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EXPERTISE FROM HUNDRED-YEAR SHOUGANG

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Pelletizing Engineering and Technology 球团工程与技术



概述

Introduction

首钢国际工程公司是中国球团工程与技术的领军者，拥有完善的技术储备，以最优化的方案为全球客户提供球团工程咨询、工程设计、工程总承包、技术装备制造和项目管理等服务。近年来为国内外20多家用户提供了30多项球团生产线设计和总承包服务，球团矿生产能力超过4000万t/a。

- ◎ 优秀的工艺及非标设备研发能力
- ◎ 国内顶级球团技术专家，提供最优化、最完善的技术服务
- ◎ 多次刷新球团建设达产周期最短新纪录
- ◎ 保持设备稳定运行时间最长纪录

As the leader in the field of Chinese pellet engineering and technology, BSIET with its complete technical equipment shall, by way of the optimized proposal, be willing to provide the customers in the world with such services as consultation, engineering, procurement, technical equipment manufacture and management in pellet engineering. BSIET, in recent years, has provided 20-odd customers at home and abroad with such services as engineering and EPC of more than 30 pelletizing lines and the pellet production capacity has exceeded 40MTPA.

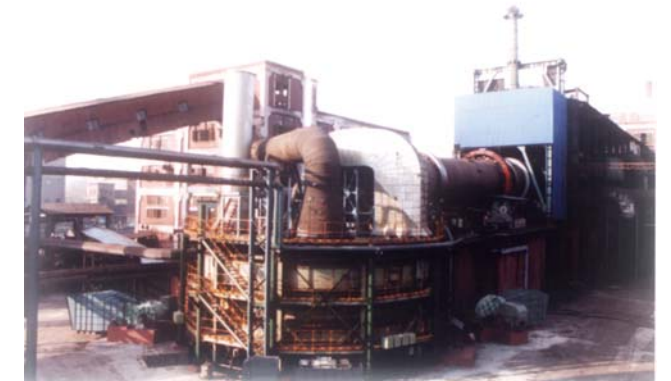
- ◎ Excellent capability to develop the process and non- standard equipment
- ◎ China's top experts in pelletizing technologies will provide the optimized and the most complete technical services
- ◎ Having created many new records of shortest production cycle in construction of pelletizing lines in China
- ◎ Keeping the longest time record of stable equipment operation in China



中国冶金科学技术一等奖
The 1st Prize of Chinese Metallurgical Science and Technology

◎ 2000年，率先成功开发链篦机-回转窑-环冷机球团技术，填补了中国大型球团技术的空白，并设计建设了中国第一条120万t/a链篦机-回转窑-环冷机生产线，荣获冶金科学技术一等奖

◎ In 2000, BSIET firstly and successfully developed the traveling grate—rotary kiln—annular cooler pelletizing technology, designed and built up the first 1.2MTPA traveling grate—rotary kiln—annular cooler production line in China. The technology filled in the gap in large-scale pelletizing technology in China, and was awarded the 1st Prize of Chinese Metallurgical Science and Technology



© 2006年，为印度完成了国内第一条全赤铁矿原料的链篦机-回转窑-环冷机球团生产线的设计和供货

© In 2006, BSIET fulfilled the engineering and procurement for the first traveling grate—rotary kiln—annular cooler production line using haematite only as raw material in India



© 2009年，联合设计完成了中国第一条400万t/a带式焙烧机球团生产线

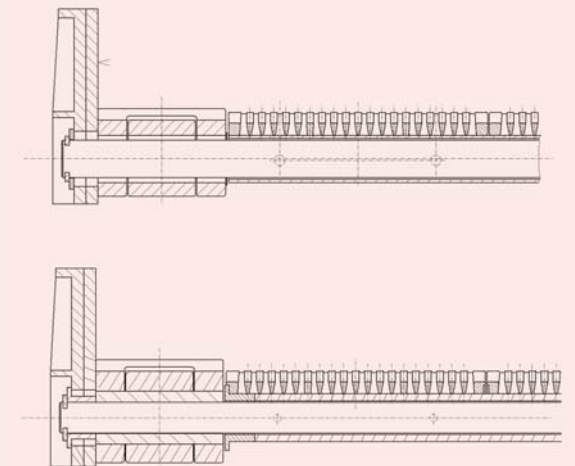
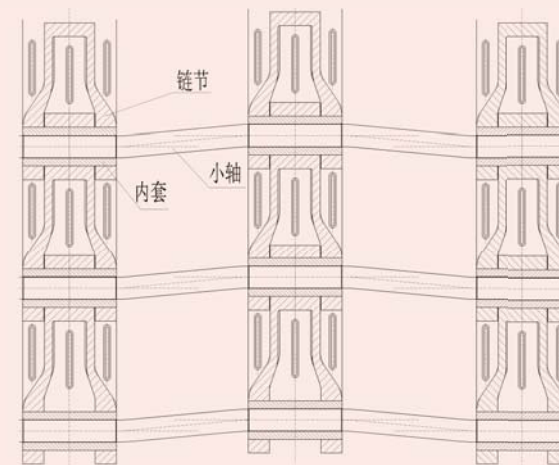
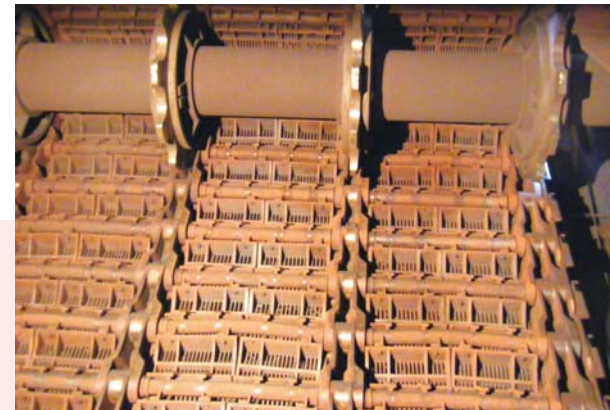
© In 2009, BSIET fulfilled the co-engineering for the first 4MTPA straight grate pelletizing line in China



优势技术 Advantaged Technologies

首钢国际工程公司建有球团实验室，并紧密结合生产实践，开创性地研发应用了多项具有里程碑意义的新技术，形成了具有特色的球团专有技术，引领中国球团技术进步。

With a pellet laboratory of its own and by way of close integration of the production practice, BSIET has creatively developed and applied many significant new technologies that have become the proprietary pelletizing technologies with characteristics and lead the Chinese pelletizing technologies to progress.



链篦机-回转窑-环冷机球团技术

Traveling Grate—Rotary Kiln—Annular Cooler Pelletizing Technology

拥有多项球团非标设备的专利技术和专有技术，如半悬挂传动支撑技术、柔性篦床技术、链篦机机头的保护装置、铲料板技术、链篦机篦板自动复位及检测装置、回转窑可换垫板技术、窑头窑尾卡口铁技术、环冷机给料斗技术、环冷机下密封技术等。

BSIET owns many patent technologies and proprietary technologies of non-standard equipment for the pellet production, for instance, semi-suspension driving support, flexible grate bed, protection device on head of traveling grate, scrapper, automatic resetting and detecting devices of grate plates, replaceable pad for rotary kiln, protection ring at discharge end and charge end of rotary kiln, feeding hopper and lower sealing for annular cooler, etc.

★ 链篦机柔性篦床技术

(发明专利，专利号ZL02158571.7)

解决篦床多排链节不同步的问题，降低链节受力；减小关键设备部件的重量，节省耐热钢用量。

★ Flexible grate bed of traveling grate

(Invention Patent, Patent No. ZL02158571.7)

It solves the problem of asynchronized multi-row chain links of grate bed, reduces the force on the chain links, lightens the weight of key equipment parts and lessens the heat-resistant steel.

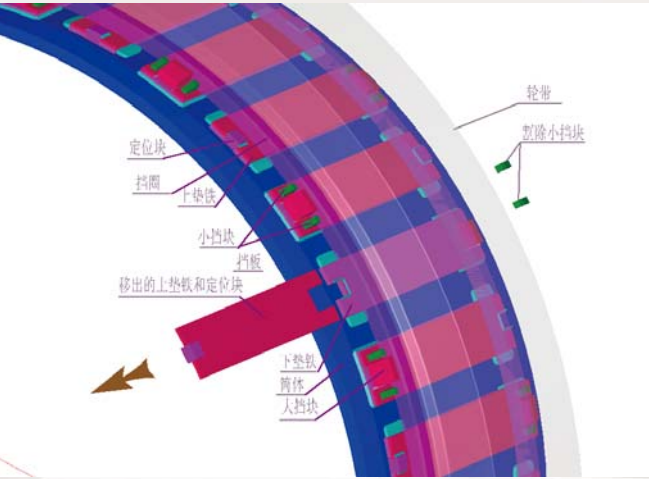
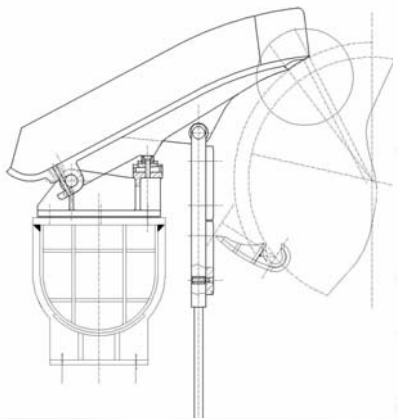


★ 链篦机铲料板装置
(发明专利, 专利号ZL02158573.3)

采用合理的结构、合理的切入角、耐高温氧化和耐磨材料, 降低铲料板的漏料量, 延长铲料板的使用寿命, 维护方便。

★ Scraper unit for traveling grate
(Invention Patent, Patent No. ZL02158573.3)

Rational structure, rational entrance angle, high-temperature-resistant oxidized and wear-resistant materials are used to reduce the leakage of scraper, prolong the service life of scraper and facilitate maintenance.



★ 回转窑筒体可更换式浮动垫铁装置
——有效保护筒体, 便于安装更换

★ Replaceable floating pad unit for rotary kiln cylinder — Cylinder is effectively protected, maintenance and replacement are easily carried out

★ 回转窑液压挡轮技术——自动调整
回转窑窑位, 延长托轮使用寿命

★ Hydraulic thrust roller technique for rotary kiln — Automatically adjust the position of rotary kiln and prolong the service life of thrust roller

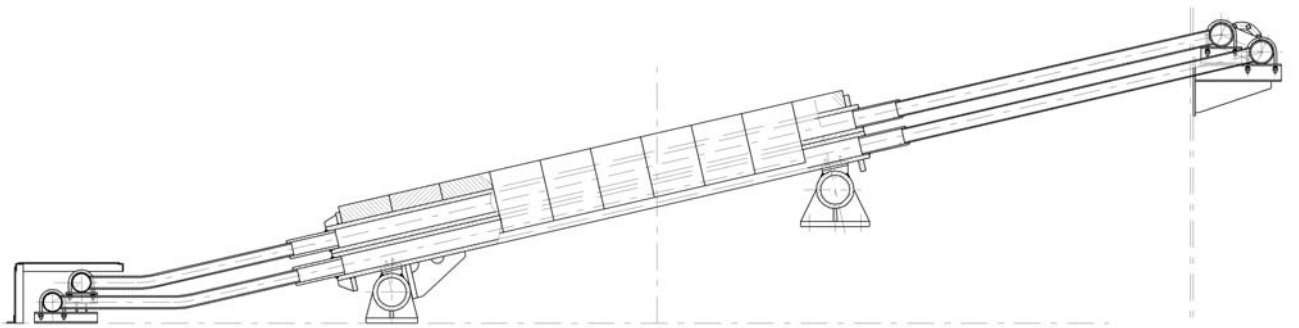


★ 回转窑新型固定筛——改善工作环境, 延长使用寿命

支撑水梁全部采用无缝钢管形式, 避免原钢板焊接式固定筛在高温下容易开裂的弊病, 避免漏水引起的停机事故, 同时减少维护工作量。

★ New stationary screen for rotary kiln — Improves the working condition and prolongs the service life

Seamless steel pipes are used for supporting lintel of the stationary screen to prevent the steel plate welded stationary screen from cracking under high temperature, avoid shut-down due to water leakage and lessen maintenance work at the same time.

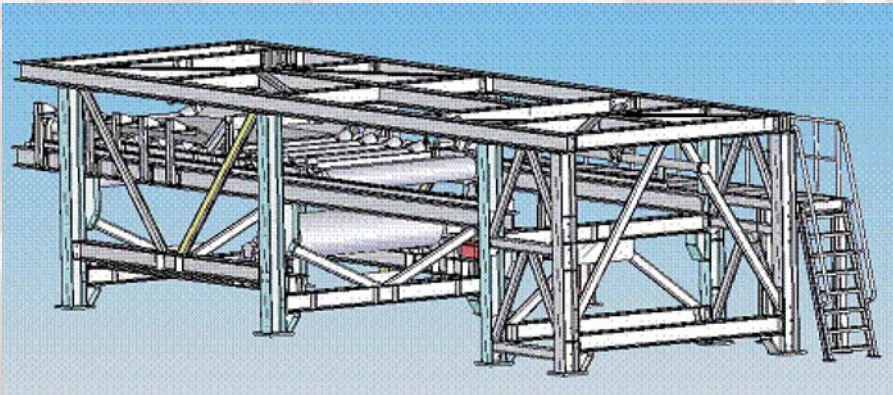


★ 球团专用梭式布料器
(实用新型专利, 专利号ZL200620158323.4)

优化布料流程, 减少生球落下次数, 改善布料效果。成功应用于首钢京唐504m²带式焙烧机球团工程, 使用效果良好。

★ Dedicated shuttle pellet distributor
(Utility Model Patent, Patent No. ZL200620158323.4)

Distribution flow is optimized to reduce the falling times of green balls and improve the distribution effect. This technique was used for 504m² traveling grate project of Shougang Jingtang Iron and Steel Plant, and the operation effect is good.



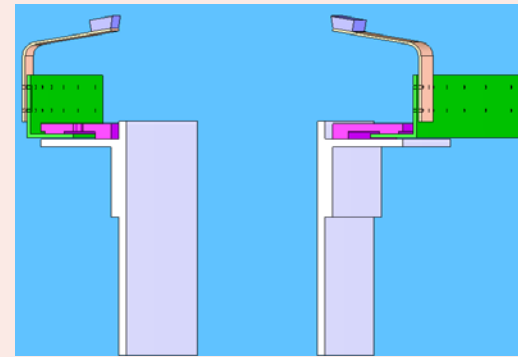
★ 环冷机下密封技术

(实用新型专利, 专利号ZL200620158322.X)

具有结构简单、摩擦系数小、使用寿命长、安装维护方便、密封效果好等优点。

摩擦板采用特殊耐磨材料制成, 依靠弹性支撑, 使摩擦板和回转体之间贴合, 确保密封面的严密, 有效解决环冷鼓风机的漏风难题。

该技术在吉林天池矿业球团工程中首次应用, 连续使用4年以上, 密封效果良好, 受到业主的赞誉, 正在全国球团厂推广使用。



环冷机下密封结构简图
Schematic diagram of bottom seal structure for annular cooler

★ Bottom seal of annular cooler

(Utility Model Patent, Patent No. ZL200620158322.X)

The seal unit has such advantages as simple structure, small friction factor, long service life, easy installation and maintenance and good sealing effect, etc.

Friction plates are made of special wear-resistant material and fit against the rotary part by means of a elastic support to ensure a tight sealing on the sealing surface and effectively prevent the annular cooling blower from air leakage.

The technology, firstly applied to the pelletizing project for Tianchi Mining Co. in Jilin province and continuously used for more than 4 years, wins praise given by the owner due to its excellent sealing effect and is being popularized to the pelletizing plant throughout China.

★ 液压马达的应用

液压马达传动平稳, 性能可靠, 可实现无极调速; 改善启动特性和过载能力, 提高球团生产线作业率, 减少维护工作量。

★ Application of hydraulic motor

The hydraulic motor with smooth driving and reliable performance can realize a stepless speed regulation.

Adoption of the hydraulic motor improves the starting property and overload capacity, increases the operability of the pelletizing line and lessens the maintenance work.



★ 综合技术装备

- ◎ 链篦机-回转窑-环冷机球团生产线热工计算和热平衡分析;
- ◎ 生产熔剂球团的试验、工艺设计和设备配置;
- ◎ 生产赤铁矿球团的试验、工艺设计和设备配置, 非标设备的设计研究;
- ◎ 球团生产线各部(链篦机、回转窑、环冷机和热风管道)耐火材料的设计、研究;
- ◎ 率先研发应用球团大型造球盘, 如 $\phi 7.0\text{m}$ 、 $\phi 7.2\text{m}$ 和 $\phi 7.5\text{m}$;
- ◎ 链篦机厂房的工艺布置优化与创新;
- ◎ 链篦机厂房内除尘灰和干散料处理的工艺设计创新, 应用新设备和新工艺布置;
- ◎ 针对生产赤铁矿球团的工艺, 进行内配燃料技术的设计和研究;
- ◎ 球团环冷机余热利用技术;
- ◎ 球团厂内工艺和环境除尘采用浓相低速气力输送技术。

★ Comprehensive technical equipment

- ◎ Thermal calculation and heat balance analysis of traveling grate—rotary kiln—annular cooler pelletizing line;
- ◎ Test, process design and equipment configuration to produce flux pellet;
- ◎ Test, process design and equipment configuration to produce hematite pellet; design and research of non-standard equipment;
- ◎ Design and research of refractory materials for all parts of pelletizing line (traveling grate, rotary kiln, annular cooler and hot blast pipe);
- ◎ Large balling disc is firstly used for the pelletizing line, e.g. $\phi 7.0\text{m}$, $\phi 7.2\text{m}$ and $\phi 7.5\text{m}$;
- ◎ Process arrangement in traveling grate building is optimized and innovated;
- ◎ Process design for treatment of dedusting ash, dry and bulk materials in the traveling grate building is innovated and new equipment, new process arrangement are adopted;
- ◎ Design and research of mixed fuel are used for process of producing hematite pellet;
- ◎ Pellet annular cooler waste heat recycling technique;
- ◎ Dense-phase low-speed pneumatic conveying technique is adopted for process and room dedusting in pellet plant.



带式焙烧机球团技术

Straight Grate Pelletizing Technology

首钢国际工程公司率先与国外先进企业合作开展带式焙烧机球团生产工艺的设计和研发，与OUTOTEC联合设计了中国最大的首钢京唐504m²带式焙烧机工程，丰富了自身的球团技术储备。

BSIET takes the lead in cooperation with foreign enterprises to design and research straight grate pellet production process. For instance, the largest 504m² straight grate project in China for Shougang Jingtang Iron and Steel Plant is jointly designed with OUTOTEC and the project now has been smoothly put into operation. This enriches the technical reserve of pellet of BSIET himself.

★ 带式焙烧机技术特点：

- ◎ 干燥、预热、焙烧、冷却全部工艺过程在一台设备上进行，设备简单、可靠，操作维护方便，热效率高，单机能力大；
- ◎ 特别适宜于以赤铁矿为原料生产球团矿；
- ◎ 预热段和焙烧段采用多个煤气烧嘴，便于温度的精确控制，主线环境清洁；
- ◎ 上罩耐材静止不动，不直接与球团接触，没有机械磨损，没有温度的急剧变化，没有热裂纹，减少粉尘负荷；
- ◎ 台车可以离线检修，缩短停机时间，提高作业率；
- ◎ 冷却段废气循环回焙烧段和预热段，热损失少，操作费用低。



★ Straight grate has the following technical characteristics:

- ◎ All the process such as drying, preheating, indurating and cooling are conducted on a same equipment that is simple, reliable, easily operated and maintained, high heat efficiency and great capacity of a single unit;
- ◎ It is specially adapted to pellet production using hematite as raw material;
- ◎ Multi-gas burners are used for preheating zone and induration zone to facilitate an accurate control of temperature and cleaning of the main line;
- ◎ Refractory material in upper hood keeps static and does not directly touch the pellet. No any mechanical wear, sharp temperature change and heat crack occur, and dust load is reduced;
- ◎ Pallet car can be offline maintained to shorten the shut-down time and increase the operability;
- ◎ Waste fume in cooling zone recycles back to induration zone and preheating zone for less heat loss and low operation cost.



环境保护及固体废弃物综合利用

Environmental Protection and Comprehensive Utilization of Solid Wastes

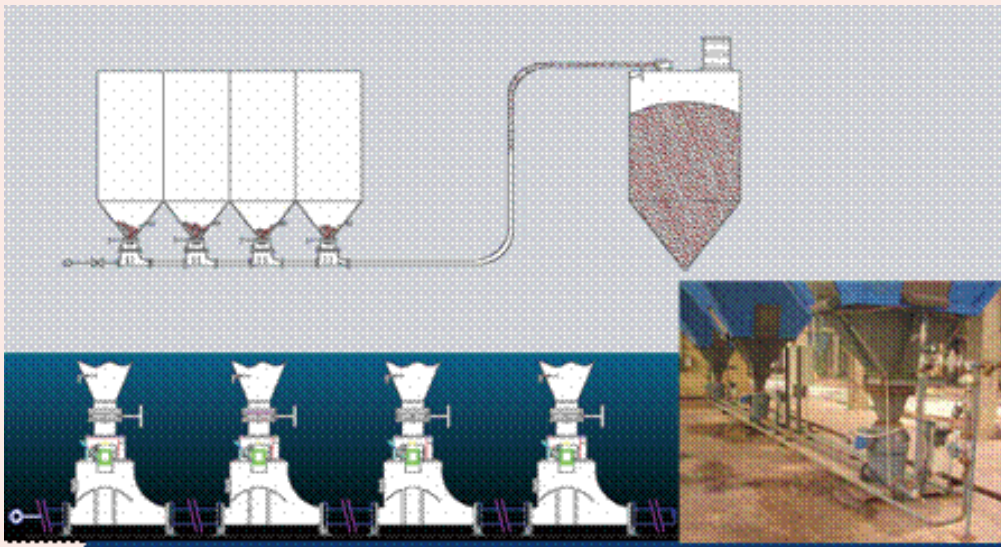
首钢国际工程公司致力于环境保护和固体废弃物综合利用技术的研发与应用，拥有系列环保专项技术和设备，为客户提供清洁、环保的球团工程。

BSIET has the serial special technologies and equipment of its own for environmental protection, devotes itself to environmental protection and development, application of the comprehensive utilization technologies for solid wastes, and is willing to provide customers with clean and environment-friendly pelletizing projects.

环境保护与综合治理

Environmental Protection and Comprehensive Treatment

- ◎ **固体废弃物**：采用气体密相输送技术将球团厂粉尘全部回收，并返回配料使用，实现固体废弃物的零排放。
- ◎ **液体废弃物**：全厂无生产废水排放，生活污水进行生化处理后排放。
- ◎ **气体排放**：根据物料种类、粉尘性质和工作制度划分除尘系统，采用高效除尘器，对扬尘点进行集中除尘，使岗位粉尘浓度 $\leq 8\text{mg}/\text{Nm}^3$ ，排放气体粉尘浓度 $\leq 30\text{mg}/\text{Nm}^3$ ，建设烟气脱硫设施。
- ◎ **噪声治理**：为减少噪声危害，选用低噪声设备，对风机等噪声源设备本体采取消声、隔声、减振措施，有效降低厂界噪声。
- ◎ **Solid wastes**: A pneumatic sense-phase conveying technology is adopted for recovery of all dusts in pelletizing plant. It realizes zero discharging of solid wastes.
- ◎ **Liquid waste**: No production waste water discharged from the whole plant, domestic sewage will be drained after biochemical treatment.
- ◎ **Gas emission**: Dust collection system will be divided based on material type, dust characteristics and work system. High-efficiency dust collectors will be adopted for central dedusting at dust-forming point and make dust density $\leq 8\text{mg}/\text{Nm}^3$ at posts. The dust density will be $\leq 30\text{mg}/\text{Nm}^3$ for air emission. Fume desulphurization facilities will be built.
- ◎ **Noise control**: Low noise equipment will be selected to reduce noise hazard. Noise elimination, insulation and vibration damping measures will be taken for fan and other noise source equipment to lower factory boundary noise in effect.



密相气体输灰技术的应用
Dense-phase gas dust conveying application

废弃物综合利用

Comprehensive Utilization of Wastes

通过自主创新技术，充分利用钢铁生产工艺中所产生的含铁废料（轧钢皮、含铁尘泥、转炉污泥等）和其它固体废弃物（高炉水渣），生产矿渣微粉作为水泥添加剂或建筑材料等。
Iron-containing waste residues (millscale, iron containing dust slime, converter sludge, etc.) from iron and steel production process and other solid wastes (BF granulated slag) will be fully utilized through independent innovational technology. The produced slag powder will be used as cement additive or building material, etc.



首钢水渣细磨工程
Shougang granulated slag fine grinding project



首钢京唐水渣细磨工程
Shougang Jingtang granulated slag fine grinding project



首秦水渣细磨工程
Shouqin granulated slag fine grinding project

典型工程 Typical Projects

承德信通首承矿业公司200万t/a球团工程

2MTPA pelletizing project, Chengde Xintong Shoucheng Mining Co.

规模：200万t/a 链篦机：4.5×60m
回转窑：Φ5.9×40m 环冷机：128m² 投产日期：2006年2月
特点：工艺布局流畅，设备配置合理，生产效率高，荣获“冶金行业部级优秀工程设计一等奖”。

Scale: 2MTPA Traveling grate: 4.5×60m
Rotary kiln: Φ5.9×40m Annular cooler: 128m² Start-up time: February, 2006
Features: Smooth process arrangement, rational equipment configuration and high productivity. The project was awarded “1st Prize of National Excellent Engineering Design in Metallurgical Industry”.



首秦龙汇公司200万t/a球团工程

2MTPA pelletizing project, Shouqin Longhui Co.

规模：200万t/a 链篦机：4.5×60m
回转窑：Φ5.9×40m 环冷机：128m² 投产日期：2009年6月
特点：工艺布局流畅，设备配置合理。建有适合多种原料的大型精矿库；增加矿粉细磨系统，提高成品球质量；成品储存采用大型钢结构筒仓。项目建设周期12个月，创造国内球团工程建设进度的新纪录，荣获“冶金行业全国优秀工程总承包一等奖”。

Scale: 2MTPA Traveling grate: 4.5×60m
Rotary kiln: Φ5.9×40m Annular cooler: 128m² Start-up time: June, 2009
Features: Smooth process arrangement, rational equipment configuration. Large ore concentration storage suitable for all kinds of raw materials; ore fines grinding system added, product ball quality increased; large steel structural silo for storage of products. The construction cycle of the project lasted 12 months. This is a new construction record of a pelletizing project in China. The project was awarded “1st Prize of National Excellent EPC Project in Metallurgical Industry”.



吉林天池矿业公司120万t/a球团工程

1.2MTPA pelletizing project, Jilin Tianchi Mining Co.

规模：120万t/a 链篦机：4.0×38m
回转窑：Φ5.0×40m 环冷机：69m² 投产日期：2008年11月
特点：工艺流程简捷流畅，设备配置合理，生产稳定，作业率高，荣获“冶金行业全国优秀工程设计三等奖”。

Scale: 1.2MTPA Traveling grate: 4.0×38m
Rotary kiln: Φ5.0×40m Annular cooler: 69m² Start-up time: November, 2008
Features: Simple and smooth process flow, rational equipment configuration, stable production and high operability. The project was awarded “3rd Prize of National Excellent Engineering Design in Metallurgical Industry”.



首钢京唐钢铁公司504m²带式焙烧机球团工程

504m² straight grate pelletizing project, Shougang Jingtang Iron and Steel Co.

规模：504m² 带式焙烧机
投产日期：2010年8月
特点：采用大型带式焙烧机生产工艺，具有对原料适应性强、焙烧温度高等特点。主生产线集中，工艺简捷，管理方便。荣获“冶金行业全国优秀工程设计一等奖”。

Scale: 504m² straight grate
Start-up time: August, 2010
Features: A large straight grate induration machine production process is adopted and is characterized by good adaptability to the raw materials and high induration temperature, etc. The main production line is centralized with simple process and easy management. The project was awarded “1st Prize of National Excellent Engineering Design in Metallurgical Industry”.



工程业绩 Performance Reference

序号 No.	用户名称 User Name	项目地点 Location	生产规模 Scale	投产时间 Start-up Time	服务方式 Scope of Work	备注 Notes
1	包钢集团 Baogang Group	中国 内蒙古 Inner Mongolia, China	5.00MPTA	建设中 Under construction	设计 Engineering	带式焙烧机工艺 Straight grate process
2	MK HOLDINGS公司 MK HOLDINGS Co.	伊朗 Iran	2×2.50MPTA	建设中 Under construction	总承包 EPC	60%赤铁矿，DRI球团 60% hematite, DRI pellet
3	承德创远矿业公司(二期工程) Chengde Chuangyuan Mining Co. (Phase 2)	中国 河北 Hebei, China	1.20MPTA	建设中 Under construction	设计、技术服务 Engineering, Consultation	
4	海明矿业公司 Haiming Mining Co.	中国 内蒙古 Inner Mongolia, China	1.20MPTA	建设中 Under construction	设计、技术服务 Engineering, Consultation	
5	攀枝花新中钛科技公司 Panzhijia Xinzhongtai Co.	中国 四川 Sichuan, China	1.20MPTA	建设中 Under construction	设计 Engineering	钒钛磁铁矿氧化球团 Vanadium titanium magnetite oxide pellet
6	攀枝花钛联投资公司 Panzhijia Tailian Co.	中国 四川 Sichuan, China	2.40MPTA	建设中 Under construction	设计 Engineering	钒钛磁铁矿氧化球团 Vanadium titanium magnetite oxide pellet
7	临沂华商矿业公司 Linyi Huashang Mining Co.	中国 山东 Shandong, China	0.80MPTA	2014.03	总承包 EPC	
8	四川德胜钢铁公司 Sichuan Desheng Iron and Steel Co.	中国 四川 Sichuan, China	1.00MPTA	2013.08	总承包 EPC	
9	威远钢铁公司 Weiyuan Iron and Steel Co.	中国 四川 Sichuan, China	2.40MPTA	2013.01	总承包 EPC	钒钛磁铁矿氧化球团 Vanadium titanium magnetite oxide pellet
10	太钢袁家村铁矿 Tisco Yuanjiacun Iron Mining	中国 山西 Shanxi, China	2.40MPTA	2013.01	总承包 EPC	70%赤铁矿球团 70% hematite pellet
11	VSB公司 VSB Co.	巴西 Brazil	1.36MPTA	2013.01	设计、设备供货 EP	全赤铁矿碱性球团 All hematite basic pellet
12	通钢矿业公司 Tonggang Mining Co.	中国 吉林 Jilin, China	1.20MPTA	2012.08	设计、技术服务 Engineering, Consultation	
13	隆盛钢铁公司 Longsheng Iron and Steel Co.	中国 山东 Shandong, China	1.20MPTA	2012.03	设计 Engineering	
14	宣钢赤城宝龙炉料公司 Xuangan Chicheng Baolong Co.	中国 河北 Hebei, China	0.80MPTA	2011.08	总承包 EPC	
15	安阳钢铁公司 Anyang Iron and Steel Co.	中国 河南 Henan, China	1.20MPTA	2011.02	设计 Engineering	冶金行业全国优秀工程设计二等奖 2 nd Prize of National Excellent Engineering Design
16	大中矿业公司 Dazhong Mining Co.	中国 内蒙古 Inner Mongolia, China	1.20MPTA	2011.01	设计、技术服务 Engineering, Consultation	冶金行业全国优秀工程设计二等奖 2 nd Prize of National Excellent Engineering Design
17	承德创远矿业公司 Chengde Chuangyuan Mining Co.	中国 河北 Hebei, China	1.20MPTA	2011.01	设计、技术服务 Engineering, Consultation	冶金行业全国优秀工程设计三等奖 3 rd Prize of National Excellent Engineering Design
18	宣化钢铁公司（二期工程） Xuanhua Iron and Steel Co. (Phase 2)	中国 河北 Hebei, China	1.20MPTA	2010.09	总承包 EPC	冶金行业全国优秀工程 总承包三等奖 3 rd Prize of National Excellent EPC Project
19	首钢京唐钢铁公司 Shougang Jingtang Iron and Steel Co.	中国 河北 Hebei, China	4.00MPTA	2010.08	设计 Engineering	带式焙烧机工艺 冶金行业全国优秀工程设计一等奖 Straight grate process 1 st Prize of National Excellent Engineering Design
20	前进钢铁公司 Qianjin Iron and Steel Co.	中国 河北 Hebei, China	0.80MPTA	2010.07	设计 Engineering	
21	唐钢青龙炉料公司 Tanggang Qinglong Co.	中国 河北 Hebei, China	2.40MPTA	2010.07	设计、设备供货、 技术服务 EP, Consultation	国家优质工程银质奖 冶金行业全国优秀工程设计一等奖 Silver Medal of National Quality Project, 1 st Prize of National Excellent Engineering Design

序号 No.	用户名称 User Name	项目地点 Location	生产规模 Scale	投产时间 Start-up Time	服务方式 Scope of Work	备注 Notes
22	首秦龙汇矿业公司 Shouqin Longhui Mining Co.	中国 河北 Hebei, China	2.40MPTA	2009.06	总承包 EPC	冶金行业全国优秀 工程总承包一等奖 1 st Prize of National Excellent EPC Project
23	攀钢米易白马球团 （二期工程） Pangang Miyibaima Pelletizing (Phase 2)	中国 四川 Sichuan, China	1.20MPTA	2009.06	设计 Engineering	钒钛磁铁矿氧化球团 Vanadium titanium magnetite oxide pellet
24	宣化钢铁公司 （一期工程） Xuanhua Iron and Steel Co. (Phase 1)	中国 河北 Hebei, China	1.00MPTA	2009.03	总承包 EPC	增产改造 Modification for production increase
25	天池矿业公司 Tianchi Mining Co.	中国 吉林 Jilin, China	1.20MPTA	2008.11	设计、技术服务 Engineering, Consultation	冶金行业全国优秀工程设计三等奖 3 rd Prize of National Excellent Engineering Design
26	昆明钢铁公司 （二期工程） Kunming Iron and Steel Co. (Phase 2)	中国 云南 Yunnan, China	1.20MPTA	2008.06	总承包 EPC	冶金行业全国优秀 工程总承包二等奖 3 rd Prize of National Excellent Engineering Design, 2 nd Prize of National Excellent EPC Project
27	AISCO公司 AISCO Co.	印度 India	1.20MPTA	2008.05	设计、设备供货 EP	全赤铁矿 All hematite as raw material
28	BMM公司 BMM Co.	印度 India	1.20MPTA	2008.04	设计、设备供货 EP	全赤铁矿 All hematite as raw material
29	承德信通首承矿业公司 Chengde Xintong Shoucheng Mining Co.	中国 河北 Hebei, Chin	2.00MPTA	2006.02	设计 Engineering	冶金行业部级优秀工程设计一等奖 实际产能达到2.60MPTA 1 st Prize of Ministerial Excellent Engineering Design Actual capacity is 2.60MPTA
30	新余钢铁公司 Xinyu Iron and Steel Co.	中国 江西 Jiangxi, China	1.20MPTA	2005.11	总承包 EPC	17%褐铁矿 17% brown iron ore
31	柳州钢铁公司 （二期工程） Liuzhou Iron and Steel Co. (Phase 2)	中国 广西 Guangxi, China	2.40MPTA	2005.05	链篦机、 回转窑非标设计 Non-standard design of traveling grate and rotary kiln	
32	鞍钢弓长岭矿业公司 （二期工程） Angang Gongchangling Mining Co. (Phase 2)	中国 辽宁 Liaoning, China	2.40MPTA	2004.11	链篦机、 回转窑非标设计 Non-standard design of traveling grate and rotary kiln	
33	莱芜钢铁公司 Laiwu Iron and Steel Co.	中国 山东 Shandong, China	0.60MPTA×3	2004.05	技术服务 Consultation	
34	武钢程潮铁矿 WISCO Chengchao Iron Mining	中国 湖北 Hubei, China	1.20MPTA	2003.12	链篦机技术改造 Modification of traveling grate	
35	鞍钢弓长岭矿业公司 （一期工程） Angang Gongchangling Mining Co. (Phase 1)	中国 辽宁 Liaoning, China	2.40MPTA	2003.10	链篦机、 回转窑非标设计 Non-standard design of traveling grate and rotary kiln	
36	首钢矿业公司 （二期工程） Shougang Mining Co. (Phase 2)	中国 河北 Hebei, China	2.00MPTA	2003.04	设计 Engineering	实际产能达到2.50MPTA Actual capacity is 2.50MPTA
37	首钢矿业公司 （一期工程） Shougang Mining Co. (Phase 1)	中国 河北 Hebei, China	1.20MPTA	2000.10	设计 Engineering	国内第一条线 冶金科学技术一等奖 中国企业新纪录 1 st line in China, 1 st Prize of Chinese Metallurgical Science and Technology, New Record of Chinese Enterprise