

首钢国际工程公司是由原北京首钢设计院改制成立、首钢集团相对控股的国际型工程公司，是北京市首家获得工程设计综合甲级资质的市属企业。公司可承揽各行业、各等级的所有工程设计，同时可提供规划咨询、设备成套、工程总承包等技术服务。公司在钢铁厂总体规划设计，炼铁、炼钢、轧钢、烧结、球团、焦化、工业炉单项设计，冶金设备成套等方面具有独到优势和丰富业绩。

公司业绩遍布国内70余家钢铁企业，以及巴西、印度、马来西亚、越南、孟加拉、菲律宾、津巴布韦、安哥拉、秘鲁、沙特等多个国家。

公司是北京市高新技术企业，获得国家科学技术奖和全国优秀设计奖等30余项、冶金行业和北京市优秀设计及科技成果奖等近300项，拥有数百项专利技术，多个项目创中国企业新纪录。

BSIET is an international engineering company established through reorganization of Beijing Shougang Design Institute. It is invested by Shougang Group who takes relative majority of the share.

BSIET has the Engineering Design Integrated Qualification Class A issued by the State. It is the first unit of Beijing municipal enterprises awarded this Qualification and is able to undertake engineering design for all industries and all grades. Meanwhile, it can provide technical services such as planning consultation, equipment integration and general contracting. BSIET owns unique technology and rich practical experience in overall design of iron and steel plants, individual design for iron making, steel making, steel rolling, sintering, pelletizing, coking, industrial furnace and integration of metallurgical equipment.

BSIET has served more than 70 iron and steel enterprises in China, and has its achievements in more than 20 countries such as India, Malaysia, Brazil, Viet Nam, Bangladesh, the Philippines, Zimbabwe, Angola, Peru and Saudi Arabia, etc.

BSIET is Hi-tech Enterprise of Beijing City, and has been awarded with 30-odd national science & technology prizes and national excellent design prizes, nearly 300 metallurgical industry and Beijing city excellent design and achievement prizes, and hundreds of national patents. Dozens of projects have created the new records of the Chinese enterprises.



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活性石灰套筒窑技术

ANNULAR ACTIVE LIME SHAFT KILN



源自百年首钢 服务世界钢铁
Expertise from hundred-year Shougang



北京首钢国际工程技术有限公司

BEIJING SHOUGANG INTERNATIONAL ENGINEERING TECHNOLOGY CO.,LTD.

套筒窑技术是国际先进的石灰生产技术。20世纪90年代，首钢在国内冶金行业率先引进德国贝肯巴赫套筒窑技术。21世纪初，首钢国际工程公司在消化吸收原贝肯巴赫套筒窑技术的基础上进行发展，创造出具有首钢特色的套筒窑新技术。

首钢特色套筒窑技术，在热工系统、内衬结构、内套筒、换热器、控制系统等方面进行了全面优化，可配套建设石灰深加工、石灰粉状产品远距离气力输送设施，并实现国产化设计，能够极大降低用户的投资和维护成本。

首钢国际工程公司拥有套筒窑工程总承包能力，十多年来先后为多家钢铁企业建设了十余座活性石灰套筒窑，产能包括300t/d、500t/d、600t/d，并具有套筒窑扩容改造和异地搬迁的工程业绩。经过生产检验证明，首钢特色套筒窑技术可靠、生产稳定、产品质量好、耐火材料使用寿命长，受到国内同行的称赞，荣获多项冶金科学技术奖和优秀设计奖。

基于用户需求，在短时间内为用户提供一个性能可靠、技术成熟、切实满足生产需要并具有国际先进水平的活性石灰生产系统，是首钢国际工程公司的追求。

Annular shaft kiln is one of the advanced lime production technology in the world. In 1990's Shougang firstly imported the annular shaft kiln technology from Beckenbach Germany in the metallurgical industry in China. At the beginning of 21st century, BSIET developed the annular shaft kiln technology and created lots of new characteristics of Shougang.

Shougang's annular shaft kiln technology has such characteristics as: the thermal system, lining structure, inner cylinder, heat exchanger, control system and so on of the kiln are overall optimized; lime deep processing system, remote pneumatic transferring of pulverized lime product system can be equipped; full automatic domestic design has been realized; and investment and maintenance cost can be greatly reduced.

BSIET has the capability to undertake the turn-key project of an annular shaft kiln and more than 10 annular active lime shaft kilns with the production capacities of 300t/d, 500t/d and 600t/d respectively for several iron and steel enterprises have been already built up by BSIET for over a decade. BSIET also has such project achievements as volume expansion and relocation of the annular shaft kiln. The operating practice has proved that Shougang's annular shaft kiln is not only praised by the domestic colleagues for its reliable technology, stable production, good product quality and long service life of refractory, but also is awarded many prizes in metallurgical science and technology as well as the prizes in the excellent design.

BSIET's pursuit is to provide customers in a short time, based on the demands of customers, with an active lime production system that fully satisfies the needs of production with a reliable performance, proven technology and advanced level in the world.



首钢迁钢2座500t/d套筒窑工程实景图
Two 500t/d annular shaft kilns project for Shougang Qiangang

主要技术特点 Main technical characteristics

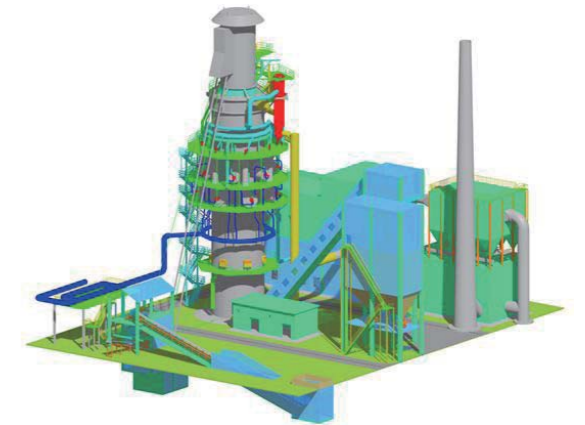
工艺系统 Process system

套筒窑主要由原料贮存、原料准备、窑本体、卷扬机房、液压站、主控楼、风机房、废气风机房、成品石灰贮运系统、除尘系统组成。根据用户情况设高低压配电室、煤气加压站、给水泵站、空压机等设施。

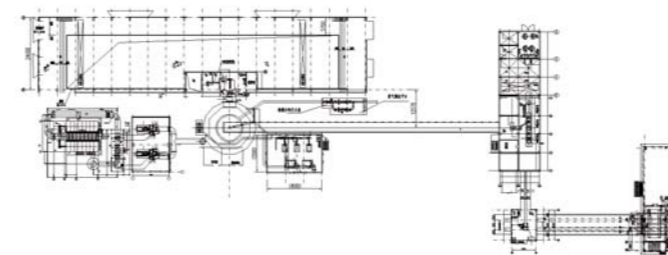
窑本体系统由窑体、上料装置、出料装置、燃烧室、换热器、喷射器以及风机系统等构成。

An annular shaft kiln mainly consists of raw material storage, raw material preparation, kiln proper, hoist room, hydraulic station, main control building, fan house, exhaust fan house, finished lime storing and handling system as well as dedusting system. Based on the conditions of customers, such facilities as high voltage and low voltage power distribution rooms, gas pressurizing station, feedwater pump station and air compressor are furnished.

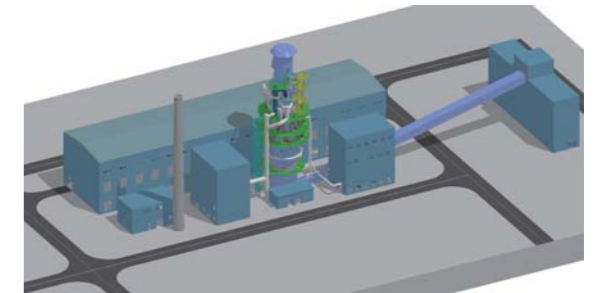
The kiln proper system is inclusive of kiln body, charging device, discharging device, combustion chamber, heat exchanger, ejector and fan system, etc.



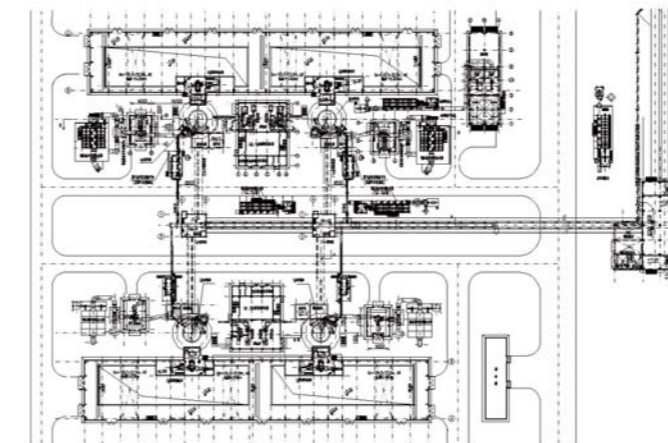
单座套筒窑三维效果图
Three dimensional effect drawing of a single annular shaft kiln



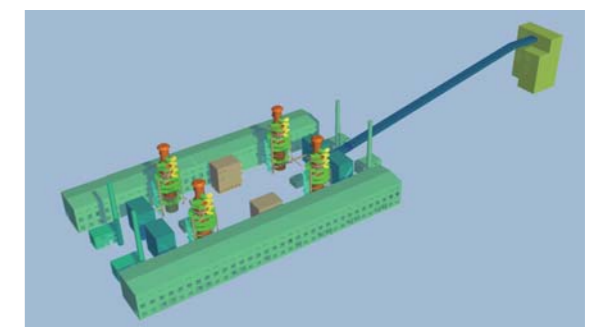
首钢迁钢600t/d套筒窑工程布置图
Layout of Shougang Qiangang 600t/d annular shaft kiln project



首钢迁钢600t/d套筒窑三维效果图
Three dimensional effect drawing of Shougang Qiangang 600t/d annular shaft kiln



首钢京唐一期套筒窑工程布置图
Layout of Shougang Jingtang stage-1 annular shaft kiln project



首钢京唐4座500t/d套筒窑三维效果图
Three dimensional effect drawing of Shougang Jingtang four 500t/d annular shaft kilns

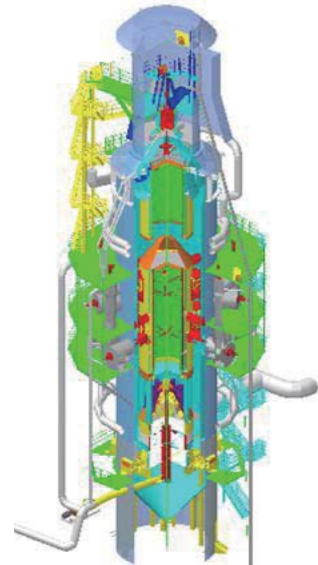
燃烧原理及工艺特点 Principle of combustion and characteristics of process

首钢特色套筒窑因其具有巧妙的内衬结构和合理的气流分配方式，在焙烧活性石灰方面性能优越。其主要特征是：

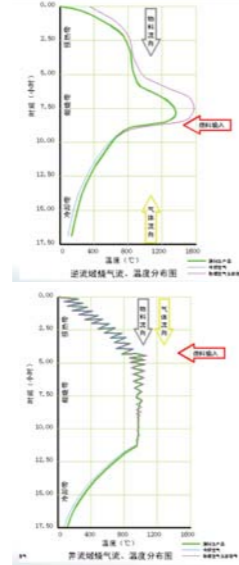
- ◎ 采用环形结构，物料在环形空间内煅烧，热气流分布更加均匀，边缘效应减小，利于焙烧；
- ◎ 采用逆流+并流的先进煅烧工艺，石灰在并流区域烧成，石灰品质高、质量稳定，活性度大于360ml，原料条件好时可达420ml；
- ◎ 采用废气预热驱动空气、冷却内套筒后的热空气作为燃烧一次风，降低热耗，热耗3887-4096kJ/kg石灰；
- ◎ 采用全负压操作，有效防止粉尘外溢，特别适合现代化工厂对环境保护要求高的场合；
- ◎ 操作简单，全自动控制，采用精确的燃料和助燃风分配技术，提高燃烧效率，降低能耗，有效改善热分布和煅烧效果；
- ◎ 采用先进的分料技术，物料在窑内多次重新分料，减小物料粒度不均对煅烧效果的影响，并降低窑内气体阻力；
- ◎ 耐火衬砌筑合理，寿命长，大修周期在5年以上，年作业率高达96%。

Shougang's annular shaft kiln has a superior performance in calcinating active lime due to its ingenious lining structure and reasonable distribution of air flow. The main characteristics are as follows:

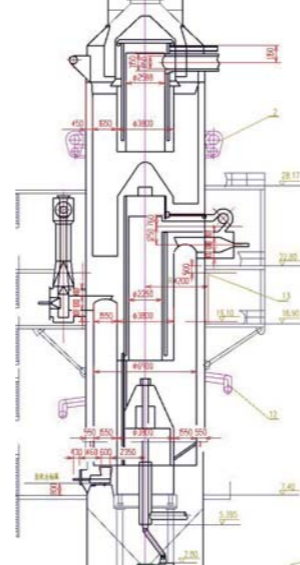
- ◎ An annular structure is adopted. The material is calcined in the annular space, the hot air flow is more uniformly distributed and the edge effect is reduced in order for better calcination;
- ◎ Such advanced calcine process as countercurrent + parallel flow is used. The lime is calcined in the parallel flow zone, the lime quality is super and stable, the activity is higher than 360ml and even 420ml if the material conditions are good;
- ◎ Waste gas is used for preheating the driving air. After cooled inner cylinder, the hot air acts as primary combustion air to reduce the heat consumption, the heat consumption is 3887-4096kJ/kg lime;
- ◎ A full-negative-pressure operation is adopted to effectively prevent dust from escaping. It is especially applicable to the place where an environmental protection is required for a modern plant;
- ◎ It is easily operated and all automatically controlled. An accurate distribution technology of fuel and combustion air is adopted to raise the combustion efficiency, reduce the energy consumption, effectively improve the heat distribution and calcine effect;
- ◎ An advanced materials distribution technology is adopted. The material is distributed many times in the kiln to reduce the impact on the calcine due to the non-uniform material grain sizes and reduce the resistance of the air in the kiln;
- ◎ The refractory lining is rationally laid for a long service life, the overhaul cycle is over 5 years and the yearly work rate is up to 96%.



套筒窑三维设计图
Three dimensional design diagram of an annular shaft kiln



套筒窑内部气流、温度分布图
Air-flow distribution pattern and temperature profile in an annular shaft kiln



套筒窑二维设计图
Two dimensional design diagram of an annular shaft kiln

窑本体 Kiln proper

窑本体由内、外筒组成。外筒为整体结构，内筒分为上内套筒、下内套筒两个独立部分。

外筒是窑体的主要承载结构，由钢板围成并衬以耐火材料，与内套筒同心布置，形成一个环形空间，石灰石就在该环形区域内煅烧。

内筒是双层钢结构套筒，夹层内通入空气冷却，防止其高温变形。筒体内外两侧砌有耐火砖。部分高温废气可通过上内套筒输出以预热驱动空气；热气流通过下内套筒内部形成循环气流，改变窑内下部热气流方向，产生并流煅烧带。

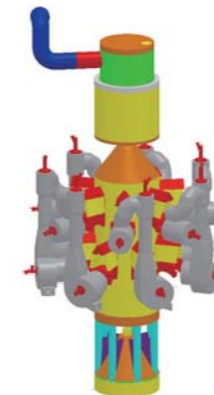
套筒窑设有两层燃烧室，燃烧室通过耐火材料砌筑的拱桥与内套筒相联。

The kiln proper is composed of inner cylinder and outer cylinder. The outer cylinder has a overall structure and inner cylinder is divided into two independent parts - upper inner cylinder and lower inner cylinder.

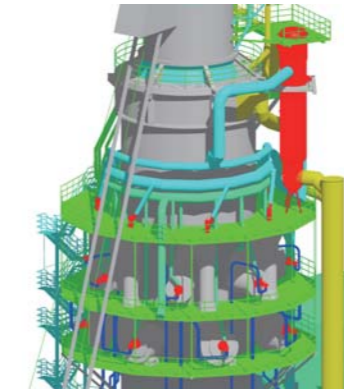
The outer cylinder is the main supporting structure that is made of steel plates with refractory material lined and is concentrically arranged together with the inner cylinder in order to form an annular space in which limestone is calcined.

The inner cylinder is a double-layer steel structural sleeve and air goes in the interlayer for cooling to prevent it from deformation. Refractory bricks are laid inside and outside the cylinder body. Part of the high-temperature waste gas is output from the upper inner cylinder to preheat the driving air; the hot air flow circulates inside the lower inner cylinder to change the direction of the hot air flow at the lower part of the kiln and to form a parallel flow calcine zone.

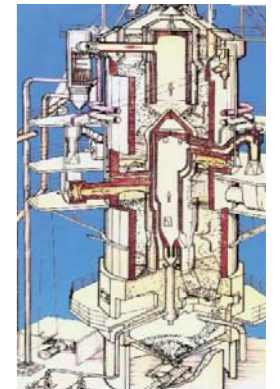
In the annular shaft kiln, there are two layers of combustion chambers that are connected to the inner cylinder by way of an arch bridge laid with refractory material.



套筒窑燃烧区内部结构图
Internal structural diagram of combustion zone in annular shaft kiln



套筒窑燃烧区外部结构图
External structural diagram of combustion zone in annular shaft kiln



套筒窑三维原理图
Three dimensional principle diagram of annular shaft kiln

套筒窑系列窑体尺寸

Dimensions of annular shaft kiln series

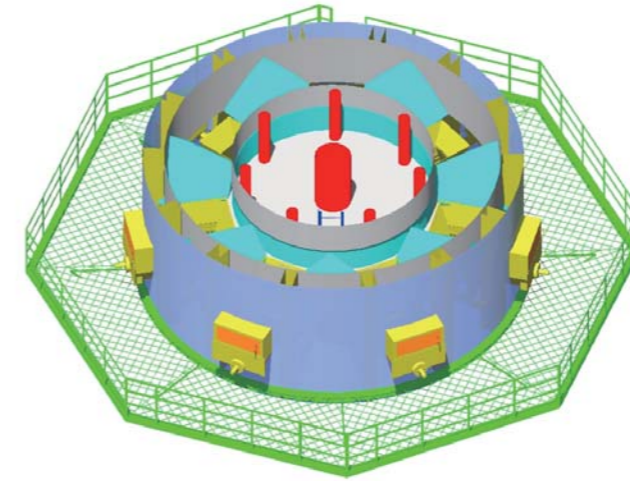
窑规格 (t/d) Kiln specifications (t/d)	300	500	600
窑体总高 (m) Total kiln height (m)	49.08	49.8	50.8
窑体有效高度 (m) Effective kiln height (m)	22.5	24.3	24.3
窑壳外径 (m) OD of kiln shell (m)	Φ6.7	Φ8.0	Φ9.0
窑壳内径 (m) ID of kiln shell (m)	Φ5.6	Φ6.9	Φ7.9
内套筒外径 (m) OD of inner cylinder (m)	Φ2.7	Φ3.8	Φ4.8
火桥跨度 (m) Span of fire bridge (m)	1.55	1.55	1.55
上烧嘴数量 (个) Numbers of upper burners (piece)	5	6	7
下烧嘴数量 (个) Numbers of lower burners (piece)	5	6	7

装料、煅烧及出灰设施 Charging, calcinating and discharging facilities

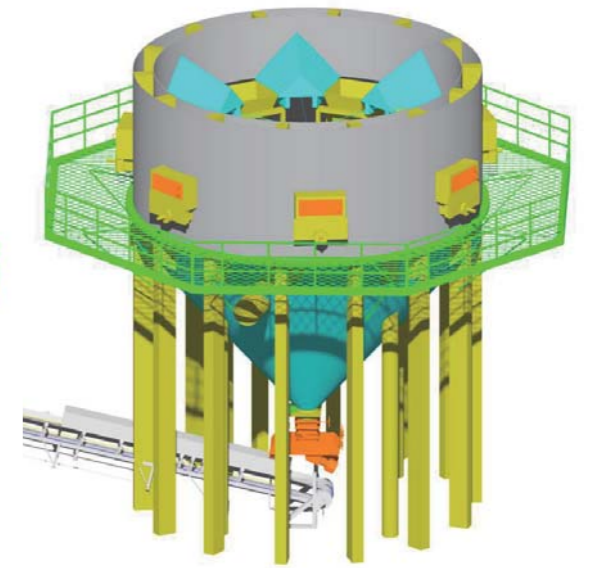
- ◎ **上料系统:** 由称量斗及密封闸门、单斗提升机、中间料仓及密封闸板、旋转布料器、料钟及料位检测装置等组成。
- ◎ **窑体煅烧系统:** 由换热器（使窑内废气与驱动空气实现热交换）、燃烧系统（含上燃烧器、下燃烧器）、喷射器（用驱动空气将窑内部分气体带出，形成再循环气流，产生窑内并流区域）、上内套筒和下内套筒等组成。
- ◎ **出灰系统:** 石灰石经预热、煅烧和冷却后，在冷却带底部由抽屉式出灰机直接卸入窑下部灰仓，然后经仓下振动给料机排出。
- ◎ **Charging system:** It is inclusive of weighing hopper and seal gate, one-bucket lifter, surge bin and seal gate, rotary distributor, bell and level detector, etc.
- ◎ **Calcine system:** It consists of heat exchanger (heat exchange between waste gas and driving air in the kiln), combustion system (upper burners and lower burners), ejector (driving air is used to take out part of gas in the kiln to form a recirculating air flow and a parallel flow zone in the kiln), upper inner cylinder and lower inner cylinder, etc.
- ◎ **Discharging system:** After limestone is preheated, calcined and cooled, the lime is directly discharged into a lime bin by a drawer type lime discharger at bottom of cooling zone, then, is discharged by a vibrating feeder under the bin.



旋转布料系统三维设计图
Three dimensional design diagram of rotary distribution system



套筒窑出灰系统三维设计图
Three dimensional design diagram of lime discharging system for annular shaft kiln



风机系统及除尘系统 Fan system and dedusting system

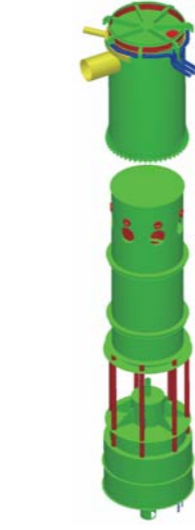
- ◎ 套筒窑风机系统主要由废气风机、驱动风机、内套筒冷却风机组成。其中：
 - 废气风机采用高压风机，将窑内废气抽出，使窑保持负压；
 - 驱动风机采用罗茨风机，向喷射器供给驱动空气；
 - 内套筒冷却风机采用离心风机，向内套筒供应冷却空气。
- ◎ 套筒窑除尘系统主要由高温布袋除尘器、除尘风机组成。
- ◎ The fan system for the annular shaft kiln mainly covers waste gas fan, driving fan, cooling fan of inner cylinder, among which:
 - the waste gas fan is of a high pressure one to exhaust the waste gas in the kiln and make the kiln keep negative pressure;
 - the driving fan is of a Roots one to supply the ejector with driving air;
 - the cooling fan of inner cylinder is of a centrifugal one to supply the inner cylinder with cooling air.
- ◎ The dedusting system for the annular shaft kiln mainly consists of a high-temperature bag filter and a dedusting fan.



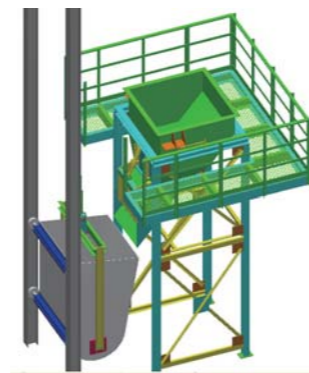
首钢迁钢 500t/d 套筒窑本体实景图
Shougang Qiangang 500t/d annular shaft kiln proper



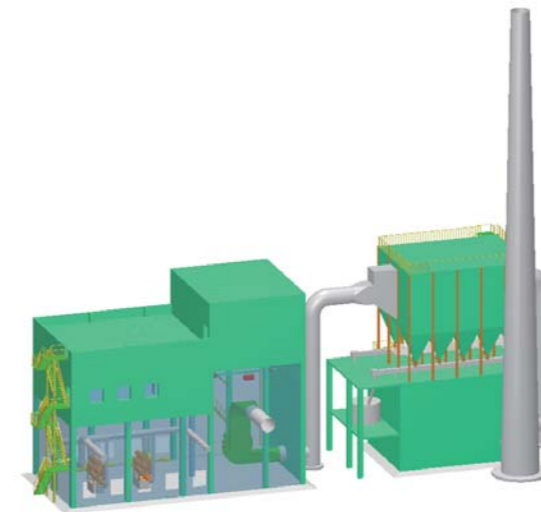
换热器三维设计图
Three dimensional design diagram of heat exchanger



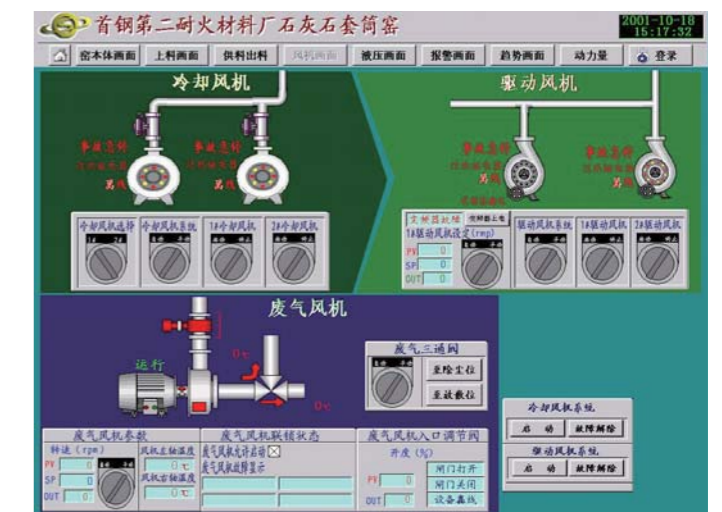
上、下内套筒三维设计图
Three dimensional design diagram of upper inner cylinder and lower inner cylinder



称量斗和料车装料三维设计图
Three dimensional design diagram of weighing hopper and skip charging



套筒窑风机及除尘系统典型三维设计图
Typical three dimensional design diagram of fan system and dedusting system for annular shaft kiln



套筒窑风机系统控制示意图
Schematic diagram of control of fan system for annular shaft kiln

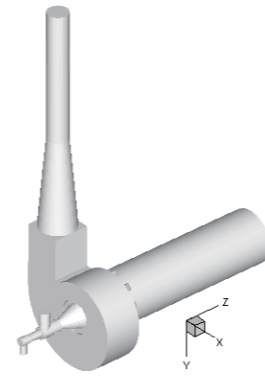
燃烧系统 Combustion system

套筒窑可使用多种燃料，如天然气、焦炉煤气、转炉煤气、高焦混合煤气等。燃烧过程通过烧嘴在燃烧室内进行。燃烧室设置在窑体中部窑皮外侧，分为上、下两层，每层燃烧室的数目由套筒窑产能决定。同一层燃烧室均匀布置，上、下两层错开布置。每个燃烧室与下内套筒之间均由耐火砖砌筑而成的拱桥相连，燃烧产生的高温烟气通过拱桥下的空间进入石灰石料层。

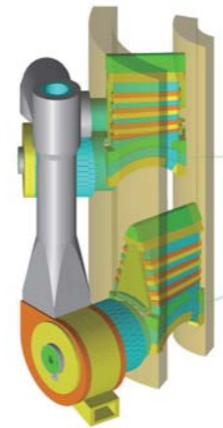
首钢国际工程公司燃烧器技术实现全国国产化，通过应用仿真计算等数字化设计手段确保燃烧器适应性广泛，可根据单窑设计要求调整燃烧器性能。

Many kinds of fuels such as natural gas, coke oven gas, converter gas, mixed blast furnace gas and coke oven gas and the like can be used for the annular shaft kiln. Combustion is conducted through burners in the combustion chambers. The combustion chambers arranged outside the kiln shell in the middle of the kiln are divided into two layers - top layer and bottom layer. The numbers of each layer of the combustion chambers are dependent upon the production capacity of the annular shaft kiln. The combustion chambers on the same layer are uniformly arranged and those on the top and bottom layers are staggered. All the combustion chambers and lower inner cylinder are connected by an arch bridge laid with refractory bricks and the high-temperature fume generated during combustion enters the limestone bed via the space under the arch bridge.

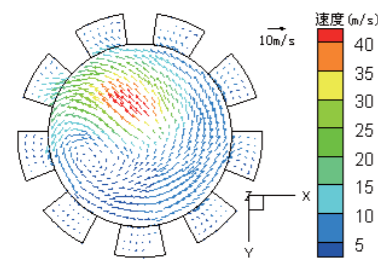
BSIET's burner technology is fully Sinicized and a wide adaptability of the burners is secured by means of digitized design such as application simulation calculation and so on. The performance of the burners can be adjusted according to the design requirement of a single kiln.



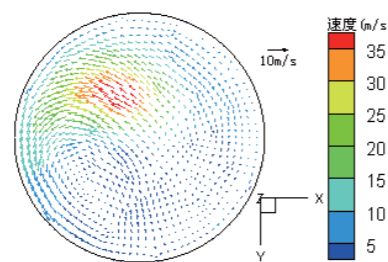
燃烧器计算模型图
Calculating model diagram of burners



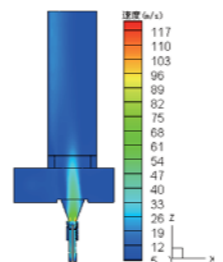
喷射器与火桥结构三维设计图
Three dimensional design diagram of ejector and fire bridge structure



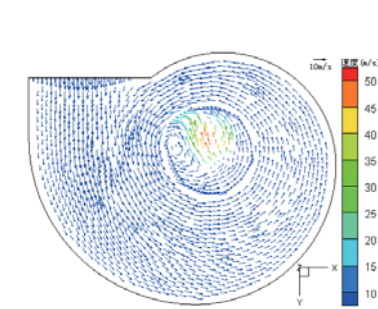
z=2.19 截面速度矢量图
Speed vector diagram of z=2.19 cross section



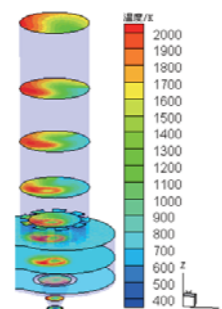
z=2.68 截面速度矢量图
Speed vector diagram of z=2.68 cross section



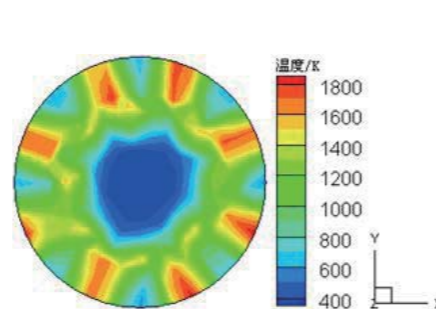
Y=0 截面速度分布图
Speed distribution diagram of Y=0 cross section



驱动空气入口中心纵切面速度矢量图
Speed vector diagram of longitudinal tangent plane in center of driving air inlet



各截面温度云图
Temperature cloud chart of each cross section



z=0.844 截面温度云图
Temperature cloud chart of z=0.844 cross section

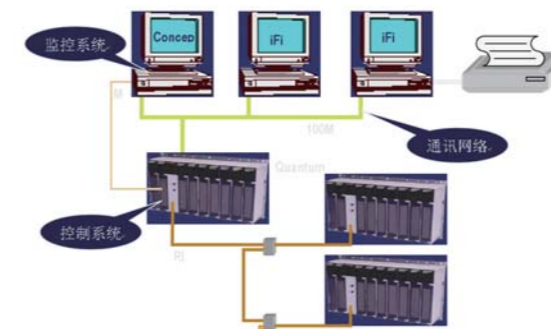
自动化控制系统 Automation control system

自动化控制系统由 PLC 系统、工程师站、操作站三部分组成。网络采用工业以太网和设备网，通过网络进行数据通讯；通过人机操作界面 (HMI) 完成工艺流程动态画面显示、传动系统运行状态显示、工艺参数设定、操作方式的选择、生产报表统计与打印，以及故障显示等功能。其主要特点是：

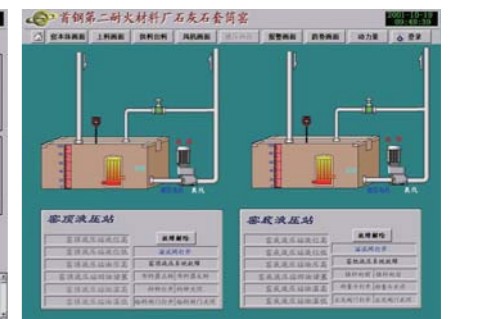
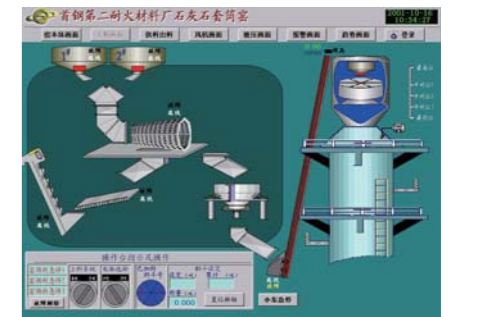
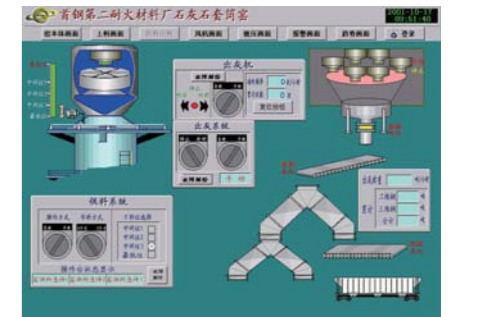
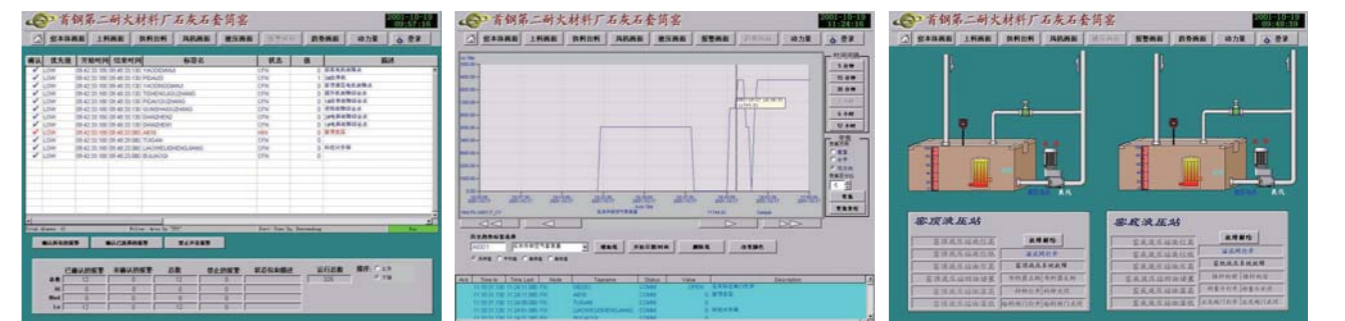
- ◎ 操作方式具有现场、手动和自动三种方式；
- ◎ 上料、布料和出灰系统可全自动运行，参数设定简单而方便；
- ◎ 采用“以产量为目标，确定出灰速度，调整窑内温度，控制上料批次”的控制思想；
- ◎ 采用“小闭环、大联锁”的控制方针，确保窑况稳定、安全运行；
- ◎ 操作和报警信息自动记录存储；
- ◎ 先进而实用的数据报表系统。

The automation control system is divided into three parts - PLC system, engineer's workstation and operator station. Industrial Ethernet and equipment net are adopted for the network by which a data communication is carried out and Human-machine interface (HMI) is used for fulfilment of such functions as display of dynamic image of process flow, display of operating status of driving system, set-up of process parameters, selection of operation modes, statistics and printing-out of production reports and display of failures, etc. The main characteristics are as follows:

- ◎ Operation modes include LOCAL, MANUAL and AUTO;
- ◎ Charging system, distribution system and discharging system can be all-automatically controlled and the parameters are set up easily and simply;
- ◎ Such control thought as "take production capacity as target, determine lime discharging speed, adjust temperature in kiln and control charge batches" is adopted;
- ◎ Such control policy as "single closed circuit and whole interlock" is adopted to ensure a stable and safe operation of the kiln;
- ◎ Information of operation and alarm is automatically recorded and saved;
- ◎ The data report system is advanced and practical.



自动化系统构成图及控制画面
Constructional diagram and control image of automation system



技术开发与创新

Technical development and innovation

- ◎ 采用短流工艺，确保石灰质量和用户要求；
 - ◎ 适应低热值转炉煤气的热工系统；
 - ◎ 燃烧器、换热器、内套筒、出灰机等关键设备设计创新；
 - ◎ 完善内衬砌筑工艺和烘窑技术；
 - ◎ 优化全过程自动化控制系统；
 - ◎ 脱硫剂制粉等石灰深加工工艺；
 - ◎ 石灰粉远距离气力输送技术等。
- ◎ A short process is adopted to ensure the lime quality and meet the customers' requirements;
 - ◎ The thermal system is adapted to the low-calorific-value converter gas;
 - ◎ Such critical equipment as burners, heat exchanger, inner cylinder, lime discharger and the like are designed and innovated;
 - ◎ Masonry process of linings and heating-up of the kiln are improved;
 - ◎ An all-process automation control system is optimized;
 - ◎ The intensive lime processing such as pulverized desulphurizing agent and so on is used;
 - ◎ Remote pneumatic transfer of the lime powder is adopted.



拥有多项专利和奖项
More patents and prizes are awarded

其他活性石灰窑技术

Other active lime kiln technologies

在多年深入研究石灰煅烧理论的基础上，首钢国际工程公司积极研究其他活性石灰生产窑型，掌握各种窑型的特点，辅以科学的研发手段，持续改进、不断创新，具备将其他引进窑型及其关键技术进行国产化转化的能力。

除套筒窑外，首钢国际工程公司在石灰回转窑、节能型竖窑等领域也具有丰富的技术储备，总承包建设了国内产能最大的云南德胜钢铁公司 1000t/d 石灰回转窑工程。

BSIET, based on a thorough study of the lime calcine theory for many years, actively studies the types of other active lime kilns and has the capability to convert the other types of imported kilns and critical technologies into the localized by means of being skilled in the characteristics of all kinds of kilns, scientific research and development, consecutive improvement and continuous innovation.

Besides the annular shaft kilns, BSIET also has its rich technical reserve in the fields of rotary lime kilns and energy-saving shaft kilns. For instance, the largest domestic rotary lime kiln with the production capacity of 1000t/d has been general contracted by BSIET in Desheng Iron and Steel Company, Yunnan province.

工程业绩

Performance reference

序号 No.	工程名称 Designations of projects	单座产能(t/d) Production capacity per kiln (t/d)	座数 Qty	投产时间 Date of operation	备注 Remarks
1	首钢第二耐火材料厂 石灰套筒窑工程 Annular lime shaft kiln project for Shougang #2 Refractory Plant	500	1	2001.11	冶金行业 部级优秀工程设计三等奖 3 rd prize of ministerial excellent engineering design in metallurgical industry
2	江苏淮钢石灰套筒窑工程 Annular lime shaft kiln project for Huaigang, Jiangsu province	300	1	2004.5	
3	首秦500m ³ 石灰套筒窑工程 Shouqin's 500m ³ annular lime shaft kiln project	500	1	2004.8	
4	首钢迁钢500m ³ 石灰套筒窑工程 Shougang Qiangang 500m ³ annular lime shaft kiln project	500	1	2004.9	
5	首钢2#石灰套筒窑工程 Shougang 2# annular lime shaft kiln project	500	1	2005.6	
6	首钢迁钢2#500m ³ 石灰套筒窑工程 Shougang Qiangang 2# 500m ³ annular lime shaft kiln project	500	1	2005.12	
7	首钢京唐石灰套筒窑工程 (一期一步) Shougang Jingtang annular lime shaft kiln project (stage 1, step 1)	500	2	2009.6	
8	首钢迁钢配套完善石灰套筒窑工程 Improved annular lime shaft kiln project necessary for Shougang Qiangang	600	1	2010.1	自主研发，冶金行业 全国优秀工程设计二等奖 Independently developed, 2 nd prize of national excellent project design in metallurgical industry
9	首钢京唐石灰套筒窑工程 (一期二步) Shougang Jingtang annular lime shaft kiln project (stage 1, step 2)	500	2	2010.2	
10	首钢迁钢1#套筒窑扩容改造工程 Volume expansion and modification project of Shougang Qiangang 1# annular lime shaft kiln	550	1	2010.5	改造前为500t/d 500t/d before modification
11	首钢长治钢铁厂石灰套筒窑工程 Annular lime shaft kiln project for Shougang Changzhi Iron and Steel Plant	500	1	2011.4	由首钢二耐搬迁，开创了 套筒窑异地搬迁的先河 Relocation of Shougang #2 Refractory Plant pioneered the relocation of an annular shaft kiln
12	云南德胜钢铁公司石灰回转窑工程 Rotary lime kiln for Desheng Iron and Steel Company, Yunnan province	1000	1	在施 Under construction	