

# 钢铁厂环境除尘工程与技术

## ROOM DEDUSTING FOR IRON & STEEL PLANT

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.



源自百年首钢 服务世界钢铁  
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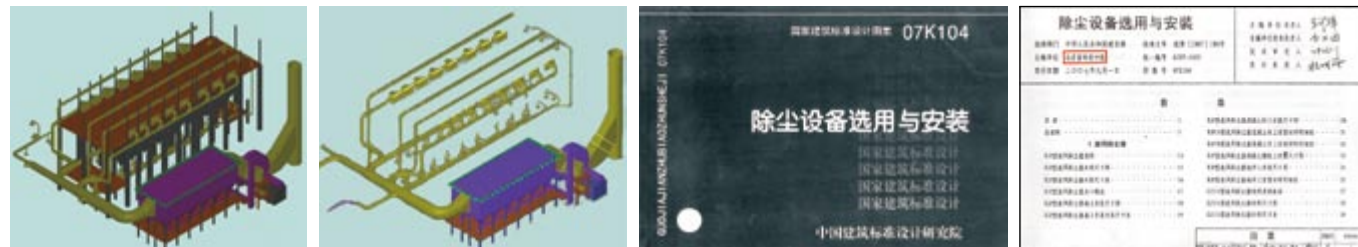
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## 发展历程 HISTORY OF DEVELOPMENT

- ◎ 首钢国际工程公司地处北京，依托于首钢，在首都环保政策的严格要求和首钢总公司的大力支持下，其环境除尘技术先进、实力雄厚，岗位和排放含尘指标一直优于国家标准；
  - ◎ 上世纪80-90年代，首钢国际工程公司首先实现了国内第一台清洁烧结机、第一套高炉出铁场除尘系统、国内最大转炉二次除尘系统及国内第一套皮带密封集尘干管的焦炉推焦除尘系统，并首批通过国家烟尘治理甲级资质；
  - ◎ 本世纪以来，首钢国际工程公司在发展除尘技术的同时，重视在全流程钢铁厂项目中的除尘规划和设计。先后完成了淮钢、湘钢、新余钢铁、首秦、迁钢、京唐、宣钢等国内钢铁厂，和津巴布韦、越南、巴西等国外钢铁厂的整体除尘规划和设计；
  - ◎ 2008年7月，首钢国际工程公司主编的《除尘设备选用与安装》国家标准图集（图集号07K104）正式颁布实施；
  - ◎ 至今，首钢国际工程公司完成了近百项总承包工程，各工程中的环境除尘项目均达到国家排放标准，取得了一系列专有技术。同时通过三维软件的应用，完成了精准、精细、精致的设计成果；
  - ◎ 首钢国际工程公司可对钢铁厂内原料、烧结、球团、焦化、炼铁、炼钢、轧钢等各工艺的所有环境除尘项目实施工程设计或工程总承包。
- ◎ Located in Beijing, Shougang-based BSIET, under the strict requirement by the capital's policy of environmental protection and under the energetic support from Shougang Corporation, has an advanced and strong room dedusting technology, and its work-post dust exhaust indexes have been always superior to the national standard.
  - ◎ BSIET, from 1980s to 1990s last century, firstly realized the first clean sintering machine, the first dedusting system for casthouse of blast furnace, the secondary dedusting system for the biggest converter and the first set of dedusting system for coke pushing of coke oven by belt-sealed dust collecting main in China, and firstly passed the national qualification class-A for fume treatment.
  - ◎ BSIET, since the present century, has been attaching importance to the dedusting planning and design in the all-flow iron and steel plant while the dedusting technology is developed. The following integrated planning and design for the iron and steel plants in China such as Huaigang, Xianggang, Xinyu, Shouqin, Qiangang, Jingtang, Xuangang, and those iron and steel plants at abroad in Zimbabwe, Vietnam, Brazil and so on have been successively undertaken.
  - ◎ In July 2008, the national standard drawing collections "Selection and Installation of Dedusting Equipment" (No. 07K104) sponsored and edited by BSIET was formally issued and implemented.
  - ◎ BSIET, up to now, has generally contracted hundreds of projects. The room dedusting items in all the projects reach the national discharging standards and a series of proprietary technologies have been obtained. The application of 3-D software has been passed, and an accurate, meticulous and exquisite design result has been completed.
  - ◎ BSIET is able to execute the engineering design or general contract of all the room dedusting items for all the processes of raw materials, sintering, pelletizing, coking, iron-making, steel-making, steel-rolling and so on in iron and steel plants.



除尘系统三维设计 3-D design of dedusting system

首钢国际工程公司主编的《除尘设备选用与安装》国家标准图集  
National standard drawing collections "Selection and Installation of Dedusting Equipment" sponsored and edited by BSIET

## 原料翻车机除尘系统 DEDUSTING SYSTEM FOR RAW MATERIAL CAR TIPPER

自主开发的翻车机除尘技术通过对翻车机室采用专有密封技术并合理确定吸尘口的最佳位置，可使粉尘排放浓度 $\leq 20\text{mg}/\text{Nm}^3$ ，处于世界先进水平。

The independently developed dedusting technology for a car tipper, by means of a proprietary sealing technology used for the car tipper room and the optimum position of the dust suction opening rationally determined, makes the dust exhaust concentration  $\leq 20\text{mg}/\text{Nm}^3$  that is in the advanced world level.

### 技术特点

- ◎ 合理设置吸尘罩，使80%以上的粉尘在产生部位附近得到一次捕集，15%以上的粉尘在翻车机室上部进行二次捕集；
- ◎ 通过对部分部位进行整体封闭，增加粉尘二次捕集率，改善了翻车机区域的环境；
- ◎ 有效地解决了空车带尘的问题；
- ◎ 采用变频调速装置调节风机，节约能源。

### 应用情况

- ◎ 首秦板坯技改配套工程翻车机除尘系统
- ◎ 首钢迁钢配套完善原料系统改造扩建工程喷吹煤料场翻车机除尘系统
- ◎ 迁安中化煤化工公司三期工程备煤车间原料工段翻车机除尘系统

**专有技术：**除尘吸风口非标设计（根据不同位置和风量多层布置）等

### Technical features

- ◎ Dust hoods are rationally arranged to primarily trap the above 80% of dust near the dust generating points and secondarily catch the above 15% of dust in the upper position of the car tipper room.
- ◎ Parts of positions are wholly enclosed to raise the secondary trapping rate and improve the environmental pollution in the car tipper area.
- ◎ Effectively solve the problem of dust generation caused due to an empty carriage.
- ◎ A VVVF device is adopted for the fan regulation to save energy.

### Application

- ◎ Car tipper dedusting system necessary for technical modification of Shouqin's continuous slab caster
- ◎ Car tipper dedusting system necessary for modification and expansion of injection of coal yard for improvement of raw material system for Shougang's Qiangang
- ◎ Car tipper dedusting system necessary for raw material section of coal preparation workshop for 3<sup>rd</sup>-stage project of Qian'an Sinochem Coal Chemical Industry Co., Ltd.

### Proprietary technology

Non-standard design of air suction openings (They are arranged in more layers according to different positions and different air volumes), and so on.



车位除尘罩 Dust hood in car position



## 典型工程：首秦板坯技改配套工程翻车机除尘系统

服务方式：设计

完成时间：2005年

### 系统特点

- ◎ 采用低压脉冲布袋除尘器；
- ◎ 风机采用变频调速装置，属于国内先进技术，可根据工艺生产情况改变除尘风机运行工况，节约能源；
- ◎ 在除尘支管上设置风量调节装置，满足设计要求的风量分配，以实现粉尘的最佳捕集效果；
- ◎ 在关键部位设置除尘点，有效地解决空车皮二次扬尘问题；
- ◎ 在捕集过程中应用公司专有技术，更有效地捕集粉尘。

运行情况：除尘器运行稳定，治理效果显著，排放及岗位浓度均达到相关规程要求。

## Typical project: Car tipper dedusting system necessary for technical modification of Shouqin's continuous slab caster

Service mode: Engineering

Time of start-up: 2005

### System features

- ◎ Low pressure pulse bag filter is used.
- ◎ A VVVF device is used for the fan that is the advanced technology in China and the fan working status can be adjusted according to the process production condition to save the energy.
- ◎ Air volume regulating measures are taken for the dedusting manifolds to satisfy the air distribution required in the design and realize an optimum dust trapping effect.
- ◎ Dedusting points are arranged in those important positions to effectively solve the problem of secondary dust generation caused by empty carriage.
- ◎ BSIET's proprietary technology is adopted for dust trapping for more effective trapping of dust.

Operating status: The dust catcher operates stably, the treatment effect is obvious, the dust exhaust and work-post dust concentration satisfy the requirements specified in the related regulations.



首秦板坯技改配套工程翻车机除尘系统  
Car tipper dedusting system necessary for technical modification of Shouqin's continuous slab caster

## 烧结机机尾除尘系统 DEDUSTING SYSTEM FOR TAIL OF SINTERING MACHINE

根据烧结工艺系统和总图布置的要求，合理设置环境除尘系统，有效解决烧结厂环境污染，应用节能环保技术，使粉尘排放浓度 $\leq 20\text{mg}/\text{Nm}^3$ ，处于世界先进水平。

Based on the requirements for the sintering process system and the general layout, the room dedusting system is rationally arranged to effectively control the environmental pollution in sintering plant. Technologies for energy-saving and environmental protection are applied to make the dust exhaust concentration  $\leq 20\text{mg}/\text{Nm}^3$  that is in the advanced world level.

### 技术特点

- ◎ 根据粉尘特性，设置不同除尘系统，改善除尘效果；
- ◎ 采用静电、布袋、湿法等除尘技术，满足环保要求；
- ◎ 采用双层密封罩技术和风量平衡器，节省除尘风量，节约能源；
- ◎ 对烧结成品除尘管道采用防磨损措施，延长管道使用寿命；
- ◎ 采用多种输灰方式，满足除尘灰输送和回收利用的需要，避免粉尘二次污染；
- ◎ 除尘设施采用先进的自动化系统，实现计算机网络集中控制。

### 应用情况

- ◎ 首秦 $2 \times 180\text{m}^2$ 烧结机机尾除尘系统
- ◎ 首钢迁钢配套完善 $360\text{m}^2$ 烧结机机尾除尘系统
- ◎ 首钢京唐 $550\text{m}^2$ 烧结机机尾除尘系统
- ◎ 云南昆钢 $300\text{m}^2$ 烧结机机尾除尘系统
- ◎ 四川德胜集团 $240\text{m}^2$ 烧结机机尾除尘系统
- ◎ 印度布山公司 $177\text{m}^2$ 烧结机机尾除尘系统

专有技术：除尘灰采用国际先进的低速密相输送技术，节约压缩空气使用量，减轻管道磨损。

### Technical features

- ◎ Different dedusting systems are provided according to dust features to improve the dedusting effect.
- ◎ Such dedusting technologies as electrostatic precipitators, bag house filters, wet dedusting and the like are adopted to meet the requirements for environmental protection.
- ◎ A double-layer sealing hood technology and an air volume balancer are adopted to save the dedusting air volume and energy.
- ◎ Wear-proof measures are taken for dedusting pipe of finished sinter to prolong the service life of the pipe.
- ◎ Many dust conveying methods are used to convey and recycle the dust, preventing the dust from secondary pollution.
- ◎ An advanced automation system is adopted for the dedusting facilities to realize a centralized control of computer network.

### Application

- ◎ Dedusting system for tail of  $2 \times 180\text{m}^2$  sintering machine of Shouqin
- ◎ Dedusting system necessary for tail of improved  $360\text{m}^2$  sintering machine of Shougang Qiangang
- ◎ Dedusting system for tail of  $550\text{m}^2$  sintering machine of Shougang Jingtang
- ◎ Dedusting system for tail of  $300\text{m}^2$  sintering machine of Yunnan's Kungang
- ◎ Dedusting system for tail of  $240\text{m}^2$  sintering machine of Sichuan's Desheng Group
- ◎ Dedusting system for tail of  $177\text{m}^2$  sintering machine of Bhushan, Indian

Proprietary technology: The world advanced low-speed sense-phase conveying technology is adopted for conveying of dust to save the compressed air and reduce the pipe wearing.



首钢京唐 $550\text{m}^2$ 烧结机工程除尘灰密相输送  
Dense-phase conveying of dust in Shougang Jingtang  $550\text{m}^2$  sintering machine



## 典型工程：首钢京唐550m<sup>2</sup>烧结机机尾除尘系统

服务方式：设计

完成时间：2008年

### 系统特点

- ◎ 全部采用低压脉冲布袋除尘设备，满足高标准的环保要求；
- ◎ 燃料破碎系统单独设置布袋除尘设备，焦炭除尘灰全部回收使用；
- ◎ 机尾除尘采用耐高温布袋，延长布袋使用寿命；
- ◎ 成品筛分布袋除尘入口设置粗颗粒分离器，减少粗颗粒粉尘对布袋的磨损，提高除尘效率；
- ◎ 应用低速密相气力输灰技术，避免粉尘二次污染。

**运行情况：**从投产至今，运行情况良好，岗位粉尘浓度 $\leq 5\text{mg}/\text{Nm}^3$ ，粉尘排放浓度 $\leq 20\text{mg}/\text{Nm}^3$ ，达到世界先进水平环保水平。

**获奖情况：**首钢京唐550m<sup>2</sup>烧结机工程设计获冶金行业全国优秀工程设计一等奖



首钢京唐550m<sup>2</sup>烧结机机尾除尘系统  
Dedusting system for tail of 550m<sup>2</sup> sintering machine of Shougang Jingtang

## Typical project: Dedusting system for tail of 550m<sup>2</sup> sintering machine of Shougang Jingtang

Service mode: Engineering

Time of start-up: 2008

### System features

- ◎ Low-pressure pulse bag filters are adopted to satisfy the rigorous requirements for environmental protection.
- ◎ An independent bag filter is furnished for fuel crushing system to recycle all the coke dust.
- ◎ High-temperature-resistant bags are used for tail dedusting to prolong the service life of the bags.
- ◎ A coarse particle separator is installed at inlet of bag filter for product screening process to reduce the bag wearing caused by coarse particle dust and raise the dedusting efficiency.
- ◎ A low-speed sense-phase pneumatic conveying technology is adopted for conveying of dust to prevent the dust from secondary pollution.



清洁的烧结工厂 Clean sintering plant

**Operating status:** Since operation, the dedusting system has been always working in good condition. The work-post dust concentration  $\leq 5\text{mg}/\text{Nm}^3$  and the dust exhaust concentration  $\leq 20\text{mg}/\text{Nm}^3$  satisfy the advanced level of the environmental protection in the world.

**Prizes winning:** The engineering design of Shougang Jingtang 550m<sup>2</sup> sintering machine wins the first prize of national excellent project design in metallurgical industry.

## 焦炉装煤推焦除尘系统

## DEDUSTING SYSTEM FOR CHARGING AND PUSHING OF STAMP CHARGING COKE OVEN

自20世纪90年代起，首钢国际工程公司吸收国外先进技术，创新设计了焦炉的装煤推焦侧除尘系统。该除尘形式为国内首次采用，荣获北京市科学技术进步二等奖。

Since the 1990's, BSIET has innovated and designed the dedusting systems for coal charging and coke pushing on coke side of the coke ovens based on the foreign advanced technologies. This type of dedusting is firstly adopted domestically in China and wins the 2<sup>nd</sup> prize of Beijing science and technology progress.

### 技术特点

- ◎ 粉尘排放浓度 $\leq 50\text{mg}/\text{Nm}^3$ ，大大优于国家标准，处于世界先进水平；
- ◎ 采用先进的炉顶翻板阀或炉顶机侧捕集罩的方式捕集装煤过程中产生的烟尘，取得良好的除尘效果；
- ◎ 采用除尘小车+皮带密封集尘装置的方式捕集、输送拦焦过程中产生的烟尘，有效解决了焦炉烟气捕集、输送的难题。

### 应用情况

- ◎ 首钢迁钢6m顶装焦炉装煤推焦除尘系统
- ◎ 淮钢4.3m捣固焦炉装煤推焦除尘系统（捣固焦炉增加机侧除尘，二合一除尘系统）
- ◎ 印度布山公司4.3m捣固焦炉装煤推焦除尘系统
- ◎ 印度金斗公司4.3m捣固焦炉装煤推焦除尘系统
- ◎ 新钢6m顶装焦炉装煤推焦除尘系统
- ◎ 山西常平公司4.3m顶装焦炉装煤推焦除尘系统  
共约15套焦炉装煤推焦除尘系统



焦炉矩形推焦除尘干管三维设计  
3-D design for main dedusting pipe of coke oven rectangular coke guide

**专有技术：**捣固焦炉机侧除尘技术、推焦除尘皮带密封集尘装置等

### Technical features

- ◎ The dust exhaust concentration is  $\leq 50\text{mg}/\text{Nm}^3$  that is far superior to that specified in the national standards and is in the advanced world level.
- ◎ Advanced oven top flap valves or pusher-side trapping hood are used for trapping fumes produced in the course of coal charging and the dedusting effect is good.
- ◎ A dedusting carriage+a sealed belt collecting device is used for trapping and transferring fumes generated during coke guide to effectively overcome the difficulties of trapping and transferring of fumes.

### Application

- ◎ Dedusting systems for charging and pushing of 6m top charging coke ovens of Shougang's Qiangang, Hebei
- ◎ Dedusting systems for charging and pushing of 4.3m stamp charging coke ovens of Huaigang, Jiangsu (Adding a coke-side dedusting system, 2-in-1 dedusting system)
- ◎ Dedusting systems for charging and pushing of 4.3m stamp charging coke ovens of Bhushan, Indian
- ◎ Dedusting systems for charging and pushing of 4.3m stamp charging coke ovens of Jindal, Indian
- ◎ Dedusting systems for charging and pushing of 6m top charging coke ovens of Xinyu Iron and Steel, Jiangxi
- ◎ Dedusting systems for charging and pushing of 4.3m top charging coke ovens of Changping Industry Co., Ltd., Shanxi  
Approx. 15 sets of dedusting system for charging and pushing of coke oven

**Proprietary technology:** Pusher-side dedusting technology for stamp-charging coke ovens; Coke-side dedusting belt sealing and dust collecting devices, and so on.



## 典型工程：迁钢6m顶装焦炉装煤推焦除尘系统

服务方式：设计 完成时间：2004年

### 系统特点

- ◎ 装煤除尘与推焦除尘布置在同一个地面除尘站，两个系统独立设置，共用输灰系统，节省设备投资；
- ◎ 焦炉装煤时采用炉顶翻板阀的形式捕集烟气，捕集效果良好；
- ◎ 推焦除尘采用除尘小车+皮带密封集尘装置的方式捕集、输送烟气，捕集、密封效果很好；
- ◎ 装煤除尘风机采用变频调速装置，根据焦炉装煤操作制度调节风机，节约能源；
- ◎ 推焦除尘风机采用液力耦合器调速装置，根据焦炉装煤操作制度调节风机，节约能源。

运行情况：从投产至今，除尘效果良好，岗位和烟囱排放均优于国家标准，烟囱排放达到30mg/Nm<sup>3</sup>。

## Typical project: Dedusting systems for charging and pushing of 6m top charging coke ovens of Qiangang

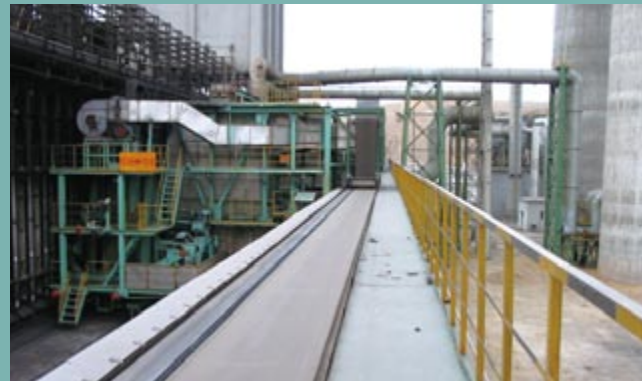
Service mode: Engineering

Time of start-up: 2004

### System features

- ◎ To save the investment for equipment, the dedusting system for charging and pushing of the coke ovens are arranged in a same ground dedusting station. The two dedusting systems are of independent separately and a dust conveying system is commonly adopted.
- ◎ When coke ovens are charged with coal, oven top flap valves are used for trapping fumes and the trapping effect is good.
- ◎ A dedusting carriage+a sealed belt collecting device is used for dust removal on coke side, trapping and transferring fumes. The trapping and sealing effects are good.
- ◎ The dedusting fans for coal charging are of VVVF and are regulated according to the coal charging operation system of the coke ovens to save energy.
- ◎ The dedusting fans on coke side are of variable-speed by hydraulic couplers and are regulated according to the coal charging operation system of the coke ovens to save energy.

Operating status: Since operation of the dedusting systems, the dedusting effect has been always excellent and the concentration of the exhausted fumes from workposts and chimney is superior to that specified in the national standard, especially the exhaust concentration out of the chimney reaches 30mg/Nm<sup>3</sup>.



迁钢6m顶装焦炉装煤推焦除尘系统  
Dedusting systems for charging and pushing of 6m top charging coke ovens of Qiangang



迁钢6m顶装焦炉拦焦机及集尘干管  
Coke guide and main dedusting pipe for 6m top charging coke ovens of Qiangang



迁钢6m顶装焦炉除尘地面站  
Dedusting ground station for 6m top charging coke ovens of Qiangang

## 高炉出铁场除尘系统 DEDUSTING SYSTEM FOR BF CASTHOUSE

在高炉出铁场除尘方面，首钢国际工程公司具有深厚的技术积淀，从上世纪70年代开始致力于高炉环境工程的研究与攻关，率先自行设计并实现了高炉出铁场除尘，大大改善了高炉出铁场的劳动条件，荣获冶金部科技成果二等奖。



首钢京唐1#高炉摆槽到铁罐处的除尘效果  
Dedusting effect from swinging chute to HM ladle of 1# BF, Shougang Jingtang



首钢京唐1#高炉出铁口的除尘效果  
Dedusting effect at taphole of 1# BF, Shougang Jingtang

BSIET has obtained rich technical deposit in dedusting of BF casthouse. Since 1970s last Century, BSIET has applied himself to studying, developing and tackling key problems of the BF environmental engineering. BSIET firstly and independently designed and realized the dedusting in BF casthouses to greatly improve the working conditions in the BF casthouses. It won the 2<sup>nd</sup> Prize of Metallurgical Science and Technology Result.

### 技术特点

- ◎ 烟尘捕集率高，全封闭部位（铁沟、渣沟等）达100%，半封闭部位（出铁口、铁水罐等）达95%以上；
- ◎ 先进的一、二次烟尘捕集技术，兼顾一次和二次烟尘的综合捕集；
- ◎ 岗位粉尘浓度≤5mg/Nm<sup>3</sup>，粉尘排放浓度≤20mg/Nm<sup>3</sup>，处于世界先进水平；
- ◎ 完善的自动化调节系统，高效节能。

### 应用情况

- ◎ 太钢1800m<sup>3</sup>高炉出铁场除尘系统
- ◎ 首秦1200m<sup>3</sup>和1780m<sup>3</sup>高炉出铁场除尘系统
- ◎ 首钢京唐5500m<sup>3</sup>高炉出铁场除尘系统
- ◎ 首钢迁钢4000m<sup>3</sup>高炉出铁场除尘系统
- ◎ 印度BIL钢铁公司1780m<sup>3</sup>高炉出铁场除尘系统  
共约20套高炉出铁场除尘系统

### Technical features

- ◎ The fume trapping rate is high. All-closed positions (hot metal runner, slag runner and the like) reach 100% and semi-closed positions (tapholes, hot metal ladles and the like) get to above 95%.
- ◎ The advanced technologies for the primary and secondary fume trapping give consideration to the comprehensive trapping of the primary and secondary fumes.
- ◎ The workpost dust concentration ≤5mg/Nm<sup>3</sup> and the dust exhaust concentration ≤20mg/Nm<sup>3</sup> satisfy the advanced world level.
- ◎ The improved automation regulation system is high efficient and saves energy.

### Application

- ◎ Dedusting system for casthouse of 1800m<sup>3</sup> BF, TISCO
- ◎ Dedusting system for casthouse of 1200m<sup>3</sup> and 1780m<sup>3</sup> BF, Shouqin
- ◎ Dedusting system for casthouse of 5500m<sup>3</sup> BF, Shougang's Jingtang
- ◎ Dedusting system for casthouse of 4000m<sup>3</sup> BF, Shougang's Qiangang
- ◎ Dedusting system for casthouse of 1780m<sup>3</sup> BF, BIL Iron and Steel Co., in India  
Approx. 20 sets of dedusting systems for BF casthouse



## 典型工程：首钢京唐1号5500m<sup>3</sup>高炉出铁场除尘系统

服务方式：设计 完成时间：2008年

### 系统特点

- ◎ 采用先进的一、二次烟尘捕集技术，并将出铁场除尘划分为三个除尘系统；
- ◎ 炉顶卸料与炉前一次除尘系统分开，更有效地保证了炉顶下料处的除尘效果；
- ◎ 出铁口捕集罩采用铁口侧吸罩、主沟盖和上部诱导顶吸罩组合的形式，将捕集率提高到95%以上；
- ◎ 强化出铁场区域的通风换气，改善岗位环境；
- ◎ 出铁场除尘划分为大、小两个子系统，并采用不同的运行方式，既确保了各个环节、各个时段的收尘效果，又最大限度地降低了电耗。

**运行情况：**从投产至今，运行情况良好，岗位粉尘浓度 $\leq 5\text{mg}/\text{Nm}^3$ ，粉尘排放浓度 $\leq 20\text{mg}/\text{Nm}^3$ ，达到世界先进环保水平。

**获奖情况：**首钢京唐1号5500m<sup>3</sup>高炉工程设计获冶金行业全国优秀工程设计一等奖

## Typical project: Dedusting system for the casthouse of Shougang Jingtang's No.1 5500m<sup>3</sup> BF

Service mode: Engineering Time of start-up: 2008

### System features

- ◎ The advanced primary and secondary fume trapping technology is adopted and the casthouse dedusting system is divided into 3 parts.
- ◎ The BF top discharging is separated from the primary dedusting system of the casthouse to more effectively ensure the dedusting effect at the discharging point on the BF top.
- ◎ A combined trapping device with a taphole one-side suction hood, a runner cover hood and an upper induced top suction hood is used as the taphole trapping hood unit to increase the trapping rate to above 95%.
- ◎ The ventilation and air exchange are strengthened to improve the working condition at workposts.
- ◎ The casthouse dusting system is divided into a large system and a small one. The two sub-systems have different operating modes in order to not only ensure the dust collecting effect in all links and all stages, but also reduce the power consumption to the utmost extent.

**Operating status:** Since operation, the dedusting system has been always working in good condition. The work-post dust concentration  $\leq 5\text{mg}/\text{Nm}^3$  and the dust exhaust concentration  $\leq 20\text{mg}/\text{Nm}^3$  satisfy the advanced level of the environmental protection in the world.

**Prizes winning:** The engineering design of the Shougang Jingtang 1# 5500m<sup>3</sup> BF wins the first prize of national excellent project design in metallurgical industry.

## 炼钢二次除尘系统

## SECONDARY DEDUSTING SYSTEM OF STEEL MAKING

首钢国际工程公司根据转炉炼钢各个工序产生烟尘的特点，结合生产流程，研究开发了合理的除尘系统，能够有效收集、净化转炉炼钢过程中产生的烟尘，大大改善转炉车间的劳动环境。

BSIET, based on features of fume dust produced from various procedures of converter steel making and combined with production process, has researched and developed the rational dedusting system, which can effectively collect and clean fume dust produced in process of converter steel making and greatly improve the operation environment of converter workshop.

### 技术特点

- ◎ 转炉炉前门形罩、炉后密封罩确保烟气捕集率达95%以上；
- ◎ 根据不同的生产设施设置不同的密封罩；
- ◎ 根据不同的生产流程合理规划除尘系统，兼顾备用；
- ◎ 岗位粉尘浓度 $\leq 8\text{mg}/\text{Nm}^3$ ，粉尘排放浓度 $\leq 20\text{mg}/\text{Nm}^3$ ，处于世界先进水平。

### 应用情况

- ◎ 首钢第二炼钢厂除尘系统
  - ◎ 首钢迁钢第一炼钢厂除尘系统
  - ◎ 首钢迁钢第二炼钢厂除尘系统
  - ◎ 南钢炼钢厂除尘系统
- 共约15套炼钢二次除尘系统



迁钢三炼钢注入铁水时的除尘效果  
Dedusting effect during hot metal pouring, Qiangang No.3 Steel Making Plant

### Technical features

- ◎ Front portal hood of converter and sealing hood after converter ensure the fume trapping rate reaching above 95%.
- ◎ Different sealing hoods are provided according to various production facilities.
- ◎ Dedusting system is effectively planned according to different production flows, and spare is taken into account.
- ◎ The workpost dust concentration  $\leq 8\text{mg}/\text{Nm}^3$  and the dust exhaust concentration  $\leq 20\text{mg}/\text{Nm}^3$  satisfy the advanced world level.

### Application

- ◎ Dedusting system of Shougang No.2 Steel Making Plant
  - ◎ Dedusting system of Shougang Qiangang No.1 Steel Making Plant
  - ◎ Dedusting system of Shougang Qiangang No.2 Steel Making Plant
  - ◎ Dedusting system of Nangang Steel Making Plant
- Approx. 15 sets of secondary dedusting system for steel making



## 典型工程：首钢迁钢第二炼钢厂除尘系统

服务方式：设计

完成时间：2008年

### 系统特点

- ◎ 根据炼钢车间各生产设施布置情况合理划分除尘系统；
- ◎ 除尘设施集中布置，通过旁通管路实现备用；
- ◎ 转炉炉前门形罩捕集效果良好，基本实现捕集率100%；
- ◎ 铁水倒罐站、脱硫扒渣以及精炼设施等通过密闭或半密闭罩捕集烟尘，捕集率达到95%。

运行情况：除尘系统运行稳定，治理效果显著，排放及岗位浓度均优于国家标准。

## Typical project: Dedusting system of Shougang Qiangang No.2 Steel Making Plant

Service mode: Engineering

Time of start-up: 2008

### System features

- ◎ Dedusting system is effectively planned according to arrangement of various production facilities in steel making workshop.
- ◎ Dedusting facilities are centrally arranged, and spare is realized through bypass pipeline.
- ◎ Better trapping effect by use of front portal hood of converter; basically achieved of 100% trapping rate.
- ◎ Hot metal reladling station, desulphurization and slag skimming and refining facilities etc. trap fume dust through closed or semi-closed hood, with trapping rate up to 95%.

Operating status: The dedusting system operates stably, the treatment effect is obvious, the dust exhaust and workpost dust concentration are better than that specified in national standard.

## 热轧精轧机除尘系统

### DEDUSTING SYSTEM OF HOT FINISHING MILL

首钢国际工程公司自主研发的热轧精轧机除尘技术，能够很好地解决精轧机烟尘及水蒸气污染的问题，降低设备损耗、改善环境条件。

The dedusting technology of hot finishing mill developed by BSIET can solve the problem of pollution of fume dust and water vapour produced by mill, reduce equipment loss and improve environmental condition.

### 技术特点

- ◎ 烟尘捕集率高。除尘罩采用整体密封、局部设检修门的方式，在方便检修、操作的前提下，最大限度地捕集烟尘，捕集率达95%以上；
- ◎ 有效排除系统凝水。由于在捕集烟尘过程中同时捕集了很多水蒸气，为确保除尘系统稳定运行且避免造成除尘灰内含冷凝水过多产生二次污染，采取一系列技术措施，使冷凝水与烟气分离，实现了在灰仓中卸除干灰的目标；
- ◎ 岗位粉尘浓度 $\leq 5\text{mg}/\text{Nm}^3$ ，粉尘排放浓度 $\leq 20\text{mg}/\text{Nm}^3$ ，处于世界先进水平；
- ◎ 完善的自动化调节系统，高效节能。

### 应用情况

- ◎ 首钢迁钢2160mm热轧精轧机除尘系统
- ◎ 首钢迁钢1580mm热轧精轧机除尘系统
- ◎ 首钢京唐2250mm热轧精轧机除尘系统
- ◎ 首钢京唐1580mm热轧精轧机除尘系统

### Technical features

- ◎ Fume dust trapping rate is high. The integral seal is adopted for dedusting hood with maintenance door partially provided, and fume dust can be trapped to the maximum with trapping rate above 95%.
- ◎ The system condensate water can be effectively removed. As a lot of water vapour is trapped in process of fume dust trapping, a series of technical measures is taken to separate condensate water from fume to achieve the goal that dry dust is discharged from dust bin, thus to ensure the stable operation of dedusting system and avoid the secondary pollution due to much condensate water in dust collected.
- ◎ The workpost dust concentration  $\leq 5\text{mg}/\text{Nm}^3$  and the dust exhaust concentration  $\leq 20\text{mg}/\text{Nm}^3$  satisfy the advanced world level.
- ◎ The improved automation regulation system is high efficient and saves energy.

### Application

- ◎ Dedusting system of Shougang Qiangang 2160mm hot finishing mill
- ◎ Dedusting system of Shougang Qiangang 1580mm hot finishing mill
- ◎ Dedusting system of Shougang Jingtang 2250mm hot finishing mill
- ◎ Dedusting system of Shougang Jingtang 1580mm hot finishing mill



除尘器出灰 Dust discharged from deduster



塑烧板安装过程 Installation of sinter-plate

首钢迁钢第二炼钢厂除尘系统  
Dedusting system of Shougang Qiangang No.2 Steel Making Plant



## 典型工程：首钢京唐2250mm热轧精轧机除尘系统

服务方式：设计

完成时间：2008年

### 系统特点

- ◎ 由烟尘收集罩、系统管道、脱水器、塑烧板除尘器、风机、烟囱、电控系统等组成；
- ◎ 精轧机工作时产生的烟尘，经烟尘收集罩收集后，通过系统管道首先进入脱水器排除冷凝水，经塑烧板除尘器净化过的尾气通过风机和烟囱排入大气；
- ◎ 除尘器收集下来的粉尘经小车运走，循环使用。



首钢京唐2250mm热轧精轧机除尘系统  
Dedusting system of Shougang Jingtang 2250mm hot finishing mill

运行情况：脱水器使用效果显著，除尘系统运行稳定，捕集及排放指标均优于相关标准。

## Typical project: Dedusting system of Shougang Jingtang 2250mm hot finishing mill

Service mode: Engineering

Time of start-up: 2008

### System features

- ◎ The said dedusting system consists of fume dust collection hood, system pipeline, dehydrator, sinter-plate deduster, fan, chimney, electric control system etc.
- ◎ Fume dust produced in operation of finishing mill, after collected by fume collecting hood, enters the dehydrator through system pipeline for removing the condensate water, and tail gas purified through sinter-plate deduster is discharged through fan and chimney into atmosphere.
- ◎ Dust collected by deduster is transported away and recycled.

Operating status: The effectiveness of dehydrator is notable, dedusting system operates stably, trapping and discharging are better than relevant standards.



精轧机除尘系统不运行时烟尘情况  
Fume dust condition in case of stop of finishing mill dedusting system



精轧机除尘系统运行时烟尘情况  
Fume dust condition in case of operation of finishing mill dedusting system

## 湿式电除尘 WET ESP

首钢国际工程公司自主研发的湿式电除尘技术，能够在含有水蒸汽的烟尘净化条件下，确保布袋除尘器长期稳定运行，并使粉尘排放浓度 $\leq 30\text{mg}/\text{Nm}^3$ ，处于世界领先水平。

Wet ESP technology developed by BSIET can ensure a long term stable operation of bag filter and make the dust exhaust concentration  $\leq 30\text{mg}/\text{Nm}^3$ , that is in the advanced world level.

### 技术特点

- ◎ 能够克服烟气中含有水汽的问题；
- ◎ 在极板上喷水形成连续水膜，保证极板收集的粉尘顺利被清除；
- ◎ 能够克服粉尘粘性大的问题，保证设备连续稳定运行。

### Technical features

- ◎ The problem of fume with water vapour in it is overcome.
- ◎ Water spraying on the polar plate forms a continuous water film to ensure the dust collected by the plate is removed smoothly.
- ◎ The problem of serious dust adhesiveness is overcome to ensure a continuous and stable operation of the equipment.



湿式电除尘 Wet ESP

## 典型工程：迁钢板坯精整工程卧式湿式电除尘系统

服务方式：设计 完成时间：2010年

### 系统特点

- ◎ 由烟尘收集罩、系统管道、湿式电除尘器、风机、烟囱、供水系统、排水系统等组成；
- ◎ 火焰清理机对钢坯进行清理时产生的烟尘，经烟尘收集罩收集后，通过系统管道进入湿式电除尘器进行净化，经电除尘器净化过的尾气通过风机和烟囱排入大气；
- ◎ 电除尘器收集的粉尘伴随除尘器的喷淋水和冲洗水，通过铁皮沟进入旋流井，处理后的水可循环使用。

运行情况：自投产以来，运行情况良好，烟尘捕集及排放指标均优于相关标准。

## Typical project: Horizontal wet ESP system for Qiangang slab finishing project

Service mode: Engineering

Time of start-up: 2010

### System features

- ◎ The said ESP system consists of fume collection hood, system pipeline, wet ESP, fan, chimney, water supply system and water drainage system, etc.
- ◎ The fume generated during slab scarfing by a fire scarfing machine enters the wet ESP via the system pipeline for purification after it is collected by the collection hood and the purified tail gas by the ESP is exhausted into the atmosphere through the fan and chimney.
- ◎ Together with the spray water and flush water of the ESP, the dust collected by the ESP goes into a cyclone well via a scale flume for treatment and the treated water is recycled.