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CISDI
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Breakthrough in the intelligent manufacture of steel

IN THIS ISSUE

CISDI

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 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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Breakthrough in the intelligent manufacture of steel

CISDI has been awarded an intelligent manufacturing contract by Shaoguan Steel in Guangdong, China.

It will provide the intelligent manufacturing solution, general design and EPC-based services for the creation of an Intelligent Centre at Shaoguan - the first of its kind in China.

The project will create a big data centre, a series of online intelligent mathematical models and an upstream-BF integrated management and control platform. The intelligent production of upstream-BF units and energy media can then be achieved.

The Intelligent Centre will redefine Shaogang as a modernised and intelligent steel producer.

The scheme will reuse Shaogang's ASU4 workshop, unifying its architectural style with the rest of the plant, and the centre will reduce the number of computers required from 335 sets to 123 - a 60 per cent reduction. It will also mean fewer operators are required. The number of posts will go down by 40 per cent, from 81 to 50.

Artist's view of the Shaogang Intelligent Centre

Background information:

Operating under the Baowu Group, Shaogang is a major steel base in southern China.

With over 40 years of experience, Shaogang has evolved into a large complex engaged in steel, logistics and trading.

The hi-tech enterprise is an important producer of steel plate for shipbuilding. Its annual output of plates, wire rods and bars can reach six million tonnes.

Fact file

◆ Intelligent manufacturing solution and general design

After surveying Shaogang's current automation and intelligent application, CISDI will analyse where improvements can be made, formulate a tailored upgrade proposal and work out the general design.

Shaogang's eight production procedures are stockyard, raw materials supply, coking, sintering, blast furnace, hot metal transport, environmental protection and energy media.

Aims:

To achieve intelligent manufacturing of the upstream-BF units and energy media, by bringing Shaogang's eight production procedures under integrated operations and control

To set up a big data centre, make online mathematic models and create an upstream-BF integrated management and control platform

◆ Intelligent Centre

An industrial world first, this project will create a leaner production process for Shaogang. It will consist of upstream BF and energy medium integrated operation and control sub-centres.

Aims:

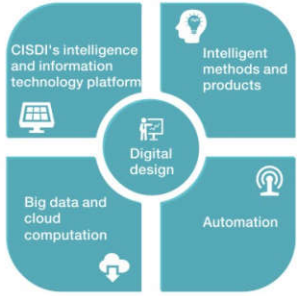
To realise an integrated operation, and control and decision-making

Intelligent applications: Top-level re-design for process flow and organisation with the metallurgical engineering as a basis

Integrated control based on safety control and system integration

Intelligent decision-making system based on big data, artificial intelligence and IoT

“Five-pronged capability system: encompassing intelligence and information technology platform, intelligence methods and products, big data and cloud computation, automation and digital design”



CISDI wins contract to create China's first dual-lateral roll change MPM

CISDI is to create a new special steel tube production line for the Changbao Precision Steel Tube Company in Jiangsu.

This production line will build China's first 3-roll mandrel pipe mill with a dual-lateral roll change system. It will be capable of producing 300,000 tonnes of small-calibre and high-VAT alloy steel seamless tubes a year.

A main rolling line, one billet cutting line and three continuous pre-finishing lines are being configured.

The specification of seamless steel tube will have an outer diameter range of 51mm to 159mm (reserved to maximum 168.3mm), a wall thickness range of 4mm to 20mm and a length range of 6m to12m (reserved to maximum 13m).

The design and supply of the line's electro-mechanical-hydraulic equipment, plant design and EPCM will be undertaken by CISDI.

CISDI and Changbao Tube are united in their pursuit of green targets and view the project as an opportunity to conduct joint research and development for China's small-calibre tube industry.

CISDI has already successfully delivered four such package supplies in the last three years, all of which are performing to world-class technical indicators.

Among them is Fengbao's Φ89mm tube mill, which is able to produce the world's smallest calibre of 3-roll mandrel mill for rolling. Its core technology and equipment were all created in China, and are seen as great breakthroughs the technological monopoly previously held by steel companies outside of China.

Changbao Steel is a specialised seamless tube producer mainly oriented to the petroleum well market and the small-calibre alloy steel high-pressure boiler sector. It has an annual capacity of 750,000 tonnes.

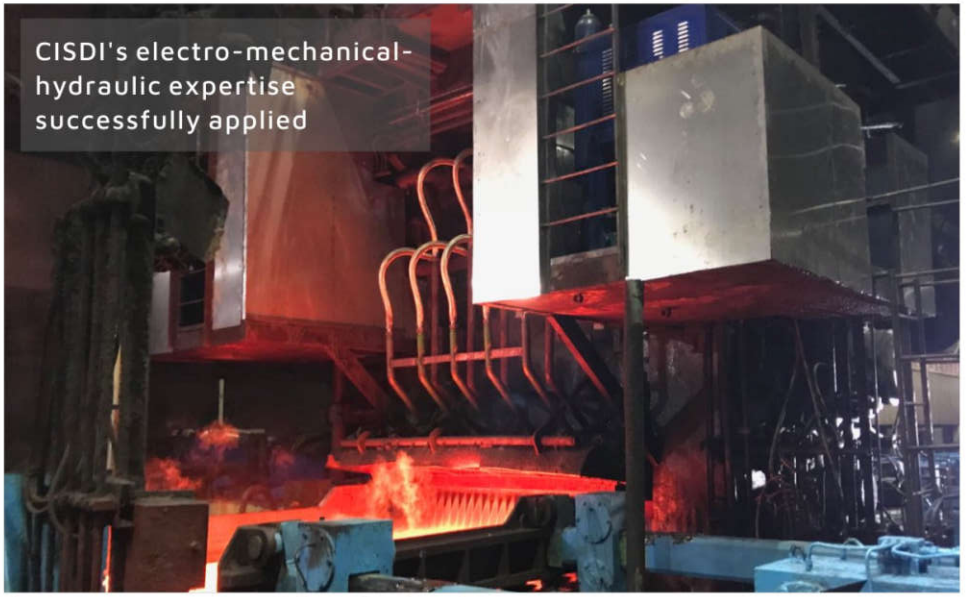
Its main products are tube for oil-gas exploration, 200,000 tonnes of power station boiler tube a year (including 40,000 tonnes of HRSG ultra-long tube and 10,000 tonnes of U-shape tube) and 50,000 tonnes of machinery tube and other special-purpose tube a year. Some 500,000 tonnes of petroleum well tubes are also produced annually and the company exports widely across Europe, America, the Middle East, Southeast Asia and Africa.

The producer has built five tube rolling lines, eight threading lines and two U-shape tube processing lines.

Other tube mill production lines have been installed by CISDI at Dalipal (Φ159mm) and VALIN Hengyang (Φ89mm rebuild).

CISDI and Changbao Tube sign for a new special steel tube line

HGC rebuild is up and running at Yingkou



The HGC system, now operating at Yingkou Medium Plate Mill

A new hydraulic gap control system is operating ahead of schedule at Minmetals' Yingkou Plate Mill.

The new finishing mill system is performing well and manufacturing high quality plate.

CISDI's electro-mechanical-hydraulic core equipment was applied to the control system and is enabling operation data to far exceed the specified guarantees. This lays a solid foundation for further improvements in the mill's production quality and yield.

Yingkou's original HGC system had a slow response, caused a large deviation in final product thickness and produced out-of-tolerance head-tail ends.

CISDI proposed a total solution and rebuild plan through hydraulic servo simulation and testing technology, and took into account the reconstruction cycle and cost.

Critical to the quality of medium plate production, HGC is a high-precision servo closed-loop control system, posing rigorous requirements on manufacture and integration.

It took CISDI two months to complete the design, simulation, manufacture and integration test of the new HGC system.

The integration test was implemented on CISDI's new-generation testing platform for step, hysteresis loop, bandwidth and other dynamic data. Results verified the system's capacity and equipment manufacture quality in a comprehensive and quantified way.

It took only ten days to remove the old pipeline and install and commission its new replacement.

"Thanks to the concerted efforts of multi-disciplinary engineers, our new HGC has been commissioned successfully ahead of schedule and has resulted in high manufacturing quality and system performance," said a spokesperson for Yingkou.

New torpedo ladle car design created for Brazilian customer

CISDI has delivered an innovative new torpedo ladle car to a steel plant in Brazil.

Designed with a compact structure and weighing 350 tonnes, the new-model torpedo ladle car, which features a large ladle-tilting torque, has been successfully hot-commissioned and has greatly improved the plant's travel and transport capacities.

The torpedo ladle was installed and put into operation without interrupting production, has achieved requirements and met the demands of the customer's working conditions.

A spokesperson for the Brazilian company commended CISDI's team efforts at every stage, from design to procurement and quality control.

"We needed some of the components to be manufactured in compliance with American standards and the whole block's manufacture was very challenging for us," added the spokesperson. "CISDI's diligent team helped us to solve the problem on schedule and with a high quality result."

It is one of sixteen torpedo ladle cars for the Brazilian company.

Strong track record wins CISDI feasibility study for Suroyam in Russia

CISDI's expertise and its numerous successful references for V-Ti magnetic iron ore smelting have won the company work at Russia's Suroyam mining project.

CISDI and GHP Russia have now signed a feasibility study contract for the development of the vanadium-titanium magnetic iron ore smelting complex in the Chelyabinsk region.

The studies will examine methods of mining, beneficiation, sintering, bulk material handling, blast furnace ironmaking, vanadium-extracted converter, continuous casting, vanadium production and plant-wide utilities.

The complex aims to produce 1.20 million tonnes of blooms a year.

CISDI will bring to the project its expertise gained from independently designing China's first large steel complex, Panzhihua Steel (also known as Pangang). Its blast furnace 4, designed by CISDI, is renowned across China for its smelting of V-Ti magnetic iron ore.

The CISDI-designed Pangang blast furnace 4, smelting V-Ti magnetic iron ore

CISDI has now designed almost all of China's blast furnaces for V-Ti magnetic iron ore smelting.

Record-beating result at Rizhao achieved with SFRE's help

Rizhao Steel is reporting a dramatic improvement in product thinness with the successful production of the first 0.6mm-thick coil from its new ESP4 line.

The ultra-thin specification beats the company's previous record of 0.7mm-thick coil, achieved several months ago, and Rizhao is delighted to have now made such a major improvement.

SFRE in China have supplied 40 pieces of guide rollers in front of the coiler, pinch rolls at the induction furnace's inlet and outlet and the induction furnace's reject kick-off roller table. They have withstood high temperature and circulated cooling system tests since commissioning, and have ensured smooth running of the entire line.

MCC-SFRE Heavy Industry Equipment, a subsidiary of CISDI Group, produces, processes, and sells heavy duty equipment and other related products.

The ESP4 line entered pilot production on March 28 and Rizhao strived to achieve mass production of 0.6mm specification coil. After numerous repeat tests and technical breakthroughs, the thinnest coil can now be successfully rolled.

CISDI Electric: Expertise and Products

CISDI Electric, located in Beijing's economic development zone, is a subsidiary of CISDI Group.

Specialising in electric equipment manufacturing, research and development, its 20,000m2 site comprises of a production shop, pilot base and drive labs.

Specialists in system integration and engineering, CISDI Electric focusses on solutions-driven power and electronic applications and electrical package supply.

Combining process and equipment with control, 3D printing and internet plus, the company applies its core technologies to production.

CISDI Electric Technology Co., Ltd., Beijing

Power and electronic applications

◆ The MVC 1200-series HV frequency converter

This highly-efficient energy-saving high-voltage frequency converter adopts a new-generation IGBT power device and large-sized chip digital control to convert directly between high-high voltages. It presents a multi-level cascade voltage doubling expertise and quasi-optimal PWM control algorithm. Leading in China, it can produce an ideal output of high-quality VVVF (variable-voltage variable-frequency) sinusoidal voltage and current.

Basic data

Voltage level: 10kV, 6kV

Load type: fan, water pump, compressor

Power range: 250kW-5,000kW

Applications: used to control fans and water pumps for the power, metallurgy, petro-chemical and cement industries.

Profile of the MVC1200-series HV frequency converter

◆ The CEE1100 -series PCS and CEE2100 -series energy storage system

Basic data

High-performance: fast, dynamic response, able to adjust electrical energy quality

Multi-functional: integrates a number of the energy management system functions

Utilises PCS (energy storage inverter) as a core carrier to develop and apply the storage system integration

An indispensable composition of distributed energy system and micro-grid system

Applications: frequency modulation, peak variation and voltage regulation at the grid or user side

Profile of the CEE1100 -series PCS and The CEE2100 -series energy storage system

◆ The MVC1100-series large-power AC-AC frequency converter

Basic data

SL150-based controller: new-type AC-AC frequency converter on SINAMICS platform, with universal hardware and software module and standardised design, configuration and commissioning tools, ensuring a high-degree integration of all the modules

Applications: speed-regulated operation of large-capacity and low-speed reversible machinery, such as large tandem mills, plate mills, Steckel mills, section mills, mine hoists, marine propellers and wind tunnels

Profile of the MVC1100-series large-power AC-AC frequency converter

◆ The DCD1110-series DC speed regulator

Basic data

Current range: 500A-4,000A

Voltage level: 400V-1,200V

INAMICS DCM digital DC drive speed regulator

Power unit: 3-phase bridge rectifier fully-controlled bridge

Pulse trigger: buffer amplifier

High-performance results

Effectively reduces investment

Applications: speed regulation for high-performance, cost-effective motors for cold rolling mills, bar and wire-rod mills and mine hoists

Profile of the DCD1110-series DC speed regulator

◆ The MVC1301-series high-performance AC-DC-AC frequency converter

Basic data

Power range: 2.5MW-8MW

Output voltage: 0-3.3kV

Main circuit: 3-level topological structure

Four-quadrant PMW rectifier: enabling dual flows of energy

High-performance motor vector control

Supporting multiple drive modes

Modularised design of power unit

Sufficient external interface for control system

Profile of the MVC1301-series high-performance AC-DC-AC frequency converter

◆ The MV/LV reactive-load compensator and harmonic filter

Basic data

Null-current switch-on: self-developed large-power thyristor current for null-current switch on and off, with neither inrush current nor impact

Fast dynamic response: able to swiftly track the system load's reactive change, real-time dynamic response to switch on within 20ms

Multiple harmonic filter compensation way: unilateral regulation, second-order high-pass, C-type

Unique protection design: automatic trip and cut off short-circuit of current, in addition to the upper-level circuit breaker in the event of abnormal operation of the capacitor unit

Harmonic filtering ratio: over 60%

Simulation analysis software for design: no resonance with the system

Results: safer operation, improved reliability, easier maintenance, higher cost-competitiveness and an improved electrical energy quality of distribution system

Applicable for low-voltage distribution systems and industrial and civil power loads with complex impacts and stabilities

The MV/LV reactive-load compensator and harmonic filter

Package Supply Products

◆ HV switch cabinets

Basic data

35kV switch cabinet: KYN61-40.5 high-voltage switch cabinet

10kV switch cabinet:

NXAir S-series high-voltage switch cabinet (the only Siemens-authorised product in China's metallurgy)

KYN28A-12G plateau high-voltage switch cabinet

KYN28A-12 universal high-voltage switch cabinet

GYG mine high-voltage switch cabinet

Profile of a HV switch cabinet

◆ Low-voltage switch cabinets and iMCCs

Blokset low-voltage switch cabinet (authorised by Schneider)

U-iMCC cabinet (authorised by Schneider)

MNS low-voltage switchgear package

Profile of a low-voltage switch cabinet and iMCC

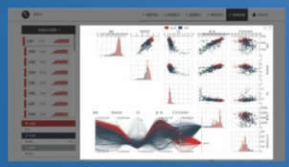
◆ Drive and automation package products

CISDI supplies total solutions to electrical equipment design and package supply. Drives and automation products branded by Siemens, ABB, TMEIC, Rockwell and Schneider can be supplied

CISDI's Big Data:
ONE-STOP CLOUD PLATFORM FOR VALUE CREATION

- CISDI has developed a one-stop cloud platform for value creation for its customers, as part of its promotion of big data.
- The platform is oriented towards production data and data mining and can realise big data driving production and make accurate, scientific decisions.
- It is committed to helping enterprises improve quality and efficiency while shortening product development cycles and has been applied throughout the full process of steel production, from ironmaking to steelmaking and casting.

EasyRefiner, an artificial intelligence product with one-touch functions for data consolidation, cleaning, transfer and visualisation



EasyMiner, a data deep mining product which optimises indicators and finds quantitative solutions

Applications of intelligent manufacture in a Blast Furnace:

- Productivity (output): +30%
- Fuel ratio (cost and environment): -12%

Based on production data collected over a period of seven years of a blast furnace since blow-in, concerned with the raw materials, fuels, operation, status and economic indicators