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CISDI

NEWSLETTER

Vol. 10, 2018



Chairman Xiao holds high-level talks with Taiwan clients

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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 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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Chairman Xiao holds high-level talks with Taiwan clients

“ CISDI brought operations management expertise to the built projects. Effective operations management guarantees FHS's competitiveness in southeast Asia ”



The CISDI delegation, pictured with FHS's leaders at Formosa Plastics Group

CISDI's chairman visited Taiwan for top-level talks on future high-level projects with the E United Group and Formosa Plastics Corporation.

In September Xuewen Xiao led a delegation to

visit I-shou Lin, the founder of YUSCO, and Yuancheng Chen and Funing Zhang, Formosa Ha Tinh Steel's chairman and president.

I-shou Lin praised CISDI's support and described the company's expertise as 'a helping hand.'

"We greatly appreciate CISDI's provision of systematic services to the Group's steel business," he commented. "CISDI has been a helping hand in our steel projects."

There was further praise at a meeting to discuss potential projects with Formosa Ha Tinh Steel. The company's chairman Chen spoke highly of CISDI's contribution to the creation of FHS's blast furnaces.

"We are rightly proud of the accomplishments

in the blast furnace plant," he said. "CISDI brought operations management expertise to the built projects. Effective operations management guarantees FHS's competitiveness in southeast Asia," he commented.

Xiao confirmed CISDI Vietnam was in the pipeline and stressed its commitment to provide high-quality operation management services to FHS.

Fact file:

The Formosa Ha Tinh Steel complex in Vietnam has a production target of 10 million tonnes a year and will be the largest green-field steel complex in southeast Asia.

CISDI created the overall plan, and is responsible for the general design, feasibility study and stockyard design, in addition to EPC services for blast furnaces, gas holders and reheating furnaces and operations management services for the blast furnace 1 and 2.



The state-of-the-art blast furnaces at Formosa Ha Tinh Steel, built by CISDI

CISDI's intelligent solutions for the interconnected era

CISDI partners with HUAWEI

China's communications giant HUAWEI is joining forces with CISDI to bring the combination of their new-age expertise to the digital industrial revolution in China and beyond.

The two organisations share a vision for an interconnected industrial eco-chain and to that end, have signed a strategic cooperative agreement.

Both parties will work together in digital renovation for steel plants, smart city, agricultural big data, smart park, intelligent manufacturing, and corporate information technology applications.

Huawei Technologies is a leading global provider of

information and communications technology, infrastructure and smart devices. With integrated solutions across four key domains – telecom networks, IT, smart devices, and cloud services – Huawei is committed to bringing digital to every person, home and organisation for a fully connected, intelligent world.

CISDI is making great strides in intelligent manufacturing, particularly its developments for smart city management and intelligent agriculture.

The company has 60 years of experience in creating automation and big data for industry and was one of the first in China to adopt intelligent

and information technology applications.

By integrating its abundant engineering experience with cloud computation, the internet of things, big data and intelligent technology, CISDI is now providing intelligent solutions and services for both steel and non-steel sectors.

The two giants signed a strategic agreement on October 10. Huawei's cloud computing and ICT expertise will support CISDI's intelligent products and lead to the provision of a cloud-computing framework for steel plants and cloud solutions for intelligent manufacturing and smart city platforms.

Background information:



Founded in 1987, Huawei is a private company fully owned by its employees. It invests heavily

in research, concentrating on technological breakthroughs that drive the world forward.

The company has over 180,000 employees and operates in more than 170 countries and regions.



CISDI is empowering industrial transformation and upgrading.

It is an active player in integrating intelligence and big

data into industry, urban construction and agriculture.

CISDI's five-armed industrial system encompasses platform,

big data, intelligence, automation and digital design. A new subsidiary, CISDI Information Technology, has now been launched.



CISDI and HUAWEI signing the strategic co-operative agreement

◆ Intelligent manufacturing

Its experience in intelligent manufacturing ranges from intelligent plant total solutions to creating intelligent stockyards, blast furnaces, warehousing and logistics.

With Baowu Group's support, CISDI has built multiple demonstration projects for intelligence.



A successful application of CISDI's intelligent warehousing solution for Baosteel

◆ Intelligent urban construction

The following intelligent products have been widely adopted across Chinese society:

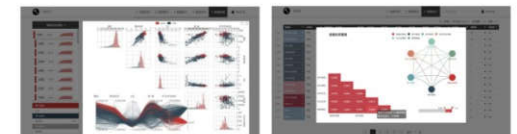
Qingzhu – smart construction site cloud

Q-touch – smart city management cloud

Qingce – intelligent business invitation and industrial co-ordination cloud

◆ Nudge +

This CISDI-developed office system connects companies and organisations with their staff. Over 30,000 enterprises and a million staff are now using Nudge +



Combining global resources to boost intelligent development

CISDI has been committed to the mission to create a cloud-network-terminal chain since it began developing its intelligence and information technology.

It is forging ahead and seizing new opportunities for innovation-driven developments.

In software, CISDI has been involved in a strategic partnership with Oracle since 2012. The two companies plan to deepen their commitment to cloud services and big data developments.

In automation, CISDI's global strategic alliance with Rockwell Automation is combining control technology and information technology to explore product development

and implementation for metals, mining, intelligent manufacturing and smart city. Both parties have worked together on Formosa Ha Tinh Steel's intelligent control equipment.

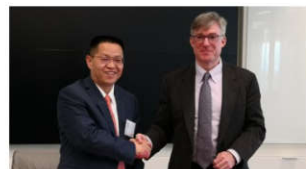
In artificial intelligence, CISDI recently initiated a working partnership with Sinovation Ventures and its Artificial Intelligence Institute to push forward the application of artificial intelligence to manufacturing processes and steel plants.

In addition, CISDI has brought together a host of major research institutions and enterprises across China - including the China Aerospace Science & Industry Corporation, Tsinghua University and Peking

University - to establish an industrial big data innovation group and an intelligent manufacturing centre.



CISDI and Sinovation Ventures are forging ahead with their joint commitment to developing AI



CISDI and Rockwell Automation join forces to upgrade a wider and value-creating strategic partnership

TATA builds another giant with CISDI's digital design expertise

TATA Steel is building its second blast furnace - with a volume of 5,873 cubic metres - at its Kalinganagar plant in Jaipur, India.

It will be the largest blast furnace in the world and has a designed capacity of 4.375 million tonnes a year.

The construction process has run smoothly since work began in June 2018.

CISDI is applying its digital design technology to the project to help TATA achieve smart construction and operations. This includes BIM simulation and parameterisation, PID (process and instrument diagram), virtual reality for training purposes and digital delivery.



An aerial view of the digitally-designed blast furnace 2 at TATA Steel's Kalinganagar plant

Fact file:

◆ BIM simulation for optimisation

The hot stove's shell weight can be reduced by 5 per cent.

The hot and cold blast pipeline networks can be made safer by 30 and 15 per cent respectively.

The uniform distribution of the hot blast temperature can be improved by 10 per cent.

The casthouse platform temperature can be reduced by 1-2 deg C.

◆ PID design

PID design co-ordinates multiple engineering disciplines online. CISDI has completed over 700,000 A1-sized drawings and collated automatic statistics from more than 13,000 data reports.

Through integration and development, CISDI's two-dimensional PID can be generated seamlessly and accurately into three-dimensional data.

◆ BIM parameterization

The cooling staves have been designed via the BIM parameterisation programme, saving 75 per cent of the labour time normally taken to produce models and drawings and shortening

the master schedule by 66.7 per cent.

As a result, a higher quality and more efficient blast furnace proper system can be designed.

◆ BIM coordinated design

Multiple engineering disciplines are co-ordinated online for BIM-based design. This technology has prevented over 1,500 potential

collisions or interferences and negates the need for design changes and construction re-work. The quality of the entire project is improved.

◆ Virtual reality training

The building information model has been introduced into a virtual reality platform to

develop a tailored user experience and cost-effective training.

◆ Digital delivery

The building information model has been introduced into the platform to associate with the drawings and suppliers' data. Such a digital design can provide the model and data for

construction and operations. This assists the client with their digital management of construction and operations.

Rebuild mill at Baosteel Shanghai producing 550,000 tonnes of wire rod a year



Baosteel Shanghai's wire-rod mill has been successfully hot-commissioned within 46 days of rebuild.

CISDI undertook the plant re-design, plus package supply of spare parts for the reheating furnace and mill.

The largest integrated upgrade of Baosteel's wire-rod production plant in two decades, product structure has been optimised and production increased to 550,000 tonnes of plain wire rods a year.

Baosteel Shanghai's wire-rod mill was founded in 1999 to produce coils 5mm to 25mm in diameter, plus cords and other small sections below Ø6.5mm. Its main focus was automobile and mechanical wire rod and the mill had an annual production capacity of 500,000-

550,000 tonnes.

At the time it was one of the world's leading mills and CISDI undertook the plant design for its initial construction.

Today's rebuild is to meet the changing market and demand for new product requirements.

Specification has been maximised to a diameter of 28mm and the product range meets the needs of the medium and high-end automobile sector - spring steel, cold-headed steel and bearing steel, high-end cord steel, cut wire and high-strength bridge cable.

Thermo-mechanical control process (TMCP) has been applied to the rebuilt line. The roughing mill and intermediate mill trains have been modified to the new high-strength, short-stress path rolling mills.

The pre-finishing mill train has been upgraded to the new-generation heavy mills. The finishing mill train and reducing and sizing mill have been upgraded.

In addition, the plant is better able to control the internal and surface quality of the final product thanks to an optimisation of the water cooling temperature control system and the laying head and Stelmor line units have had their capacity increased.

Electric and automation control, hydraulic and lubrication, power supply and distribution systems, roll shop facility, civil and utilities have been modified correspondingly.

Masteel's new era silos are underway

The creation of 20 intelligent silos for Masteel's south zone has begun.

This major rebuild project will enable the plant to run its production 24 hours a day and has major environmental benefits.

CISDI has the contract to supply the new coking coal silos and auxiliaries, which will be used for storing and batching materials, to an EPC mode.

Energy conservation and environmental protection are top priorities. All previously exposed belt conveyors, transfer towers and silos will be completely enclosed, which will reduce coal consumption by 6,500 tonnes a year.

Transfer towers will be installed with mist suppression, or clean transfer technology. The crushing chamber will use a mechanical cleaner to further reduce dust. These measures will create a zero liquid discharge storage zone.

Each silo has a diameter of 21 metres and a 10,000 tonne storage capacity. The plant's existing tripper system will be modified, including its remaining coal receiving system, truck coal receiving pit and belt conveyor's corridors and transfer towers.

New facilities will integrate reutilisation devices for tar slag and chemical sludge.



CISDI wins two water treatment contracts

CISDI's water treatment expertise is in demand.

The company has won contracts at Masteel's long products mill and with Baosteel Zhanjiang.

Masteel's water treatment project will support the rebuild of its long products mill. CISDI will carry out the treatment station's design, supply, construction, system and software functional specification, commissioning and performance test for the beam blank casting and heavy H section rolling

line.

The station will provide water for the casting machine (with the exception of the mould, which requires soft water), the H section mill and other auxiliaries, and process all circulating water.

Baosteel Zhanjiang's water treatment project will support the steelmaking plant's new LF2 and RH unit 3.

CISDI will conduct its process and electric and automation design, equipment supply, commissioning and performance test.

Eco reheating furnace at Qsing Tuo up and running



The reheating furnace at Qsing Tuo's high-speed wire-rod mill 1 is now operating and running stably.

Located in the Fujian province, Qsing Tuo Group is the world's largest producer of stainless

steel and deep processing.

Built on an EPC basis by CISDI, the walking-beam reheating furnace runs on blast furnace gas.

Dual-regenerative combustion and decentralised switchover

expertise have been applied. The furnace's skids and posts feature evaporative cooling devices. Those highlights effect on saving energy and reducing consumptions while ensuring a high product quality.

CISDI's cost-cutting solution for a descaling system



The high-voltage frequency converter at the descaling pump

A high-pressure descaling pump system supplied by CISDI-Electric is reducing maintenance costs at Shandong Shengyang's 1,700mm hot strip mill.

The upgraded descaling system rises from 15Hz to 50Hz in just eight seconds and can reverse in 20 seconds. Enhanced automation levels have cut maintenance costs dramatically.

Shengyang's outdated descaling system had five 710KW water pumps which worked in parallel and adjusted the outlet pressure by changing the quantity of pumps.

Problems included intermittent pressure control, pumps wearing badly and high maintenance costs.

CISDI rebuilt the descaling system by replacing the original five pumps with one 4,500KW

water pump. A powerful MVC1200-10k/350 high-voltage frequency converter enables the pump's rotation speed to be controlled smoothly, which will extend its service life.

The converter, with a load motor of 10kV/4500kW and a nominal capacity of 5,650KVA, is the most powerful ever to be supplied by CISDI Electric to a water descaling system.

Technical characteristics of the MVC1200-series HV frequency converters



A profile of CISDI's MVC1200-series HV frequency converter

- Highly-integrated digital control system (PECS controller)
- Modular design
- Stacked bus expertise
- Strong diagnosis on faults
- Ergonomics-focused HMI
- Small outline dimensions, easy maintenance
- Tailored design
- Small harmonic yet high power factor
- Good output characteristics
- Internet + field bus
- Superior energy efficiency



The air cushion conveyor at Baosteel's centralised coal supply system

Floating on air

CISDI designs an innovative solution for Baosteel

Baosteel's centralised coal supply system for its blast furnace ironmaking plant has been rebuilt and put into operation.

CISDI designed the system and the rebuild was completed in less than three months.

The technological process, transfer towers and belt conveyor corridors have been enclosed to benefit the environment, worn and corroded facilities have been replaced and upgraded and

additional dust collection points have been added in the transfer towers.

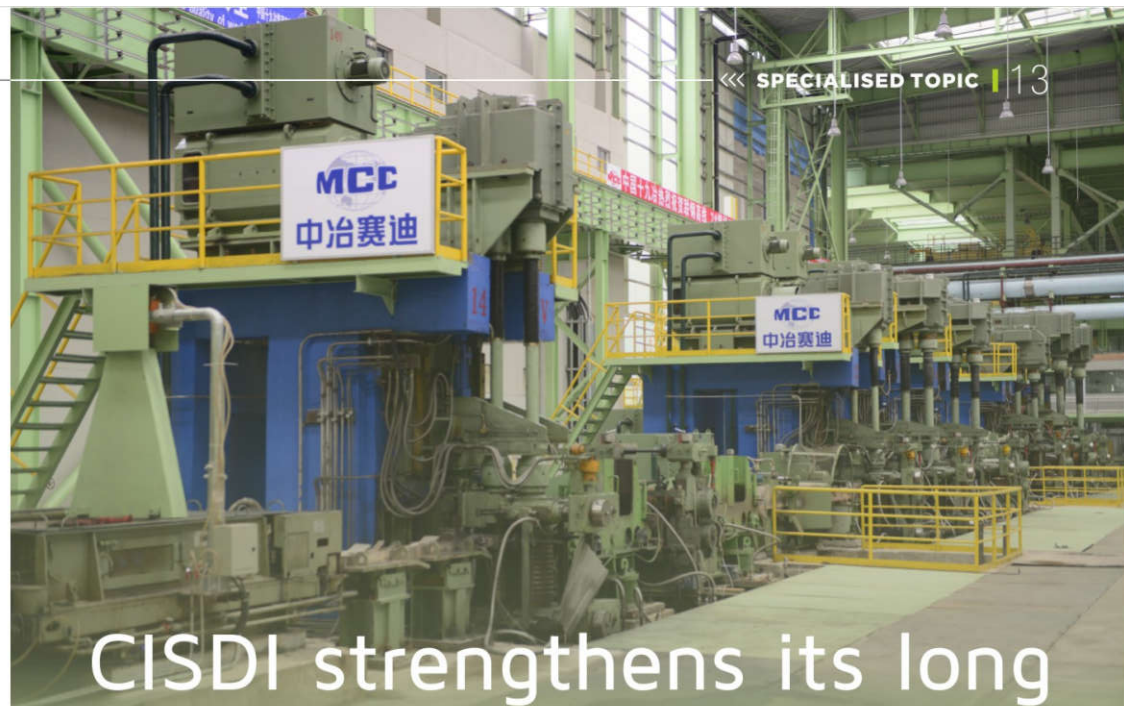
To create a more environmentally-friendly transportation method, the belt conveyor V117 has been converted to an air cushion conveyor.

The conveyor has no carrier roller unit under the middle transport sections. Instead, a thin gas film supports the belt and materials. The result is a more efficient, quieter and less air-polluting

transportation procedure. Materials are fully enclosed as they are moved, and equipment maintenance and operation costs are greatly reduced.

Air cushion conveyors are widely used for transporting grain and coal and in port and electric sectors, but this was a first for Baosteel.

A spokesperson for the ironmaking plant said: "The air cushion conveyor is working very well. It is much cleaner and requires less maintenance."



CISDI strengthens its long products mill expertise

ASSB's new high-speed wire-rod mill and high-speed bar mill in Malaysia are CISDI's latest references for its long products mill expertise.

Package supplied by CISDI, the two mills have been producing at ASSB's project on the Belt and Road route since the end of last year.

The high-speed wire-rod mill can produce 600,000 tonnes of coil in a specification range of $\Phi 5.5\text{mm}$ to $\Phi 16\text{mm}$ a year. The maximum rolling speed is 105 metres a second.

The high-speed bar mill can roll at 45 metres a second and produce 700,000 tonnes of straight bars a year in a range of $\Phi 10\text{mm}$ to $\Phi 16\text{mm}$.

CISDI's core technologies integrated into the mills include hot direct charging and rolling, groove-free rolling, no-twist rolling, high-speed rolling and thermo-mechanical

control rolling. CISDI has also provided and integrated the core process, equipment and automation control systems along the entirety of both lines.

The main technical indicators have reached world-leading levels and product quality and accuracy have been guaranteed. ASSB reports that both lines are operating stably.



CISDI's long products mill expertise

I Technological process

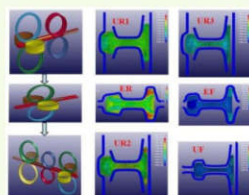
◆ System integration

Years of engineering and project experience enables CISDI to create tailored, optimised design proposals for its clients. Proposals are based on comprehensive and scientific analysis

of the iron-steel interface and bring about more competitive investment and technology and greater profit.

◆ Groove/Pass design

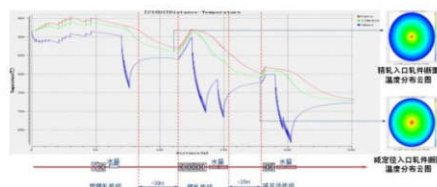
CISDI is a master of pass design and simulation technology for round bar, square bar, split rebar, heavy rail and H section. CISDI's pass design, which includes its groove-less rolling expertise, contributes to high-accuracy, low energy consumption rolling of various long products.



◆ Thermo-mechanical control process

CISDI is innovation-driven and has become an expert in controlled rolling and controlled cooling technologies.

The team has developed a high-precision reducing and sizing mill and enclosed-loop temperature control equipment for high-precision bar and wire-rod production, and for the temperature control of heavy bar at its idle and after its rolling (the heavy bar's maximum diameter to $\Phi 150\text{mm}$).



◆ Direct hot charging and rolling

Cast billet is charged directly into the rolling mill for rolling without being reheated by the reheating furnace, saving energy and reducing production costs while gaining a higher yield.



◆ Straightening expertise

CISDI has developed its expertise in bar and section straightening to encompass engineering and technical assistance in production.

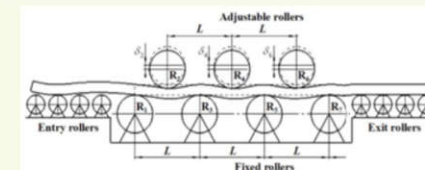
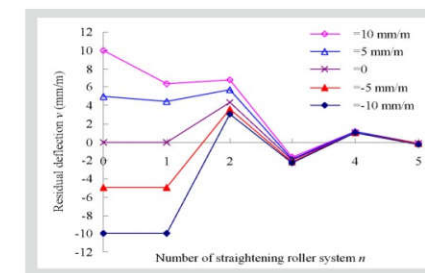


Diagram of CISDI-developed bar and section straightener

◆ Operations management expertise

CISDI provides systematic and optimised solutions for companies experiencing problems with production inaccuracy, inferior structural properties and high production costs.

CISDI's solutions have been proven to improve its clients' competitiveness.



Graph of the work curve of straightening rollers

II Equipment level

◆ NHCD short-stress path rolling mill

CISDI's NHCD-series short-stress path rolling mill has been awarded 11 patents.

Its compact structure is highly rigid and reliable and generates a large rolling force from a small axial shift.

It has over 1,100 sets of references. Major end-users include:



NHCD short-stress path rolling mill

- Baosteel Shanghai - high-speed wire-rod line
- Xingcheng Special Steel - flat mill
- TISCO - bar mill
- Daye Special Steel - mill
- Shijiazhuang Steel Yingkou - heavy bar mill
- Changcheng Special Steel - mill
- NISCO - heavy bar mill
- Juneng Special Steel - heavy bar mill and premium bar mill
- Shagang - blooming mill
- Shiheng Special Steel - mill
- India's Aarti Steels - alloy bar mill

◆ BDCD blooming mill

The blooming mill is a core equipment for rolling out high-quality bar and wire-rod and section products.

CISDI has developed BDCD750, BDCD850, BDCD1000, BDCD1100, BDCD1200 and BDCD1350 blooming mills. They have been successfully applied to:

- Xingtai Steel - quality section mill and stainless steel mill
- NISCO - heavy bar mill
- Suqian - heavy section mill
- Handan Steel - heavy rail mill
- Shijiazhuang Steel - heavy bar mill and section mill
- Rizhao Steel - heavy H-section mill
- India's Aarti Steels - alloy bar mill



BDCD blooming mill

◆ HSCD housing mill

CISDI supplies high-rigidity housing mills in the specifications HSCD900, HSCD720, HSCD600, HSCD480 and HSCD380.

Its multiple references include Beiman Special Steel's heavy bar mill, which has applied CISDI's housing mill with the maximum specification in China.



HSCD housing mill

◆ Flying shear

CISDI has developed various shears for long products production. The FSHCD flying shear, HSHCD hot shear, CSHCD cold shear and HYSCHD hydraulic shear feature high cutting precision and reliability.



3D model of CISDI's shear for long products mill

◆ SRSCD wire-rod reducing and sizing mill

This heavy-duty V-shape cantilever mill, comprised of a two-stand reducing mill and a two-stand sizing mill, is driven by dual motors and equipped with fewer clutches.

Its speed regulation box has a compact structure, is easily controlled and highly reliable.

The reducing and sizing mill is designed for regulating speeds by 16 combined ratios.

Its roll collar and stand can be changed quickly.

Fact file:

Product specification: $\Phi 5.0\text{mm}$ - $\Phi 26\text{mm}$

High-speed rolling: designed speed at 140m/s, guaranteed speed 112m/s

Thermo-mechanical controlled rolling: minimum 750°C low-temperature rolling, maximum 45% large-reduction-ratio rolling

Single pass design: a simplified pass system for rolling

Free-specification rolling: expanded product specifications, adaptable to the end-user's wire-rod product specifications

High-precision rolling: dimensional deviation controlled within $\pm 0.1\text{mm}$, ellipticity less than 60% of the dimensional deviation.



SRSCD wire-rod reducing and sizing mill

◆ UMCD universal mill

CISDI has developed a patented universal mill for rail and H section rolling.

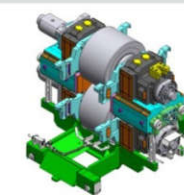
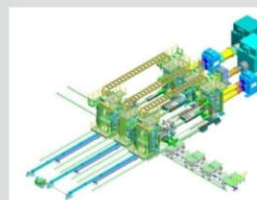
Fact file:

Flexible process proposal - Universal mill rolling for H section, rail, I beam and channel; 2-hi mill rolling for angle, bulb, L and sheet piling

Flexible selection of mill specifications - UMCD450, UMCD600 and UMCD1000

High-precision rolling - advanced pass design system, high-rigidity mill structure and high-precision hydraulic automatic control

Reliable equipment - simple and refined mill structure and allows fast change of mill rolls



SRSCD wire-rod reducing and sizing mill

◆ Bar reducing and sizing mill

CISDI has developed a three-roll high-precision reducing and sizing mill and a two-roll pre-stressed reducing and sizing mill for bar rolling.

Both mills are driven individually, highly reliable and easily controlled.

Speed regulation ratios meet specification requirements.

The mill stands are compactly configured and quickly changeable.

Fact file:

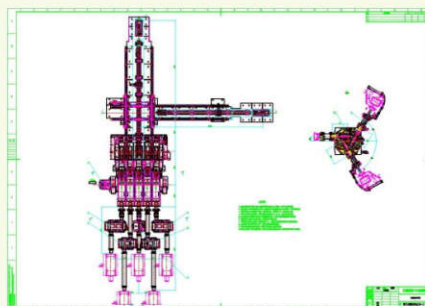
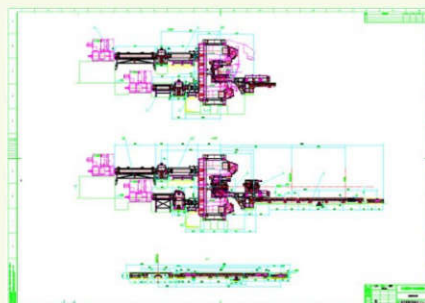
Product specification: $\Phi 13\text{mm}-\Phi 90\text{mm}$

Thermo-mechanical controlled rolling:
minimum 750°C low-temperature rolling,
maximum 45% large-reduction-ratio rolling

Single pass design: a simplified pass system for rolling

Free-specification rolling: expanded product specifications, adaptable to the end-user's special requirements on bar product specifications

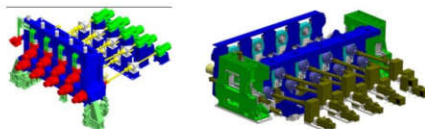
High-precision rolling: dimensional deviation controlled to within 1/5DIN, ellipticity no more than 60% of the dimensional deviation



Bar reducing and sizing mill

◆ Straightener

CISDI has developed a patented two-hi precision straightener for bar rolling, and a cantilever and gantry straightener for section rolling.



New development for billet casters reduces energy and running costs



CISDI has completed the reliability test for a billet caster mould oscillator which saves energy and requires no maintenance.

The oscillator, which also has strong environmental benefits, is capable of high precision and fast response. It is highly reliable, with a long service life, and is capable of large outputs. Little wear and tear occurs, so service life is extended.

CISDI's newly-developed electro-hydraulic servo expertise is a key feature. The servo motor directly controls

the hydraulic cylinder; no hydraulic station, hydraulic servo valve or interconnecting piping is required. Only a small amount of hydraulic oil is necessary and oil cleanliness is moderately required.

The sample machine performed stably throughout seven days of load-testing and hit numerous world-class indicators. Position control accuracy reached a micrometer, the highest response frequency was 7Hz and the maximum noise during operation was under

60 decibels.

CISDI has applied for 18 patents for its oscillator technology and been awarded one patent for invention and seven patents for new-model application.

Combining advantages of the conventional electro-hydraulic servo system and the electric servo system, the oscillator boasts flexible control of the servo motor drive, a high output of hydraulic drive, a low electric drive energy consumption and low wear.

Fact file:

Sinusoidal or non-sinusoidal oscillation is able to regulate amplitude, frequency and waveform function online
Cables transmit electric energy instead of pressure energy being transmitted by hydraulic pipeline

Very little wear and tear occurs during operation and able to

make an automatic compensation on wears

Easy installation, no maintenance required and the unit can be changed quickly

Reduced installation space - no need for a hydraulic station, hydraulic servo valve and interconnecting piping

Little hydraulic oil is needed

and oil cleanliness is moderately required

High output, reliable performance and at least 40% less energy consumed than with conventional hydraulic servo oscillators

Reduced noise levels (less than 60 decibels during operation)

Technical data

Oscillation frequency (online regulation): 0-400cpm

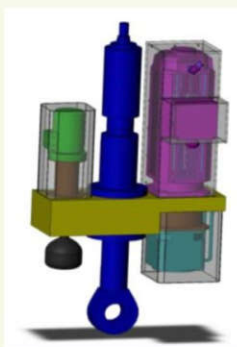
Oscillation amplitude (online regulation): 0-10mm

Skew ratio (online regulation): 0-20%

Oscillating longitudinal deviation: $< \pm 0.1\text{mm}$

Oscillating transversal deviation: $< \pm 0.1\text{mm}$

Positioning accuracy: $< \pm 0.005\text{mm}$



CISDI-Green EAF

Fully automatic and enclosed charging of scrap



Penetrated preheating of scrap, enhanced scrap specification, control of preheating time



Top-side-chute charging structure, targeting charges to the centre of EAF heating, improving the cold zone inside the furnace and enhancing thermal efficiency



Good control of fume temperature during the scrap preheating process, which also maintains dioxin control



CISDI-DMI-AC electrode regulation system can reduce power consumption by 15-25kWh/t-liquid steel



Metal yield enhanced by 1-3%



Increased hot heel by 15-60% (especially relevant for project upgrades)



CISDI-Green EAF, shown in 3-D