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，是国家科技部批准的高新技术企业，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、节能环保单项设计，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 300 余项，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 is a High-Tech Enterprise approved by the Ministry of Science and Technology, having 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, environment protection 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 has been awarded with 30-odd national science & technology prizes and national excellent design prizes, 300-odd 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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# 铁水预处理技术
# HOT METAL PRETREATMENT

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.

首钢国际工程公司拥有多项铁水预处理优势技术，能够结合客户的个性化需求，在高炉铁水沟、铁水运输线、铁水倒罐站、炼钢厂房内等多个不同位置，在铁水包、鱼雷罐、专用炉等多个不同反应容器内，完成铁水脱硫、脱硅、脱锰、脱磷处理，实现“高效、高质、低成本、节能、环保”的铁水供应。

BSIET has plenty of advanced technologies in hot metal pretreatment, which meet the clients' individualized requirements of desulphurization, desilication, demanganization and dephosphorization on different positions of iron runner, hot metal transportation line, hot metal re-ladle station and steel-making house and in different reaction vessels of hot metal ladle, torpedo ladle and special furnace etc, realizing a “high efficiency, high quality, low cost, energy saving , environmentally friendly” hot metal supply.

铁水 KR 脱硫
Hot metal KR desulphurization


鱼雷罐铁水脱硫
Hot metal desulphurization in torpedo ladle

铁水脱磷
Hot metal dephosphorization

铁水沟铁水脱硫
Hot metal desulphurization in iron runner



# 优势工艺技术 Advanced technologies of process

## 单吹颗粒镁脱硫工艺
## Desulphurization by injection of particle Mg only

颗粒镁喷吹脱硫工艺具有设备简单、投资省、渣量少、铁损小、处理时间短、温降低、脱硫剂消耗低、运行成本低等优势。首钢国际工程公司在自主研发关键工艺技术的基础上，形成了不同形式的单吹颗粒镁脱硫工艺。

The desulphutization by injection of particle Mg only has advantages of simple equipment, less investment, less slag, less iron loss, shorter processing time, less temperature drop, less consumption of desulphurizing agent and lower operation cost. BSIET has developed different forms of desulphurization by injection of particle Mg only based on the independently developed key technology.

### 铁水线上在线喷吹捞渣脱硫方式

该工艺能够最大限度地节约主厂房占地面积、加快处理节奏，具有良好的经济和社会效益。

◆ 技术特点

◎ 将横移车与喷枪升降装置相结合，一台喷枪横移车对应两个喷吹脱硫工位，缩短处理周期，减少铁水温降，节省设备投资
◎ 采用捞渣技术，通过捞渣设备的旋转功能，实现一台捞渣机对应两个工位的工艺操作，节省设备投资
◎ 在铁水车上进行脱硫，无需配置大天车吊运铁水包，节省设备投资
◎ 采用防溅罩，减少喷溅对设备的损坏
◎ 保证横移车精确对位后自动锁死（精度达到±50mm），防止横移车在脱硫过程中发生跑偏

### Desulphurization by on-line injection and slag skimming in hot metal line

This technology can save as much as possible the occupied land area of main shop building, speed up processing rhythm, realizing a good economic and social benefit.

◆ Technical features

◎ The traversing car is combined with lance lifting device, and each traversing car has two desulphurization injection positions, thus reducing the treatment cycle, reducing the temperature drop of hot metal and saving equipment investment
◎ Slag skimming process can use one skimmer with two working positions through the revolving function of the skimmer, thus saving equipment investment
◎ Desulphurization is conducted on the hot metal car, so there's no need to configure a crane for ladle, thus saving equipment investment
◎ Splash shield is applied to reduce equipment damage by splashes
◎ Automatic deadlock (precision is ±50mm) is guaranteed after the traversing car is aligned precisely to prevent the traversing car running off from the process of desulphurization

### 喷吹罐横移车式脱硫方式

该工艺适宜现有厂房车间面积小、布置空间紧张等特殊情况，为老厂改造提供一种独特的脱硫方式。

◆ 技术特点

◎ 喷吹罐及喷枪布置在横移车上，减小喷吹管道长度，喷吹状态稳定
◎ 无需铁水运输车及轨道等设施，节省占地面积

### Desulphurization by injection tank traversing car

This technology is applicable to special cases that has small area of existing shop building and limited space for layout, providing an unique desulphurization for the revamping of old plant.

◆ Technical features

◎ Injection tank and lance are arranged on the traversing car, reducing the length of injection pipeline and having a stable injection
◎ No facilities like hot metal transportation car and railway are required and the occupied land area is saved

## 专利技术

◎ 移动式脱硫反应装置（实用新型，专利号ZL200520018474.5）
◎ 自动扒渣机（实用新型，专利号ZL200520018473.0）
◎ 铁水倒罐、脱硫扒渣运输装置（实用新型，专利号ZL200520106369.7）
◎ 铁水罐车在线铁水脱硫预处理系统（发明专利，专利号ZL200910081140.5）
◎ 喷枪升降横移车夹持机构（实用新型，专利号ZL200920106931.4）

## Patents

◎ Movable desulphurization reaction equipment (utility model, patent No.ZL200520018474.5)
◎ Automatic slag skimmer (utility model, Patent No.ZL200520018473.0)
◎ Hot metal ladle-to-ladle, desulphurization, slag skimming and transportation device (utility model, Patent No.ZL200520106369.7)
◎ Online hot metal desulphurization pretreatment system in a hot metal car (invention, patent No.ZL200910081140.5)
◎ Clamping fixture of traversing car with lance lift (utility model, patent No.ZL200920106931.4)

邢钢单吹颗粒镁脱硫设施
Desulphurization by injection of particle Mg only of Xinggang

## 典型工程：邢钢铁水在线双工位喷吹颗粒镁脱硫工程

◎ 规模：设计能力175万t/a，铁水罐65t、铁水装入量65t
◎ 投产时间：2008.11
◎ 服务方式：工程总承包
◎ 项目特点：该项目很好地利用邢钢的现场情况进行布置，把脱硫站建在炼铁厂高炉和炼钢厂之间的铁水运输线上，属国内首创。选用单吹颗粒镁脱硫剂配以捞渣机进行脱硫预处理。项目自投产以来，使用情况良好，各项技术指标达到国内同行业领先水平。

## Typical project: Desulphurization by duplex injection of particle Mg only in hot metal line of Xinggang

◎ Scale: designed capacity 1.75Mt/a, hot metal ladle 65t, hot metal capacity 65t
◎ Start-up time: 2008.11
◎ Service: EPC
◎ Project features: This project is arranged with better consideration of construction site situation, and the desulphurization station is built on the iron transportation line between the BF iron-making plant and steel-making plant, which is original in China. This project used injection of particle Mg only together with the slag skimmer for desulphurization pretreatment. This project runs smoothly since beginning production and all technical indexes reached an advanced level of this field in China.

双工位铁水捞渣设施
Duplex slag skimming equipment for hot metal



# 铁水包复合喷吹脱硫工艺
# Combined injection desulphurization in hot metal ladle

## 技术特点

◎ 减少脱硫剂耗量，减少渣量、降低铁损
◎ 有效维持铁水显热，喷吹温降小于1.2℃/min
◎ 采用密封喷吹大门收集烟尘，脱硫剂采用密封管路输送，工作环境良好
◎ 采用可调喉口阀门控制脱硫剂喷吹速度，实现精确、连续喷吹流量调节
◎ 喷吹罐采用动态压差喷吹控制技术，实现稳定喷吹操作
◎ 采用双喷枪互为备用的工艺布置，实现喷吹工位连续作业，满足连续生产要求
◎ 先进的脱硫剂复合喷吹计算机模型，可实现全自动操作或对实际操作进行指导

## Technical features

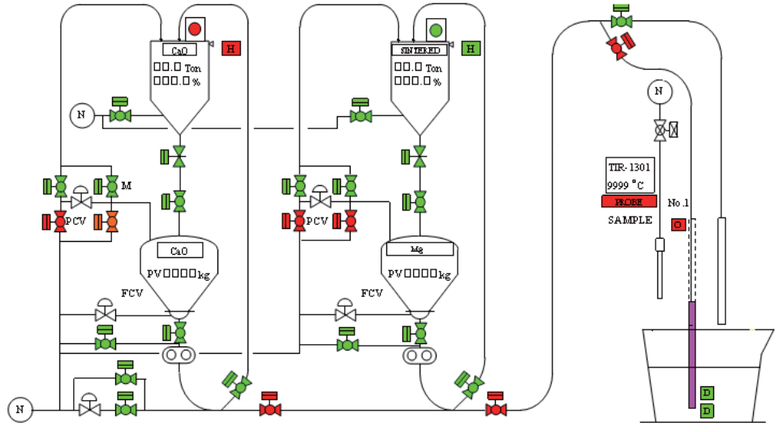
◎ Reduction in desulphurizer, slag and loss of iron
◎ Sustaining sensible heat of hot metal, injection temperature decline is less than 1.2℃/min
◎ Dust is collected by sealed injection gate, and desulphurizer is conveyed through sealed pipes, thus creating a good operation environment
◎ Precise and continuous injection flow control is realized by controlling the injection speed of desulphurizer through an adjustable throat valve
◎ Stable injection is realized by adopting a dynamic differential pressure injection control technology in the injection tank
◎ Continuous working at each injection unit is realized by adopting a pair of mutual standby lances configuration, which satisfies the requirements of continuous production
◎ Advanced computerized model for combined desulphurizer injection can realize an automatic operation or give guidance to operation

## 典型工程：包钢二炼钢铁水脱硫工程

◎ 规　　模：设计能力200万t/a，铁水罐225t、铁水装入量210t
◎ 投产时间：2001.12
◎ 服务方式：工程总承包
◎ 项目特点：国内第一个210t铁水包复合喷吹脱硫EPC项目，引进美国ESMII公司的脱硫设备，采用镁粉和石灰粉两种脱硫剂进行复合喷吹，脱硫效果好。荣获全国优秀工程总承包奖。

## Typical project: Hot metal desulphurization project in No.2 steel-making plant of Baogang

◎ Scale: designed capacity 2Mt/a, hot metal ladle225t, hot metal capacity 210t
◎ Start-up time: 2001.12
◎ Services: EPC
◎ Project features: this project is the first combined injection desulphurization EPC project with application of 210t hot metal ladle in China, which introduced advanced desulphurization equipment from ESMII of America. It achieved a good performance by using powdered magnesium and lime powder as desulphurizer in the combined injection. This project was awarded Outstanding Prize of National Excellent Project General Contract.




复合喷吹系统图
Systematic figure of combined injection desulphurization in hot metal ladle

## 铁水喷吹“三脱”工艺
## "Desulphurization, desiliconization and dephosphorization" injection for hot metal

该工艺为首钢国际工程公司自主研发的优势技术，工程投资仅为引进国外技术和设备的 1/2~1/3，效果良好，脱磷效果达到国外技术先进水平，终点 [P] 稳定在 <0.006%。

铁水“三脱”喷吹设施
“Desulphurization, desiliconization and dephosphorization” injection equipment for hot metal

### 技术特点

◎ 采用可调喉口阀门控制脱硫剂喷吹速度，实现精确、连续喷吹流量调节
◎ 采用动态压差喷吹控制技术，实现稳定喷吹操作
◎ 采用双喷枪互为备用的工艺布置，实现喷吹工位连续作业，满足连续生产要求
◎ 采用水冷低马赫数氧枪，有效保证保碳软吹氧，达到控制铁水温度的作用
◎ 设置水冷盘管加耐材水箱型防溅罩，有效防止铁水喷溅对设备损坏
◎ 低净空铁水罐低温铁水脱磷工艺

### 典型工程：邢钢不锈钢铁水脱磷工程

◎ 规　　模：设计能力30万t/a，铁水罐45t、铁水装入量35-50t
◎ 投产时间：2011.6
◎ 服务方式：工程总承包
◎ 项目特点：
- 铁水脱硅、脱磷处理中心布置在现有不锈钢车间电炉跨南侧，通过铁水过渡跨与转炉炼钢厂衔接
- 脱硅、脱磷在同一反应容器内完成，节省了处理成本与时间
- 采用铁水面吹氧工艺，灵活控制铁水温度，解决低温铁水进站问题
- 采用合理的喷吹载气和顶部吹氧搅拌工艺，创造良好的脱磷动力学条件，提高脱硅脱磷效率
- 采用氧化铁皮作为固体脱磷剂，降低铁水污染，同时有效回收铁元素
- 通过工业电视监视有溢渣倾向时，采用顶部加入消泡剂工艺，有效控制脱磷过程喷溅，降低铁损
- 脱磷效果达到引进国外技术的水平，终点 [P] 稳定在 <0.006%，同时节省了大量的技术与设备成本

邢钢喷吹脱磷设施
Injection dephosphorization facility of Xinggang



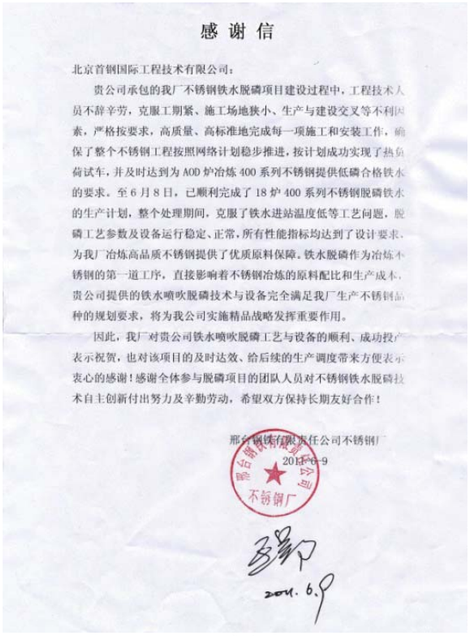
This technology is invented and developed by BSIET independently and the project investment is just 1/2~1/3 of the foreign technology and equipment, but the performance is excellent, and the dephosphorization performance reached international level and the final [P] remains <0.006%.

### Technical features

◎ Precise and continuous injection flow control is realized by controlling the injection speed of desulphurizer through an adjustable throat valve
◎ Stable injection is realized by adopting a dynamic differential pressure injection control technology
◎ Continuous working at each injection unit is realized by adopting a pair of mutual standby lances configuration, which satisfies the requirements of continuous production
◎ Application of water cooling low Mach-number oxygen lance makes soft oxygen blowing and a stable carbon level possible, and at the same time hot metal temperature is controlled
◎ Splash shield in the shape of a tank with water cooling pipes and refractory can effectively prevent the equipment damage caused by hot metal splash
◎ Low temperature hot metal dephosphorization in Low clearance ladle

### Typical project: Hot metal dephosphorization of stainless steel of Xinggang

◎ Scale: designed capacity 300000t/a, hot metal ladle 45t, hot metal capacity 35-50t
◎ Start-up time: 2011.6
◎ Service: EPC
◎ Project features:
- Desiliconization and dephosphorization treatment center is deployed south to the electric furnace of the stainless steel building, and connected with converter steelmaking plant through hot metal transitional bay
- Desiliconization and dephosphorization are completed in the same reaction vessel, which saves treatment costs and time
- Injection oxygen directly to the surface of hot metal makes it easier to control the hot metal temperature and solves the problem of temperature drop
- By adopting rational air injection and top oxygen injection for stirring, a good dephosphorization dynamic condition is created, which improves the efficiency of desiliconization and dephosphorization
- Using iron oxide scale as solid dephosphorizer lowers the hot metal pollution and effectively recycles iron element
- When the industrial monitor finds the tendency of flushing, anti-foam will be added from the top in order to control the splash in the process and lower the loss of iron
- Dephosphorization performance has reached international level and final [P] remains <0.006%, while saving the investment in technology and equipment



感 谢 信

北京首钢国际工程技术有限公司：

贵公司承包的我厂不锈钢铁水脱磷项目建设过程中，工程技术人员不辞辛劳，克服工期紧、施工场地狭小、生产与建设交叉等不利因素，严格按要求，高质量、高标准地完成每一项施工和安装工作，确保了整个不锈钢工程按照网络计划稳步推进，按计划成功实现了热负荷试车，并及时达到为 AOD 炉冶炼 400 系列不锈钢提供低磷合格铁水的要求。至 6 月 8 日，已顺利完成了 18 炉 400 系列不锈钢脱磷铁水的生产计划，整个处理期间，克服了铁水进站温度低等工艺问题，脱磷工艺参数及设备运行稳定、正常，所有性能指标均达到了设计要求。为我厂冶炼高品质不锈钢提供了优质原料保障。铁水脱磷作为冶炼不锈钢的第一道工序，直接影响着不锈钢冶炼的原料配比和生产成本。贵公司提供的铁水喷吹脱磷技术与设备完全满足我厂生产不锈钢品种的规划要求，将为我公司实施精品战略发挥重要作用。

因此，我厂对贵公司铁水喷吹脱磷工艺与设备的顺利、成功投产表示祝贺，也对该项目的及时达效、给后续的生产调度带来方便表示衷心的感谢！感谢全体参与脱磷项目的团队人员对不锈钢铁水脱磷技术自主创新付出努力及辛勤劳动，希望双方保持长期友好合作！

邢台钢铁有限责任公司不锈钢厂

2011-6-9

2011. 6. 9

邢钢公司感谢信
Letter of Thanks from Xinggang

脱磷喷枪、氧枪设施
Dephosphorization lance, oxygen lance facility

## 多功能KR铁水处理工艺
## Multi-functional KR hot metal treatment process

该技术为首钢国际工程公司自主研发的优势技术，能够满足炼钢工序对超低 S、P、Mn、Si 铁水的要求，为冶炼工业纯铁、取向硅钢等特殊钢种提供合格的超低硫、低磷、低锰的铁水。首钢国际工程公司具有设计、供货、安装、调试、投产等全方位的技术能力。

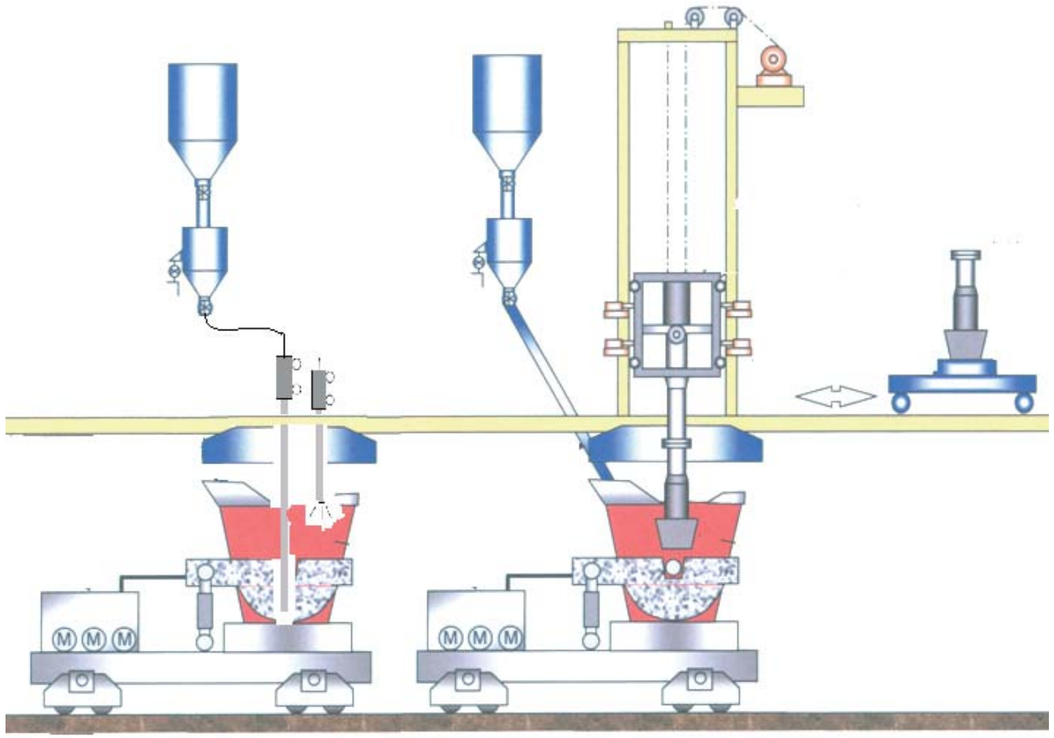
### 技术特点

◎ 设置单独的喷吹位或三脱料仓，在KR处理站实现铁水综合预处理功能
◎ 根据需要设置顶吹氧枪设施，保证铁水温度在入炉要求范围内
◎ 根据情况设置捞渣方式，显著降低铁损、节省生产成本
◎ 采用先进的搅拌、喷吹模型，实现低成本高效率生产

This technology is invented and developed by BSIET independently, which can satisfy the requirements of extremely low content of S, P, Mn, Si in hot metal and provide qualified hot iron with ultra-low S, P,Mn for special steels such as industrial purified iron, oriented silicon steel etc. BSIET has a full capacity of engineering, supplying, installation, commissioning and put-into-operation.

### Technical features

◎ Set up single injection position or desulphurization, desiliconization, dephosphorization bins, and realize the pretreatment of hot metal at the KR treatment station
◎ Set top-blowing oxygen lance according to requirements to make sure hot metal temperature is acceptable before entering furnace
◎ Different slag skimming modes can be adopted to significantly reduce iron loss and save production cost
◎ By adopting advanced stirring and blowing models, low cost and high efficiency are achieved



多功能 KR 铁水处理工艺示意图
Sketch map of multi-functional KR hot metal treatment



### 典型工程：首钢京唐KR脱硫捞渣改造工程

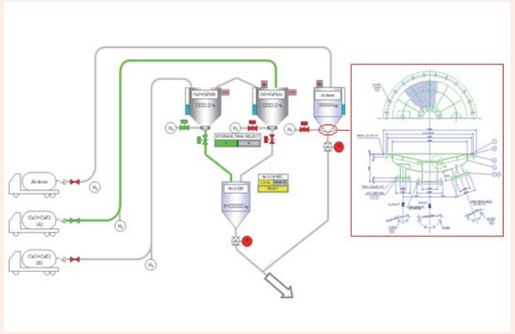
◎ 规模：设计能力300万t/a，铁水罐300t
◎ 投产时间：2010.12
◎ 服务方式：设计
◎ 项目特点：设有4个处理位，采用扒渣机进行脱硫渣扒除。该项目于2010年11月进行改造，12月投产，在保证捞渣时间不增加的前提下，显著降低铁损、节省生产成本。

### Typical projects: KR desulphurization and slag skimming renovation of Shougang Jingtang

◎ Scale: designed capacity 3Mt/a, hot metal ladle 300t
◎ Start-up time: 2010.12
◎ Service: engineering
◎ Project features:there are 4 treatment positions which use skimmers for slag removal. This project was started in November, 2010 and finished in December. Under the precondition of increasing no time for skimming, iron loss is greatly lowered and cost is saved.


首钢京唐 KR 脱硫捞渣设施
KR desulphurization and slag skimming facility in Shougang Jingtang

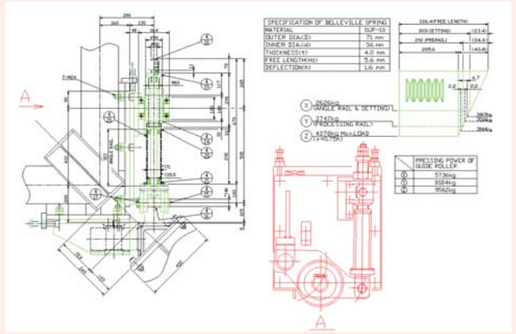
## 设备技术特点
## Technical characteristics of equipment



仓底流态化设施示意图
Sketch map of fluidized bin bottom devices

仓底流态化技术：有效控制下料速度和精度，防止仓口堵料。

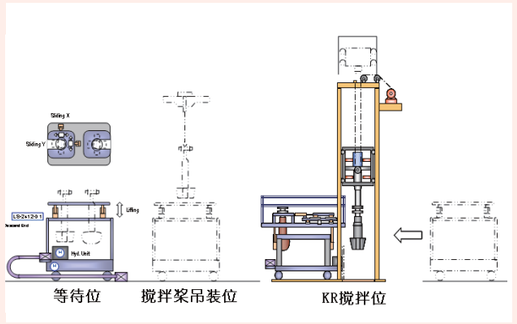
Fluidized bin bottom technology: effective control over the speed and precision of burden, avoid bin gate blocking.



搅拌框架蝶簧减振设备
Sketch map of anti-vibration Belleville spring on stirring frame

搅拌框架蝶簧减振技术：有效降低搅拌桨旋转引起的机械振动，减少对设备的冲击，降低平台钢结构的冲击负荷。

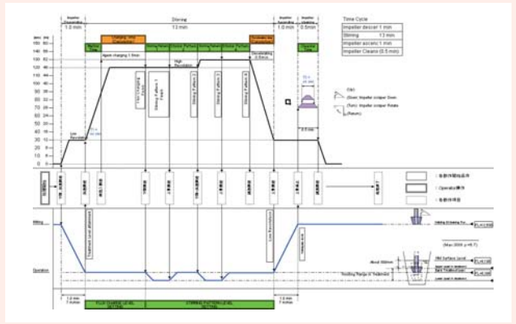
Anti-vibration Belleville spring on stirring frame: this technology can effectively reduce the vibration caused by stirring blade and impact on the equipment and lower the impact load on the steel structure of the platform.




搅拌桨快换示意图
Sketch map of swift replacement of stirring blade

搅拌桨快换技术：一台搅拌头更换台车上设置两个搅拌桨放置位，节省更换时间和空间。

Swift replacement of stirring blade technology: set two stirring blade positions on one stirring head of the replacing car and this will save time and space.



搅拌模型图
Stirring mode

先进的搅拌模型：根据设定搅拌模式，自动调整并控制搅拌速度和时间，确定加入脱硫剂的时间和速度，保证低消耗、高效率的脱硫效果。

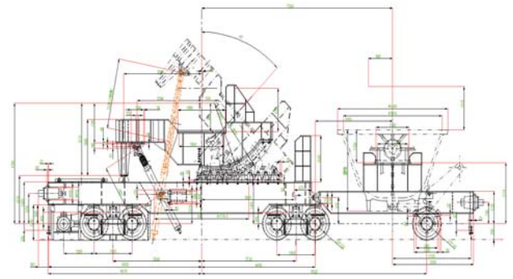
Advanced stirring mode: according to the set stirring mode, automatically adjust and control the speed and time of stirring, and determine the addition time and speed of desulphurizer, to ensure a low cost and high efficient performance.



# 优势设备技术 Advanced technologies of equipment

## 紧凑型液压倾翻铁水称量车
## Compact hydraulic tilting hot metal weighing car

◎ 液压驱动，运行安全平稳
◎ 液压站位于铁水车上，紧靠液压驱动缸，无操作滞后现象
◎ 液压管路设置同步压差调节阀，解决两个驱动液压缸同步问题
◎ 采用齿条倾动控制轨迹，保证倾翻后合适的扒渣位置
◎ 采用称量信号无线发射和接收技术，有效消除称量信号的干扰，保证称量精度
◎ 驱动采用变频调速控制技术，确保铁水运输车准确定位



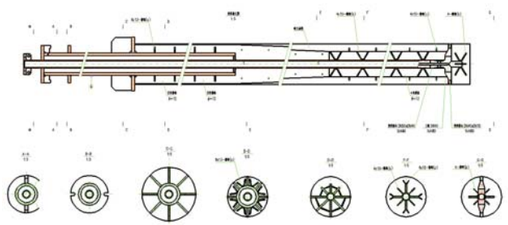
紧凑型铁水倾翻车设备图
Compact hot metal tilting car equipment

◎ Driven by hydraulic, it can run smoothly
◎ Hydraulic station is on the car and near the hydraulic cylinder, therefore there is no delay phenomenon
◎ Synchronized pressure adjusting valve is set on the hydraulic pipes so as to synchronize the two hydraulic cylinders
◎ Rack tilting mechanism is used to control the path and to make sure an appropriate position for slag skimming
◎ Using wireless transmitting and receiving technology for weighing signal can effectively avoid the interference of weighing signal and insure a precise weighing
◎ Using frequency control of motor speed technology insures a precise positioning for hot metal transport car

铁水倾翻车
Hot metal tilting car

## 长寿命、高强度喷枪技术
## Long-life, high strength lance

◎ 采用厚壁无缝钢管作为喷枪内管，按一定规律交叉焊接加筋肋作为骨架，保证喷枪的强度
◎ 良好的抗侵蚀、抗散裂性能
◎ 增加渣线及墙头部分耐材厚度，保证喷枪的整体寿命均衡
◎ 采用与中心管热胀系数相近的浇注耐材，防止处理过程中产生裂纹
◎ With the thick seamless steel pipe as inner pipe of the lance and regularly crossed seamed reinforced ribs as skeleton, it can insure a high strength lance

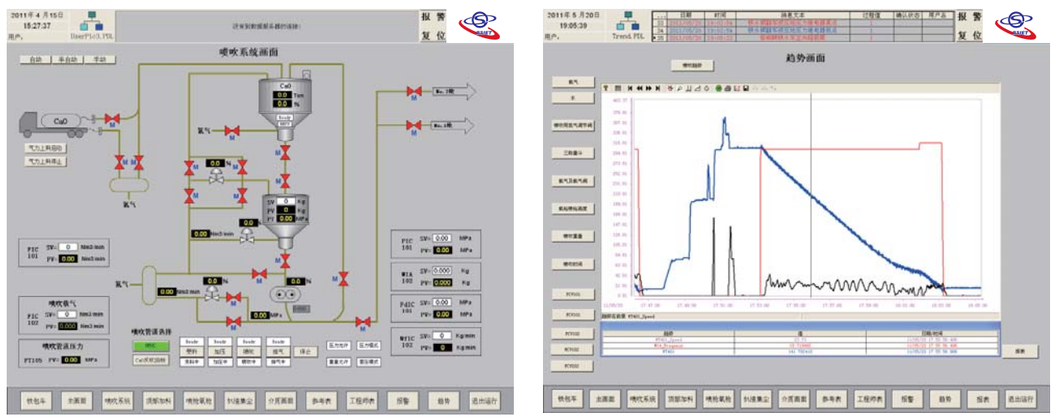


高强度喷枪结构示意图
Sketch map of the structure of high strength lance

◎ Good quality in incorrodibility and anti-scattering strength
◎ Reinforce the thickness of refractory near the slag line and wall head so as to insure a life balance of the lance
◎ Use refractory whose swelling index is close to the central pipe to prevent cracks in the process

## 动态压差喷吹控制技术
## Dynamic differential pressure injection control

◎ 根据喷吹过程需要，设定喷吹罐压力与载气压力差，实现过程的动态控制，保证稳定的喷吹效果
◎ 根据喷枪插入铁水深度，自动调节喷吹压力，有效控制铁水喷溅和堵枪
◎ 采用单元化集成阀台对喷吹管路实现压力、流量等工艺参数的优化控制
◎ Set the differential pressure between the injection tank and injection carrier according to the practical need in the process, therefore insure a stable injection effect by a dynamic control of the process
◎ Automatically adjust the injection pressure according to the lance depth in hot metal so as to effectively avoid splashes and lance block
◎ Unitized integrated valve platform is used to realize an optimizing control of the process parameters of pressure and flow etc.




动态压差喷吹控制 HMI 画面及曲线
HMI menu and curve of dynamic differential pressure control



## 自适应喷枪夹持器
## Auto-adjusting lance clamping device

◎ 液压或电液驱动，夹持力量大，结构紧凑
◎ 采用5个铰接或可转动点连接，夹持具备自适应功能，两夹钳可自动互相等待，有利于同步夹持，对枪体及升降小车有很好的保护作用
◎ 采用柱式导向，避免夹钳摆动
◎ 减振效果明显，使用寿命长
◎ Hydraulic or electro-hydraulic drive, great clamp strength and compact structure
◎ Use 5 hinges or flexible joint as connection. Clamping device is auto-adjusting and two clamps can automatically wait for each other so as to synchronize their move and that is a protection for the lance itself and the lift car
◎ Column guide is applied to avoid the swing of the clamps
◎ Anti-vibration effect is obvious and life is long

## 水冷防溅罩
## Water cooling splash shield

◎ 采用水冷与耐材相结合的结构形式，有效延长设备使用寿命
◎ 水冷盘管式盖壁，减少粘渣
◎ 盖顶采用分环式水箱冷却结构形式，避免冷却死区产生
◎ 冷却水箱采用防爆钉连接形式，有效防止冲压或受热后设备变形
◎ 采用防溅罩，显著减少铁渣飞溅现象，有效保护周围设备不受损坏
◎ The combination structure of water cooling and refractory can effectively prolong the life time of equipment
◎ Water cooling coil pipe cover can reduce slag sticking
◎ Cover top uses ring water cooling tank as the cooling structure which avoid the cooling dead zone
◎ Cooling water tank uses anti-explosive nail for connection which effectively prevents equipment deformation after impact or heating
◎ After using the splash shield, iron splash is noticeably reduced and the surrounding equipments are protected effectively

使用中的水冷防溅罩
Water cooling splash shield in use

# 主要业绩表 Performance reference

| 序号<br>No. | 工程名称<br>Designations of projects | 设计能力<br>Design capacity | 公称容量×台<br>Nominal capacity × set | 服务方式<br>Service mode | 投产时间<br>Start-up time | 主要工艺及装备<br>Main process and equipment |
|---|---|---|---|---|---|---|
| 1 | 包钢二炼钢铁水脱硫工程<br>Hot metal desulphurization, No.2 steel making plant, Baogang | $200\times10^4$ t/a | 210t×1 | 总承包<br>EPC | 2001.12 | 离线式复合喷吹、铁水倾翻运输车、扒渣机<br>Off-line compound injection, hot metal tilting transfer car, slag skimming machine |
| 2 | 首钢二炼钢厂铁水脱硫工程<br>Hot metal desulphurization, No.2 steel making plant, Shougang | $340\times10^4$ t/a | 210t×2 | 设计<br>Engineering | 2002.6<br>(一期Phase 1)<br>2004.2<br>(二期Phase 2) | 离线式喷镁、铁水倾翻运输车、扒渣机、捞渣机<br>Off-line Mg injection, hot metal tilting transfer car, slag skimming machine, slag scooper |
| 3 | 首钢三炼钢厂铁水脱硫工程<br>Hot metal desulphurization, No.3 steel making plant, Shougang | $100\times10^4$ t/a | 80t×1 | 设计<br>Engineering | 2004.12 | 离线式喷镁、喷吹横移车、捞渣机<br>Off-line Mg injection, injection traversing car, slag scooper |
| 4 | 首钢迁钢铁水脱硫工程<br>Hot metal desulphurization, Shougang Qiangang | $400\times10^4$ t/a | 210t×3 | 设计<br>Engineering | 2004.12<br>(一期Phase 1)<br>2006.8<br>(二期Phase 2) | 离线式喷镁、铁水倾翻运输车、扒渣机<br>Off-line Mg injection, hot metal tilting transfer car, slag skimming machine |
| 5 | 首秦铁水脱硫工程<br>Hot metal desulphurization, Shouqin | $300\times10^4$ t/a | 100t×3 | 设计、供货<br>Engineering & Equipment supply | 2005.3<br>(一期Phase 1)<br>2006.7<br>(二期Phase 2)<br>2008.1<br>(三期Phase 3) | 离线式喷镁、铁水倾翻运输车、扒渣机<br>Off-line Mg injection, hot metal tilting transfer car, slag skimming machine |
| 6 | 承德钢厂铁水脱硫工程<br>Hot metal desulphurization, Chengde Steel Plant, Hebei | $120\times10^4$ t/a | —— | 设计、供货<br>Engineering & Equipment supply | 2006.11 | 铁水沟喷吹颗粒镁、撇渣器<br>Injection of granulated Mg in iron runner, slag skimmer |
| 7 | 山东宏达钢厂铁水脱硫工程<br>Hot metal desulphurization, Hongda Steel Plant, Shandong | $70\times10^4$ t/a | 70t×1 | 总承包<br>EPC | 2006.11 | 离线式喷镁、铁水倾翻运输车、扒渣机<br>Off-line Mg injection, hot metal tilting transfer car, slag skimming machine |
| 8 | 邢钢铁水脱硫工程<br>Hot metal desulphurization, Xinggang | $175\times10^4$ t/a | 65t×4 | 总承包<br>EPC | 2008.11 | 在线式喷镁、铁水运输线上、扒渣机<br>On-line Mg injection, on hot metal transportation line, slag scooper |
| 9 | 首钢迁钢三期KR脱硫工程<br>KR desulphurization, Shougang Qiangang(Phase 3) | 340 x $10^4$ t/a | 230t×3 | 设计<br>Engineering | 2010.2 | 离线式KR、铁水倾翻运输车、扒渣机<br>Off-line KR, hot metal tilting transfer car, slag skimming machine |
| 10 | 江苏申特铁水脱硫工程<br>Hot metal desulphurization, Shengte, Jiangsu | $150\times10^4$ t/a | 120t×1 | 设计、供货<br>Engineering & Equipment supply | 2010.8 | 离线式喷镁、铁水运输车、捞渣机<br>Off-line Mg injection, hot metal transfer car, slag scooper |
| 11 | 宣钢铁水脱硫工程<br>Hot metal desulphurization, Xuangang | $260\times10^4$ t/a | 120t×2 | 总承包<br>EPC | 2010.11 | 离线式喷镁、铁水运输车、捞渣机<br>Off-line Mg injection, hot metal transfer car, slag scooper |
| 12 | 首钢京唐KR脱硫捞渣改造工程<br>Revamping for KR desulphurization slag scooping, Shougang Jingtang | $300\times10^4$ t/a | 300t×1 | 设计<br>Engineering | 2010.12 | 离线式KR、铁水倾翻运输车、捞渣机<br>Off-line KR, hot metal tilting transfer car, slag scooper |
| 13 | 邢钢不锈钢铁水脱磷工程<br>Hot metal dephosphorization for stainless steel, Xinggang | $30\times10^4$ t/a | 45t×1 | 总承包<br>EPC | 2011.6 | 离线式三脱、铁水倾翻运输车、扒渣机<br>Off-line Three-removing, hot metal tilting transfer car, slag skimming machine |
| 14 | 首钢京唐二期KR脱硫工程<br>KR desulphurization, Shougang Jingtang (Phase 2) | 340 x $10^4$ t/a | 200t×2 | 设计<br>Engineering | 建设中<br>Under construction | 离线式KR、铁水倾翻运输车、扒渣机<br>Off-line KR, hot metal tilting transfer car, slag skimming machine |
| 15 | 贵钢KR脱硫工程<br>KR desulphurization, Guigang | 270 x $10^4$ t/a | 100t×2 | 总承包<br>EPC | 建设中<br>Under construction | 离线式KR、铁水倾翻运输车、扒渣机<br>Off-line KR, hot metal tilting transfer car, slag skimming machine |