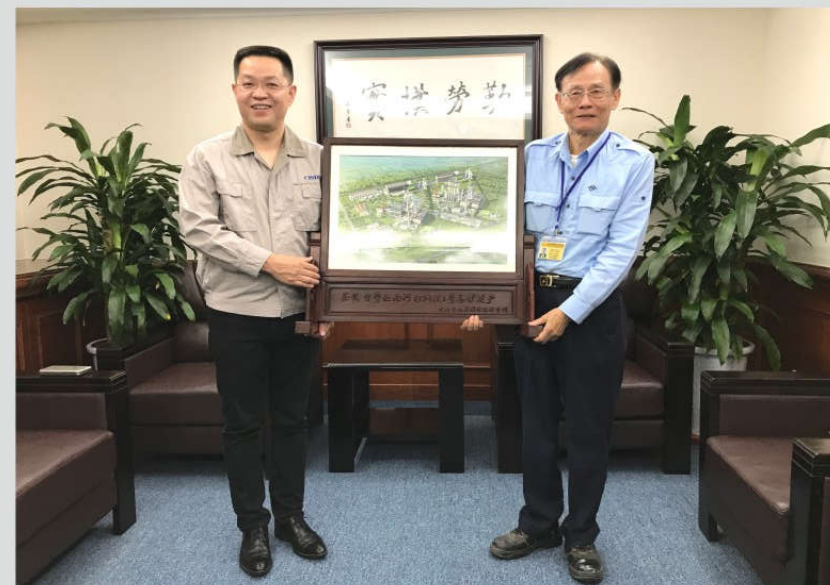
CISDI's ultra-high performance and low energy consumption patented blast furnace technology won it the contract.

The company's unique BCQS 'no-bell top' distributors and slag granulating drums have been incorporated into the design of both furnaces and over 90% of the equipment has been made in China.

CISDI has provided consulting, elaborate engineering and project management services for the construction of Formosa Ha Tinh Steel in Vietnam. Its expertise is ensuring high-quality process control on design, equipment and safety from project start-up to completion.



Mr. Chenyuan, chairman of Formosa Ha Tinh Steel, presses the button on the blow-in of BF1



Mr. Xiao Xuewen, chairman of CISDI, presents the startup memorial to FHS



The Formosa Ha Tinh Steel site illuminates the night sky



FHS BF2 construction is nearing completion



FHS BF1 taps the hot metal



FHS BF1 in full production

Special Topics of FHS

Overview

Client: Formosa Plastics Corporation

Location: Ha Tinh, Vietnam

Construction period: Dec.2012~Apr.2017 for Phasel

Capacity: 7.0Mt/a for Phasel

Main configuration: 4,350m³ BF_s, 300t BOF_s, 2,050mm HSM, combined bar & wire-rod mill, and wire rod mill

Main products: Coils, long products

Orientation and services

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

CISDI's overall process management and technology consultancy is providing the client with a one-stop service throughout the whole life cycle of the FHS project



The Formosa Ha Tinh Steel site, showing BF1 and BF2



CISDI engineers on-site



The CISDI team at work



Commissioning team at work

Consulting and General Design

Services:

- 1) Overall planning and general design, systematic total solutions
- 2) Feasibility study reports in accordance with the depth and format requirements of UNIDO and World Bank
- 3) Integrated Consulting Services (ICS), tailor-made on plant-based standard and regulation, investment control, management of design, procurement and construction, production standard and maintenance system

Results:

- 1) General design featuring systematic, cost-efficient and sustainable development
- 2) Control on technology, schedule, quality and cost
- 3) Saving of nearly RMB 600 million (USD 88 million) investment cost by the end of May 2013, excl. the imponderable benefits from reduced capital and operation costs creditable to optimisations

Highlights:

- 1) FHS Step 1 of Phase I completed the target of 7.07Mt/a billets, Step 2 of Phase I planned for 10.60Mt/a, and future Phase II is planned to reach 21.85Mt/a billets
- 2) Supplying the high-quality bars and wire rods, flats and commercial billets to ASEAN and surrounding markets in response to the multifaceted needs of social and economic development, upholding the concepts of advanced and reliable technology and down-to-earth and economical construction, observing the principles of environmental protection, high inception, high performance with low consumption
- 3) The plant is laid out in a 'U' shape taking account of the technological and marine transport requirements. This characteristic allows for clear process units and functional divisions while maintaining a compact arrangement. Intelligent land use optimises internal and external logistics while allowing for sustainable future developments
- 4) Steel plant built in line with the overall plan to become a major contributor to the social and economic development of ASEAN and create labour opportunities



FHS BF1&2 (EPC)

Overview:

BF volume: 4,350m³ each

Capacity: 3.197Mt/a each

Footprint: BFs in 320,000m², pig machines in 31,000m²

Startup time: BF1 in May 2017

Service mode: EPC

Highlights:

1) CISDI's in-house core technologies and equipment for high-performance and low-consumption large BFs is incorporated into the project, realising an integrated export of China's large BFs

2) CISDI's IPMS development (intelligent production management system) successfully combines big data analysis technology with practical production

3) Core individual equipment on EPC mode (including CISDI no-bell top, and CISDI energy-efficient and environment-friendly granulating drum)

Core technologies (partial):

High-performance and Low-consumption Large BF Core Technologies

- Comprehensive technological package covers large BF process theory, design system, core equipment and intelligent control
- CISDI process theory and design system of >4,000m³ BF lays a solid foundation for achieving an efficient high-performance, low-energy consuming large scale BF
- A new model of BCQS (no-bell top) and IPMS provide effective means of achieving high-performance and low-consumption via equipment and control technology

BCQS-model Parallel-hopper Top

- BCQS distributor co-developed by Baosteel, CISDI and Qinye Heavy Machinery
- Hydraulically actuated, it's capable of sealing at high pressure while offering flexible distribution modes. Adapts to the BF's operation requirements and enables the distribution chute to change its inclination angles along with rotation speed. Achieves uniform distribution from furnace wall to centre as per the different matrices of process requirements
- Continuous charging performance



The BF1 at Formosa Ha Tinh Steel

- Reliable operation, easy maintenance, facilitating high output, low-energy consumption and long campaign life
- Performance data at international leading levels

Environmental-protection and Energy-efficient Slag Drum Granulating Technology

- Simple and reliable structure of slag granulating equipment, small footprint, easy maintenance
- Drum driven by motor, with high load-bearing capacity
- Configuration of filtering screen and mesh sizes avoids excessive dead corners, expands effective filtering area and processing capacity. Guarantees the grain size of slag and filtered water quality
- Gas-water cleaning system for maintaining smooth meshes
- Drum capable of automatically adjusting speed along with the change of slag quantity, thus improving slag quality
- Expels steam into the upper air chimney where it naturally condenses, which is environmentally friendlier, saves energy and reduces costs of both investment and operation
- Comprised of complete-set of drum equipment patents and references (package supply) in various levels of BF volumes

IPMS (Intelligent Production Management System)

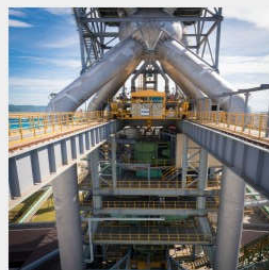
- EIC acts on an advanced platform and integration which enhances BF production automation level. Optimisation of resources configuration in operation, equipment management and maintenance. Result is an improvement in productivity
- Complete solutions to BF intelligent production based on the BF intelligent decision-making system
- Leading the world's BF control system in terms of R&D, application and function

Analysis and Diagnosis System for Dedusting Pipeline Network

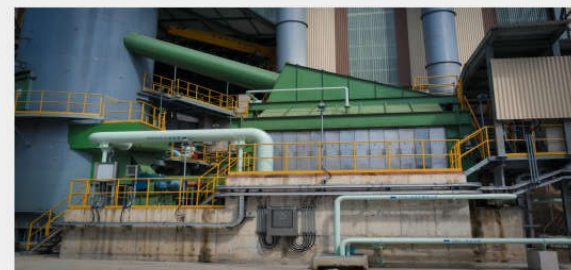
- Patented computation software enables simulation calculation of airvolume balances in large-sized dedusting pipeline network. Controls the unbalanced rate within (\leq)10%

Integrated Design of Hot Blast Stove Proper Brickwork

- Accurate selection of refractories for different parts of the wall according to the hot blast stove's thermal calculation and temperature field distribution. This ensures hot blast stove's high temperature and long campaign life
- Accurate installation of expansion joints among the high-heat brickwork effectively absorbs thermal expansion and prevents destructive stress



BCQS Distributor



CISDI's Drum Granulating Technology has been incorporated into the BF1 and BF2, providing greater energy efficiency and environmental protection

Stockyard (E)

Overview:

Receiving capacity: 33.01Mt/a

Footprint: 1.45Mm²

Effective storage capacity: circa 4.78Mt

Number of stacking and reclaiming equipment: 29

Number of belt conveyors: 276

Length of belt conveyor: circa 60km

Number of buildings and structures: 108

Service mode: E

Highlights:

The largest single-phase installed capacity stockyard in the world, with cutting edge technology and comprehensive functionality

2) B and C model environment-friendly stockyards with logistical automatic control and optimised management create cleaner production

3) Plant-wide solid wastes are recovered internally and treated within the processing facility

4) A prime example of China's expertise in creating global mega green stockyards for export

Core technologies (partial):

Green Stockyard Storage Technology

- Applies Model B or C stockyard in accordance with the needs of the different material characteristics
- Creates highly-efficient, environment-friendly storage for bulk materials which gives large storage volume per unit area, thus creating a reduction in overall land usage

Stock Intelligent Batching and Blending Technology

- CISDI's calculation model and control technology for blending, batching, stacking and reclaiming controls the component fluctuation of blended ores, ensuring sinter ore production quality and stability
- Blending intelligent stacking model: acting on planned receiving, segmented stack management, auto configuration of batching plan, auto control of loading, auto optimised calculation of CFW (constant feeder weigher), closed circuit cyclic control, multi-dimensional tracking in batching process, etc.

Intelligent Flow Decision-making Technology

- Computer-aided intelligent operation and control
- Adopts optimal route algorithm, which automatically searches all available flows between start and end equipment
- Making intelligent decisions on the best dynamic flow for saving energy, equipment utilisation, running cost and maintenance planning

Stockyard Foundation Treatment Technology

- Experienced in foundation treatment and installation of large stockyard facilities
- Ensures the tailor-made proposal is reasonable, economical, safe and reliable in both installation and operation



CISDI GROUP CO., LTD.

Reheating Furnace (EPC)

Overview:

Services: Seven reheating furnaces are incorporated in Phase I for the production units of the 2,050mm hot strip mill, breakdown mill, high-speed wire-rod mill and coil/wire mill

Furnace model: energy-efficient impulse control walking-beam reheating furnace

Service mode: EPC

S/No.	Item	Measuring Unit	2,050mm HSM	Breakdown Mill	High-speed Wire-rod Mill	Coil/Wire Mill
1	Number of RHF	stand	4	1	1	1
2	RHF Proper Size	m	55.53×11.7	30.4×13.1	31.86×12.7	31.86×12.7
3	Reheating Capacity (Carbon Steel)	t/h	300	185	160	160
4	Startup Time		Dec. 2015	Apr. 2016	May 2017	Mar. 2016

Highlights:

- 1) All reheating furnaces utilise CISDI's latest patented developments
- 2) Design: Benefits include digital reheating furnace, full-furnace dynamic simulation and 3D coordinated design technologies, which optimise the process and improve reheating quality and furnace temperature uniformity
- 3) Equipment: CISDI's high-efficiency and low-NOx burners, efficient tubular air preheaters and evaporative cooling system ensures low energy consumption and low emissions from reheating furnace production
- 4) E&A: CISDI's digital pulse and cross-amplitude-limiting proportional combustion technologies and self-learning model optimise combustion quality and self-control model, achieving the RHF operation with low LOI, reduced maintenance and full automation. The result is a greatly reduced operation cost and extended service life

Core technologies (partial):

Low-NOx Mixed gas Adjustable-flame Burner

- Large adjustment ratio when the flame is fired in the desired length
- Flame capable of being kept in good stability and rigidity when the production load is pretty low
- Low NOx content in the fume



RHF for 2,050mm HSM

Low-NOx Mixed Gas Flat-flame Burner

- Large adjustment ratio
- Keeping flat flame stability when the air excessive coefficient is low

Evaporative Cooling Device for Walking-beam RHF

- Extending cooler's service life
- Reducing incident ratio
- Saving cooling water consumption
- Reducing RHF energy consumption
- Effectively recovering the excessive heat energy
- Steam as generated from production process to be reused for production and living

Spherical Rotary Joint

- The preferred main component for flexible tube joint between the cyclic-moving cooler and fixed part
- Capable of rotating by any angles around the axis and crippling along any directions
- Rotating flexibly, well sealed, and low wearing



RHF for Coil/Wire Mill

Gas Holder (EPC)

Overview:

Storage Gas	Holder Type	Capacity (m³)	Pressure (kPa)	Piston Speed (m/min)
BFG	POC	300,000	12	2.3
COG	POC	150,000	8	1.0
LDG	PRC	100,000	2.70~3.33	5

Highlights:

- 1) Designed to resist high wind loads-max. wind pressure of 155daN/m²/0.9kPa
- 2) POC-type BFG holder with the high working pressure and high storage capacity
- 3) Designed to resist local seismic acceleration conditions – seismic accelerations: 0.1013g, Grade 7 anti-shock as specified in GB50011

Core technologies (partial):

Anti-typhoon Technology

- ANSYS used to analyse typhoon conditions around Ha Tinh in Vietnam. Wind tunnel tests were carried out and further tests conducted during live typhoons to verify the theoretical study results. This ensured the gas holders were built with high anti-typhoon performance, to the world's highest standards

Gas Leakage Control

- The gas holder's distortion under wind pressure, gas pressure and construction welding was analysed in detail using ANSYS software
- Ensuring zero leakage of BFG and COG holders

Automation Systems

- Unmanned operation
- Automatic water drainage
- Automation level control

Uniformly-distributed Gas Inlets and Outlets

- Ensuring stable and level operation of the piston

Pre-formed Shell Plates

- The gas holder's shell plates are pre-formed and stress relieved
- Minimising distortion due to welding, ensuring smooth operation of the piston



300,000m³ BFG Holder (left) and 150,000m³ COG Holder (right)



100,000m³ LDG Holder

CISDI Promotes Its Expertise in Southeast Asia at AISIF 2017

CISDI has showcased its expertise in full-process total solutions to an audience of the most prominent iron and steel plants in Southeast Asia.

The company gave illuminating keynote speeches to over 500 delegates at the 2017 ASEAN Iron and Steel Sustainability Forum, staged in Singapore in May.

The event is the largest gathering of steel plants in the Association of Southeast Asian Nations, plus influential traders from around the world.

CISDI's primary topics were its expertise in consulting, energy system optimisation and solid waste treatment technologies.

The company's representatives spoke informatively, emphasizing to the audience the core technology and equipment advantages CISDI's expertise brings to its contracts worldwide.

In addition, CISDI took a stand at the EXPO to promote its role as core technology provider and general designer for three of the biggest and most advanced steel plants on the planet - China's Baosteel Zhanjiang plant, Vietnam's Formosa Ha Tinh Steel and the ASSB plant in Malaysia.

Among the visitors the CISDI team greeted were AISIF's chairman Ashish Anupam and its secretary general Tan Ah Yong. John Keung, the CEO of Building and Construction Authority (BCA Singapore), was another esteemed visitor.

CISDI Makes Keynote Speech on Green EAF Technology to Global Audience

CISDI impressed fellow iron and steel traders from around the globe with its world-leading achievements in green technology for electric arc furnace steelmaking.

The Chinese engineering giant spoke before an audience of 700 at the 6th International Iron & Steel Forum in Izmir, Turkey.

The May gathering was hosted by Turkey's National Metallurgical Engineers Association and CISDI was honoured to be a Silver Sponsor of the event.

The company's keynote speech outlined the huge advancements in commercial competitiveness that can be achieved through innovative advancements in new-generation Green EAF and System Energy Optimisation. It was met with great interest by the audience.

While attending the forum, CISDI also explored new project opportunities with representatives of Erdemir and Tosyali Steel and established new contacts with such steelmakers as Izmir, BASTUG, Dilier and Ekinciler.

CISDI Stockyard Online Upgrading Technology

- ◆ CISDI offers a ground-breaking online upgrading service for steel stockyards.
- ◆ Upgrades are carried out safely and economically - and without incurring down-time - thanks to the company's advanced technology in systematic processes and procedures, its expertise in construction crafts, production scheduling and production warranty.
- ◆ Customers can rely on the safe and reliable supply of raw materials for downstream users of the stockyard during the entire upgrading process.

Baosteel Stockyard Revamp — the world's largest stockyard, upgraded to an environment-friendly application

Receiving capacity: 50.95Mt/a
Yard storage capacity: 4.38Mt/a
Yard proper area: 680,000m²
Startup time: stepwise between 2015 and 2020
Service mode: E/EP



Tangshan Ruifeng Stockyard Revamp — the world's 1st stockyard upgraded with CISDI-ECIA technology

Receiving capacity: 10.10Mt/a
Yard storage capacity: 250,000t
Yard proper area: 21,000m²
Startup time: 2016
Service mode: EP+CM

