

源自百年首钢
服务世界钢铁

EXPERTISE FROM HUNDRED-YEAR SHOUGANG

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BSIET

Industrial Furnace Engineering
and Technology
工业炉工程与技术



北京首钢国际工程技术有限公司
BEIJING SHOUGANG INTERNATIONAL ENGINEERING TECHNOLOGY CO., LTD.

专业介绍 Introduction of the discipline

北京首钢国际工程技术有限公司（BSIET）工业炉事业部是中国从事钢铁行业热工领域节能减排、环保技术和工程设计、产品开发及工程总承包（EPC）的技术服务商，在大型板坯/方坯步进（推钢）式加热炉、硅钢加热炉、罩式炉、环形加热炉及各种形式热处理炉、熔铝炉及直接还原铁工艺用炉方面形成了独特的技术优势和丰富的管理经验，获得多项专有技术和专利、拥有丰富的业绩。BSIET工业炉事业部以领先的技术为基础、优质的产品为保证、顾客的满意为目标，将专业技术服务贯穿于项目建设的全过程，最终实现和客户的共赢。

The industrial furnace business department of Beijing Shougang International Engineering Technology Co. Ltd. (BSIET) is a technical service provider engaged in energy saving and emission reduction, environmental protection technology and engineering design, product development and project general contract (EPC) in heat engineering field of iron and steel industry in China, having unique technical advantages and abundant experience in large walking beam (pushing) reheating furnace for slab/billet, reheating furnace for silicon steel, bell type reheating furnace, rotary hearth reheating furnace as well as various heat treatment furnaces, aluminum melting furnace and furnaces for direct reduction process, possessing many proprietary technologies and patents and having sufficient performance references. The industrial furnace business department of BSIET, taking leading technology as the bases, quality product as the guarantee and client's satisfaction as the target will render technical services throughout the entire process of project and finally realize win-win situation for both provider and client.



优势服务 Services available



★ 综合能源热工系统解决方案

可根据产品大纲和工艺要求为您配置最合理、经济的加热炉、热处理炉或其它加热设备，并实施EPC服务。

★ 合同能源管理

可与客户签订能源管理合同，针对您的炉子热工系统进行综合评估，制定并实施改进方案。

★ 加热系统节能减排改造

可为您的炉子量身定做节能减排改造方案，并可提供EPC服务。

★ Solution for heat engineering system with comprehensive energy

Configure most rational and economical reheating furnace, heat treatment furnace or other heating equipment in accordance with product mix and process requirement and perform EPC service.

★ Contractual energy management

Enter into energy management contract with clients to carry out comprehensive evaluation on heat engineering system of your furnace, prepare and implement modification proposal and realize win-win situation with client.

★ Energy saving and emission reduction modification on heating system

Customize modification proposal for energy saving and emission reduction for your furnace and provide entire EPC service.

优势服务：

作为原首钢的企业设计院，我们的技术源于生产之需求、提升于生产之改进、应用于生产之实践。我们具有以下优势：

- 1、参与生产调试，掌握第一手生产数据，如加热工艺曲线等；
- 2、为生产保驾护航，与生产紧密结合，随时改进，不断积累，不断创新；
- 3、具有指导生产、培训新技术的经验和能力；

我们承诺：“工程的生命周期不仅限于工程竣工。我们不仅是工程承包者，也是先进生产工艺的指导者和探索者”

Advantages of the service:

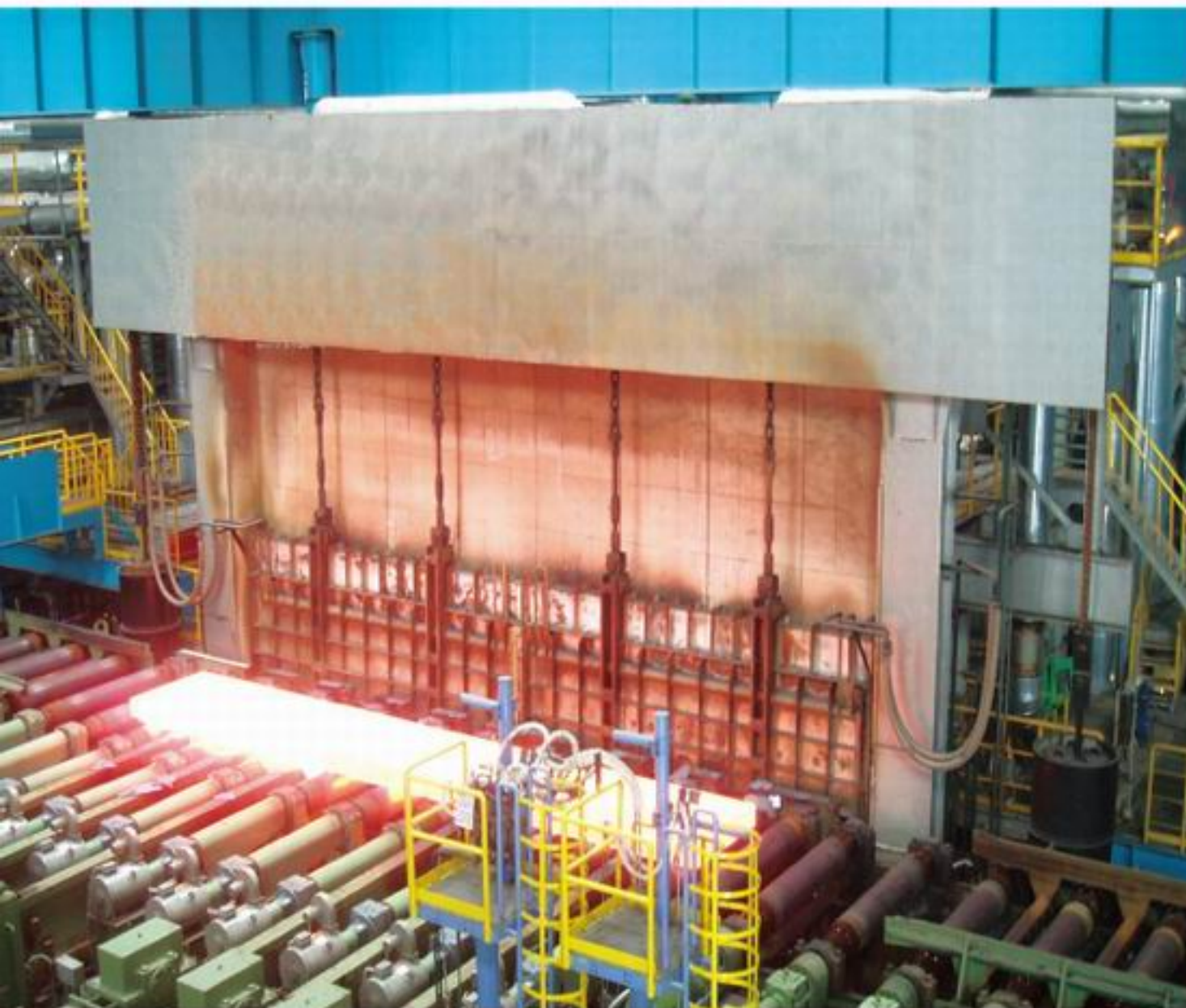
We used to be an enterprise design institute for Shougang, our technology is from the demand of production, promoted by the renovation of production and applied to the practice of production. We have the following advantages:

- 1、participate in production commissioning, possess first hand production data like heating processing curve etc.;
- 2、assist the production, closely follow the production, improve them from time to time, accumulate experience successively and keep making innovation;
- 3、having the ability and experience to give instruction to the production and technical training;

Our commitment is “the completion of project is not the end of project life. We are not contractor only but also the instructor and explorer of advanced production process”.

优势技术 Superior technology

- ◎ 大型步进式加热炉技术
- ◎ 蓄热式燃烧技术
- ◎ 方坯步进（推钢）式加热炉
- ◎ 连续辊底式热处理炉、室式热处理炉、罩式热处理炉
- ◎ 环形加热炉、热处理炉
- ◎ 熔铝炉及其它领域炉窑
- ◎ 煤气 低NO_x调焰烧嘴（混合煤气、天然气）
- ◎ 高温硅钢加热炉及保温炉
- ◎ 硅钢电磁感应加热炉



- ◎ Technology of large walking beam reheating furnace
- ◎ Regenerative combustion technology
- ◎ Walking (pushing) reheating furnace for large, medium and small bar and wire rod
- ◎ Continuous roller hearth heat treatment furnace, chamber heat treatment furnace and various bell type heat treatment furnaces
- ◎ Rotary hearth heating furnace, heat treatment furnace
- ◎ Aluminum melting furnace and kiln and furnace for other field
- ◎ Low NO_x flame adjustable burner for gas (mixed gas, natural gas)
- ◎ High temperature silicon steel heating furnace and holding furnace
- ◎ Silicon steel electromagnetic induction heating furnace



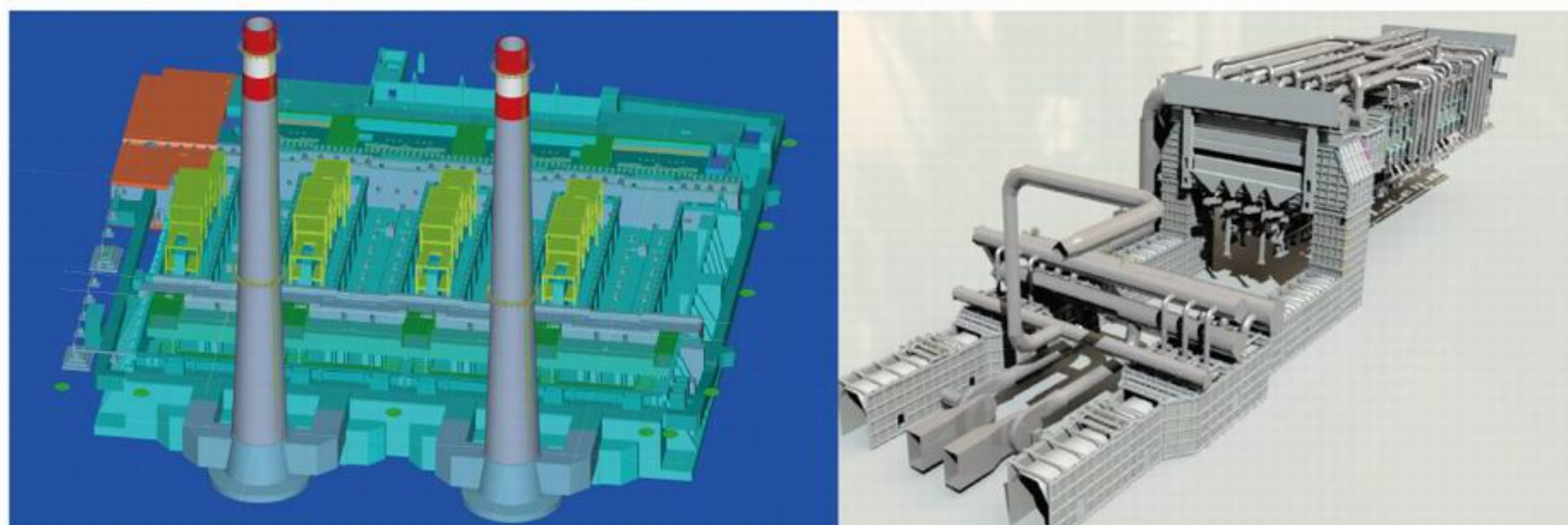
优势产品 Superior products

- ◎ 各式蓄热式烧嘴（单蓄热、双蓄热；小球、蜂窝体）
- ◎ 三通换向阀、四通换向阀
- ◎ HDRI高温直接还原铁储料罐
- ◎ 电磁感应加热炉设备
- ◎ 高温罩式退火炉（用于硅钢热处理）
- ◎ 保护气氛罩式退火炉（用于冷轧、热轧卷退火处理）
- ◎ 台车式退火炉
- ◎ 蓄热式换热器
- ◎ 熔铝炉

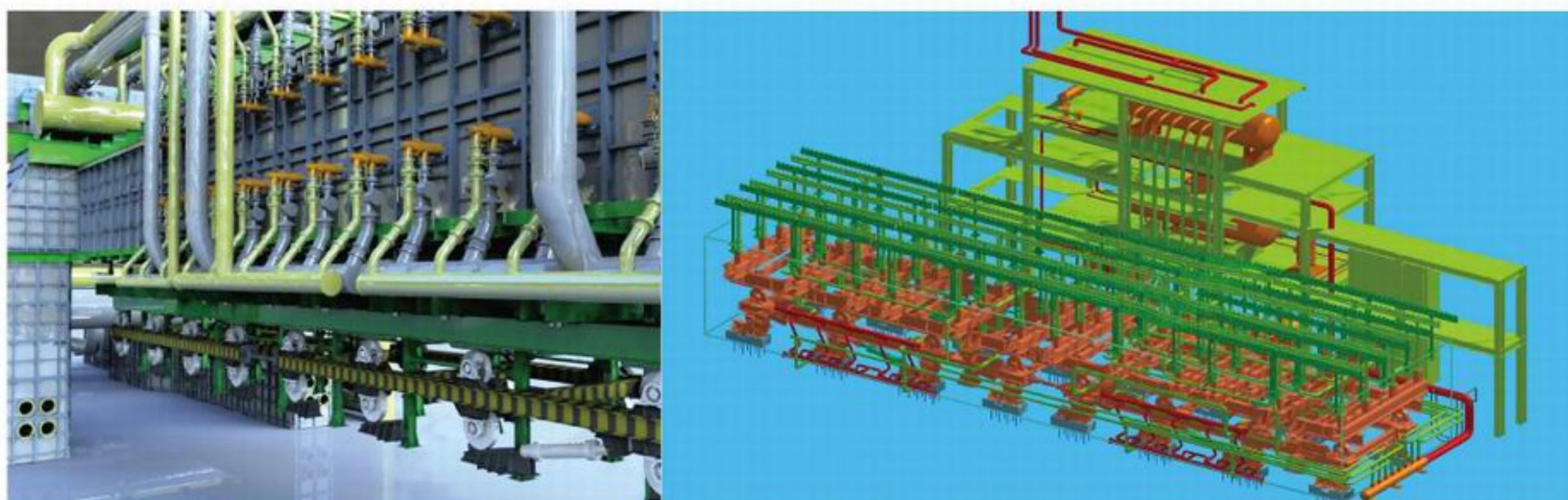
- ◎ Various regenerative burner (single regeneration, double regeneration, granule and beehive)
- ◎ Three way switching valve, four way switching valve
- ◎ Material bin for HDRI
- ◎ Equipments for electromagnetic induction heating furnace
- ◎ High temperature bell type annealing furnace (for heat treatment of silicon steel)
- ◎ Protective atmosphere bell type annealing furnace (for annealing of cold rolled and hot rolled coil)
- ◎ Pallet annealing furnace
- ◎ Regenerative heat exchanger
- ◎ Aluminum melting furnace



先进的设计手段 Sophisticated design means



三维工厂建模 3-D plant modeling



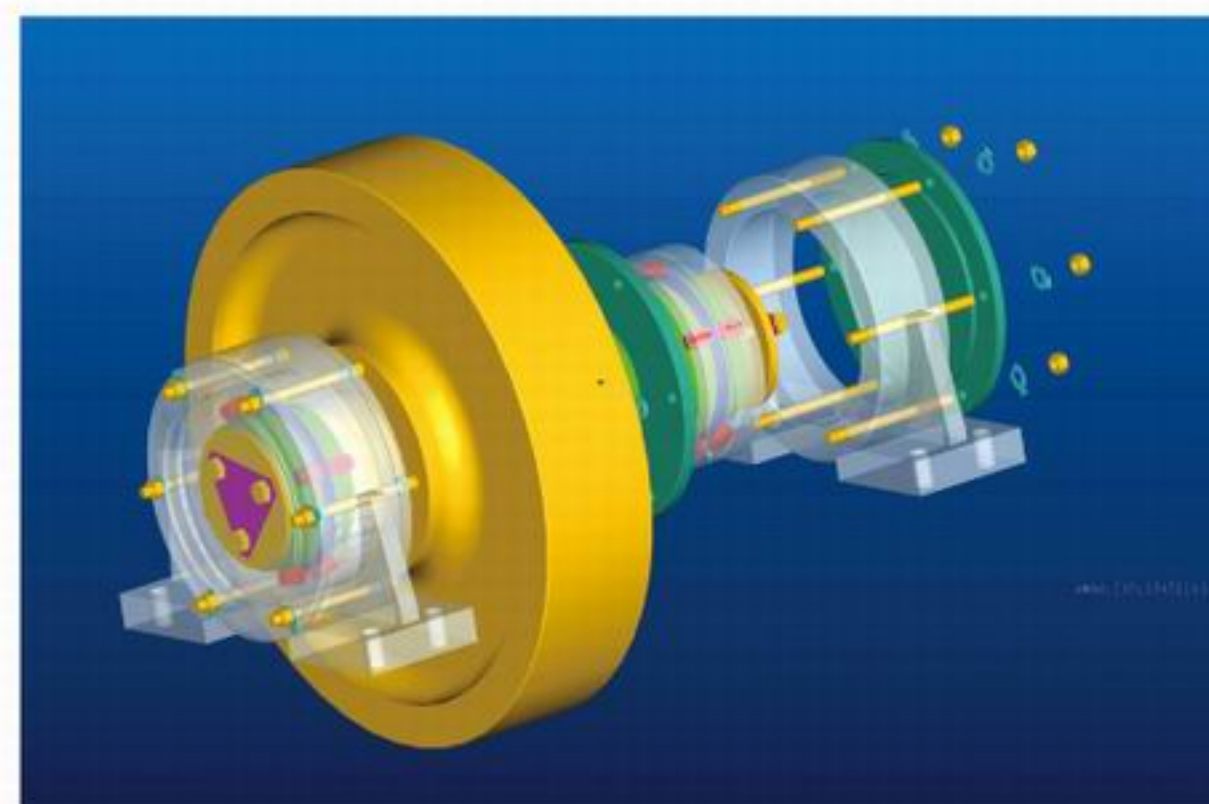
三维模拟组装 3-D simulation of assembly

三维辅助设计 3-D, CAD

全过程使用三维辅助设计，提供给您的一项设计方案都经过验证和层层把关，一切皆为您考虑。
3-D CAD will be used through the whole process; each design proposal provided has been checked and reviewed.

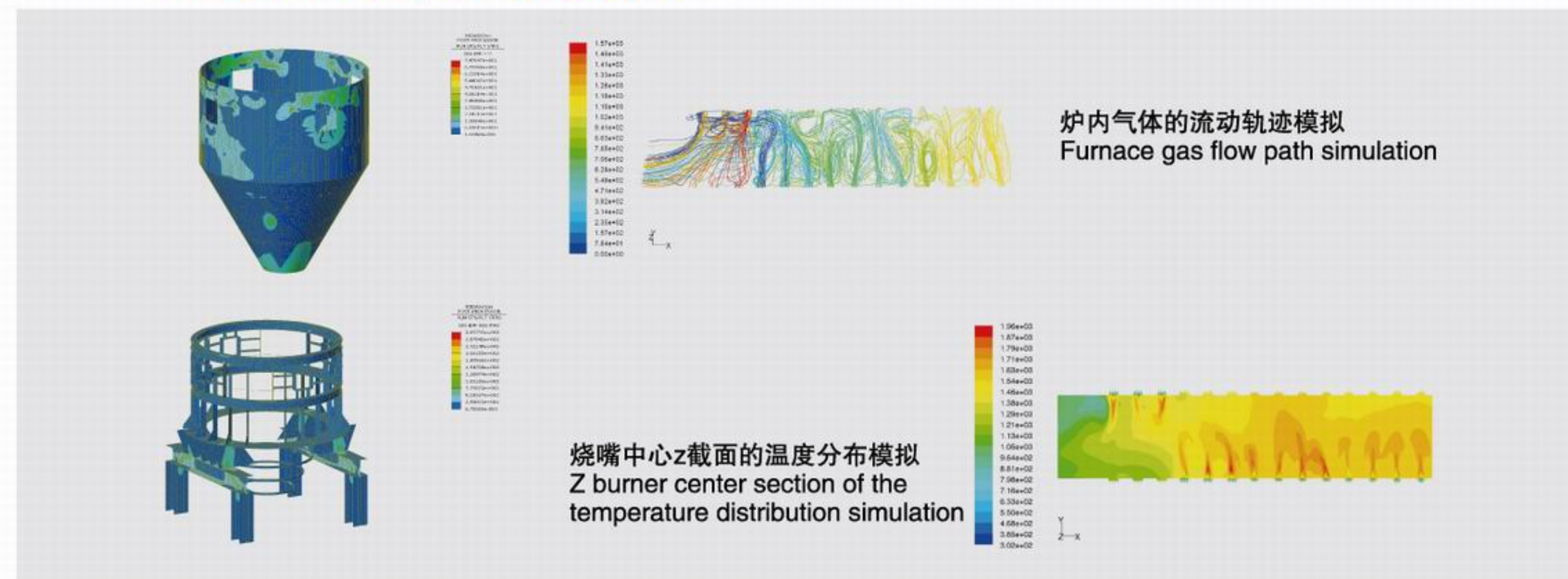


三维管路碰撞检查 3-D check on pipe line collision

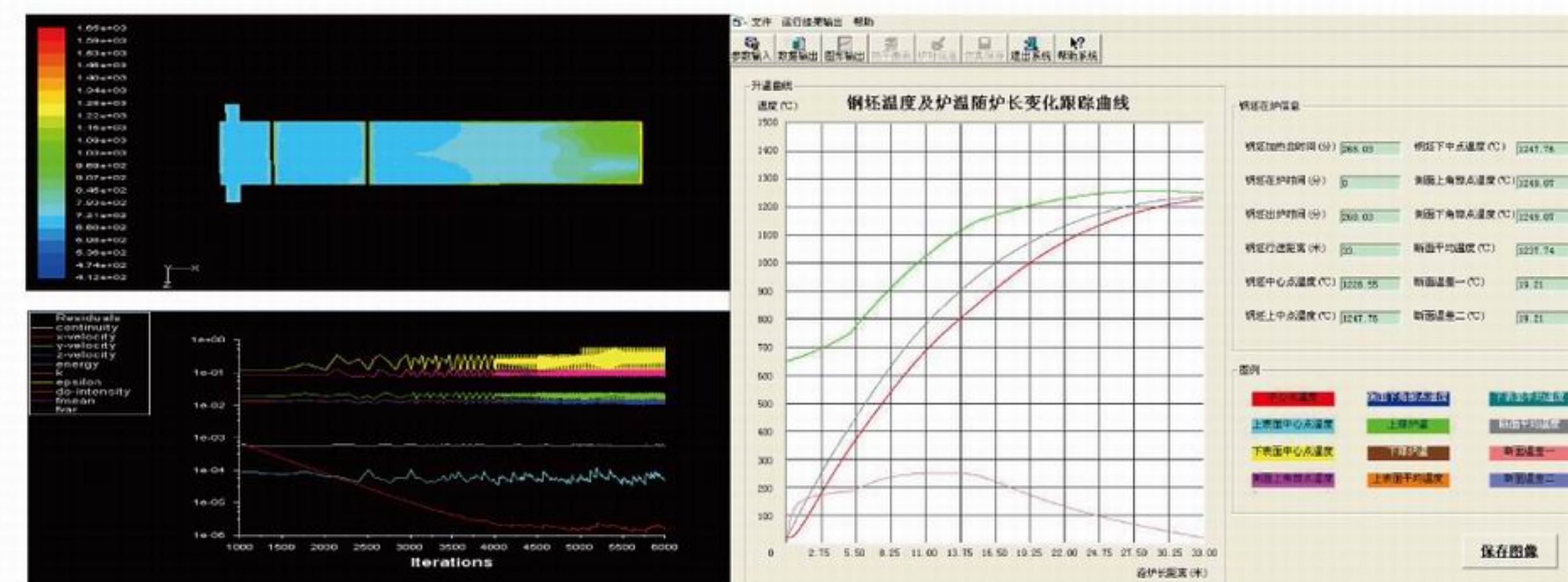


三维模拟组装 3-D simulation of assembly

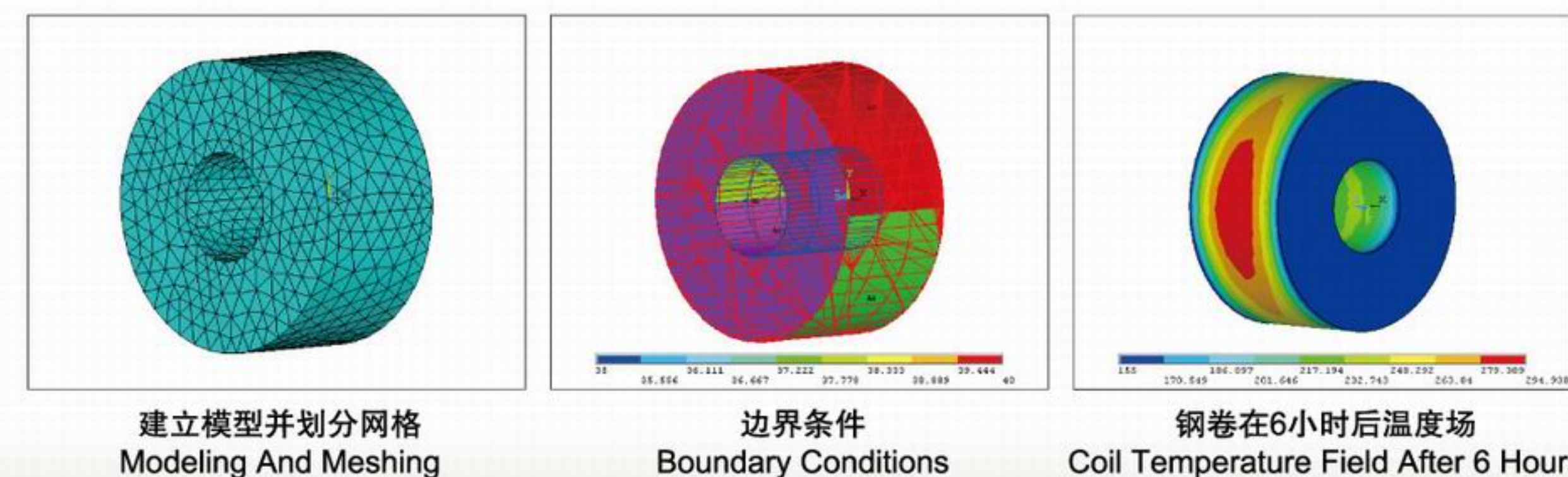
利用软件对设备进行应力分析及炉内流场模拟 Stress analysis on equipment and simulation of flow field inside the furnace by using software



利用计算机仿真模拟进行加热曲线研究 Heating curve study by computer simulation



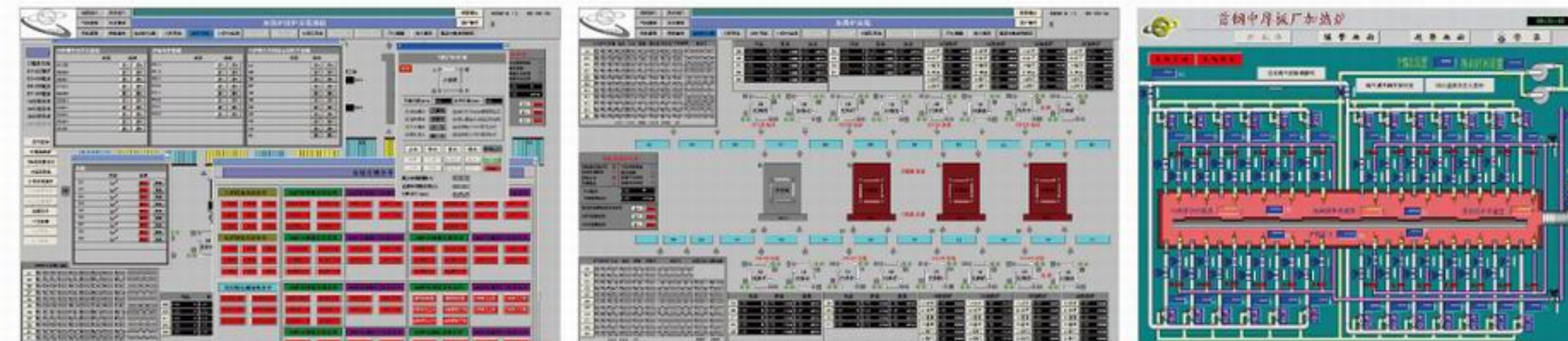
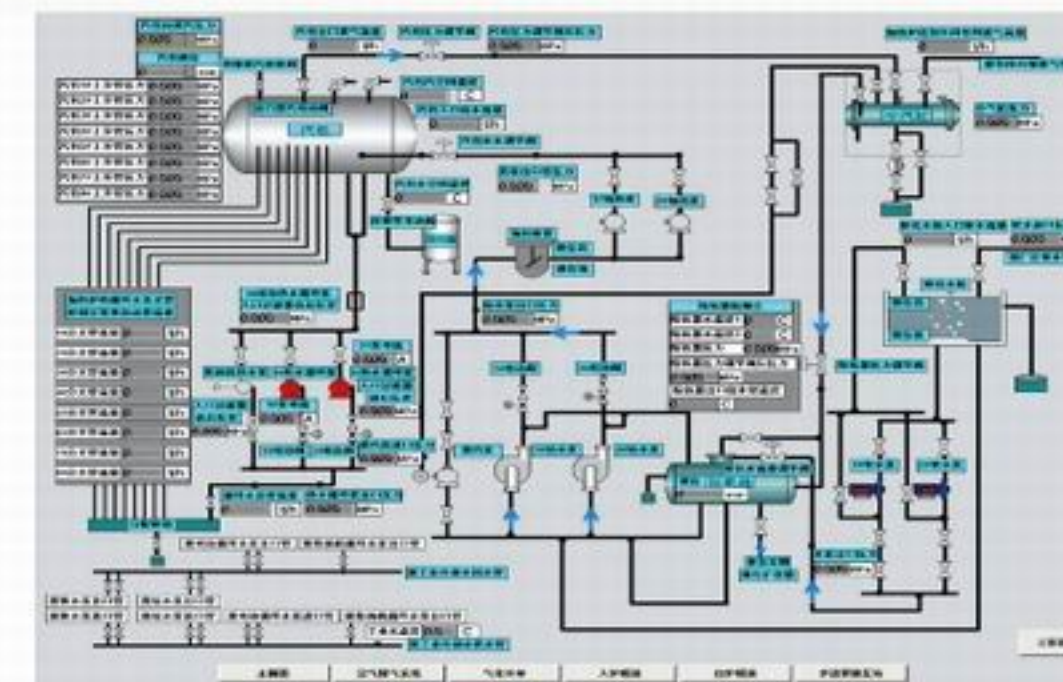
利用软件建模模拟产品加热过程 Simulation of product heating process by software modeling



自动化控制 Automatic control

BSIET在工业炉的控制理论和工程经验处于国内领先地位，并在实际工程中成熟应用：

- ◎ 串级并联双交叉限幅控制燃烧技术
- ◎ 氧化锆残氧分析法自动修正空燃比
- ◎ 多目标专家寻优燃烧模型
- ◎ 二级控制与数学模型技术
- ◎ 钢坯精确定位技术，实现梅花布料
- ◎ 全自动装、出钢，“一键式”烧钢
- ◎ 温度跟踪自学习模型



BSIET has been in leading position in China for control theory and engineering experience of industrial furnace and applied them in actual projects:

- ◎ Cascade parallel dual crossing amplitude limit controlled combustion technology
- ◎ Automatic correction of air-fuel ratio by zirconia residual oxygen analysis
- ◎ Multi target expert optimizing combustion model
- ◎ 2-level control and mathematic model technology
- ◎ Stock precision position technology to realize “club” distribution
- ◎ Full automatic charging, discharging, “one touch” heating
- ◎ Temperature tracking self-adaptation model



典型业绩及产品举例 Typical performance references and demonstration of products

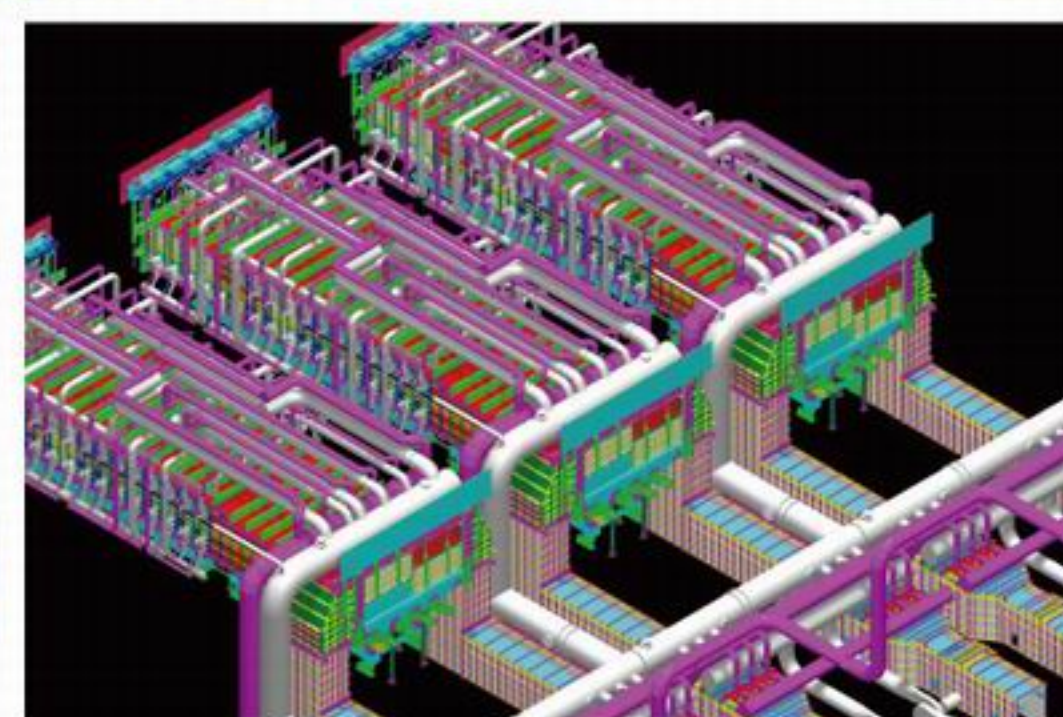


迁钢1580热轧厂1#-3#加热炉

产量及炉型：270t/h步进梁式加热炉（1#炉、2#炉为低温炉；3#炉为硅钢高温炉）
供热系统：蓄热和常规燃烧相结合 燃料：混合煤气 投产时间：2010.4

1# - 3# reheating furnaces of 1580 hot rolling mill Qiangang

Output and furnace type: 270t/h walking beam reheating furnace (1# furnace, 2# furnace are low temperature furnace; 3# furnace is silicon steel high temperature furnace)
Heating system: combination of regeneration and normal combustion fuel: mixed gas
Date of start-up: 2010.4



首钢京唐公司2250热轧厂1#-4#加热炉

产量及炉型: 350t/h步进梁式加热炉

供热系统: 1#-3#炉为常规燃烧, 4#炉为蓄热式 燃料: 混合煤气 投产时间: 2008.08

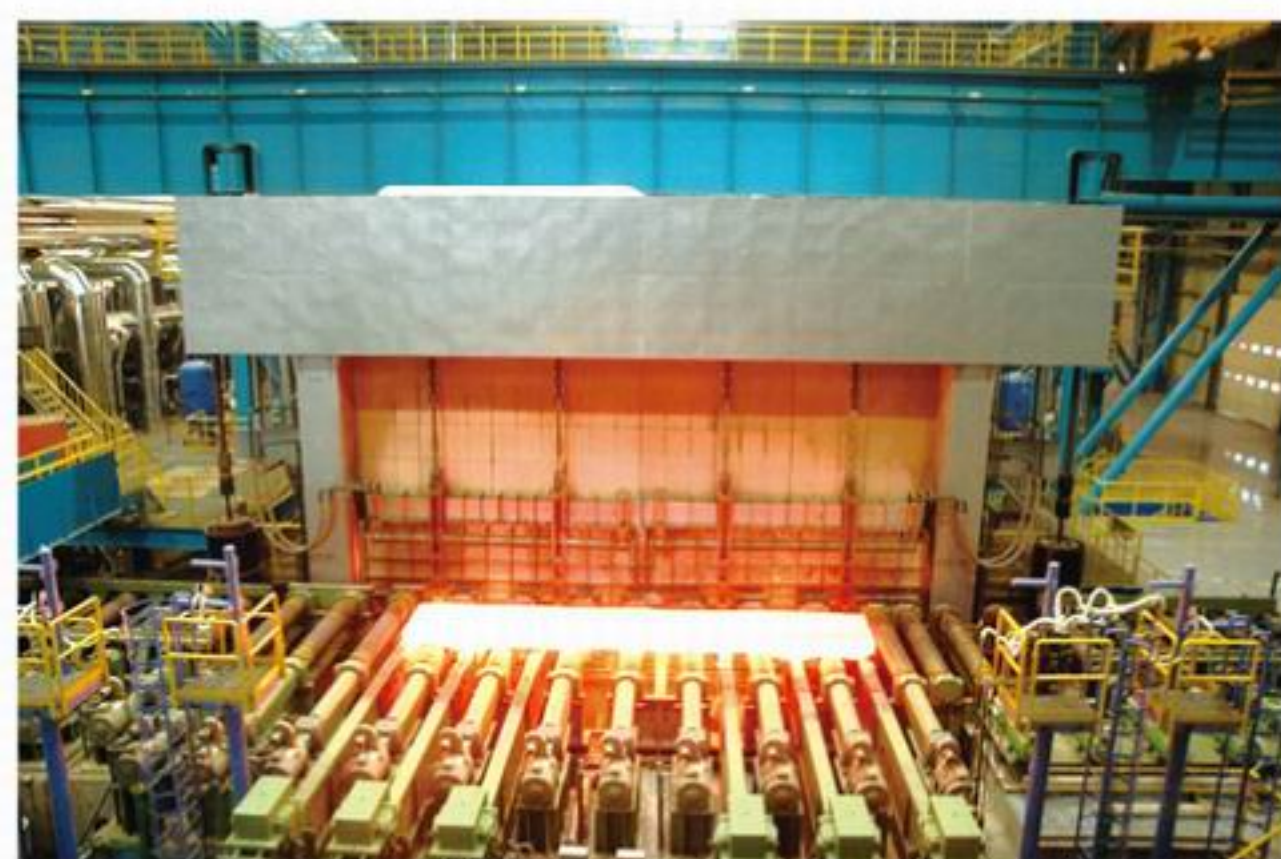
1#-4# reheating furnace of 2250 hot rolling mill, Shougang Jingtang

Output and furnace type: 350t/h walking beam reheating furnace

Heating system: 1#-3# are normal combustion, 4# is regenerative

Fuel: mixed gas

Date of start-up: 2008.08



迁钢2160热轧厂1#-4#加热炉

产量及炉型: 250t/h步进梁式加热炉 燃料: 混合煤气 投产时间: 2006.12

1#-4# reheating furnace of 2160 hot rolling mill, Shougang Qiangang

Output and furnace type: 250t/h walking beam reheating furnace Fuel: mixed gas

Date of start-up: 2006.12

棒线材加热炉实例

Examples of bar and wire rod reheating furnaces



首钢精品棒材车间加热炉

产量及炉型: 140t/h步进梁式加热炉 燃料: 高、焦炉混合气 投产时间: 2005.10

Reheating furnace of quality bar workshop, Shougang

Output and furnace type: 140t/h walking beam reheating furnace

Fuel: BFG and COG mixed gas Date of start-up: 2005.10



山西中阳高速线材120t/h步进式加热炉

产量及炉型: 120t/h步进梁式加热炉

燃料: 混合煤气 投产时间: 2007.10

120t/h walking beam reheating furnace for high speed wire rod mill, Zhongyang, Shanxi

Output and furnace type: 120t/h walking beam reheating furnace

Fuel: Mixed gas Date of start-up: 2007.10



首钢一线材二车间加热炉

产量及炉型: 120t/h步进梁式加热炉

燃料: 混合煤气 投产时间: 2005.12

Reheating furnace of No.2 workshop of No. 1 wire rod plant, Shougang

Output and furnace type: 120t/h walking beam reheating furnace

Fuel: Mixed gas Date of start-up: 2005.12

其它炉型实例 Examples of other furnace

高温环形热处理炉

用途：取向硅钢高温退火
炉型：转底式环形炉、保护气氛

High temperature rotary hearth heat treatment furnace

Usage: high temperature annealing of oriented silicon steel
Furnace type: rotary hearth circular furnace, protective atmosphere

电磁感应加热炉设备

- 液压自平衡提升系统
- SHE坯料运输系统
- 特殊耐高温炉床

Electromagnetic induction furnace equipment

Hydraulic self-balance lifting system
SHE slab transfer system
Special high temperature resistant hearth

板坯保温炉

- 储坯能力可达千吨
- 全纤维炉型
- 自动移盖机

Slab temperature soaking furnace

Slab storage capacity can reach to thousand tons
Full fibre furnace
Automatic cover remover



首钢中厚板辊底式热处理炉（保护气体）
Roller hearth heat treatment furnace for medium and thick plate mill Shougang (protective gas)

产品实例 Products examples



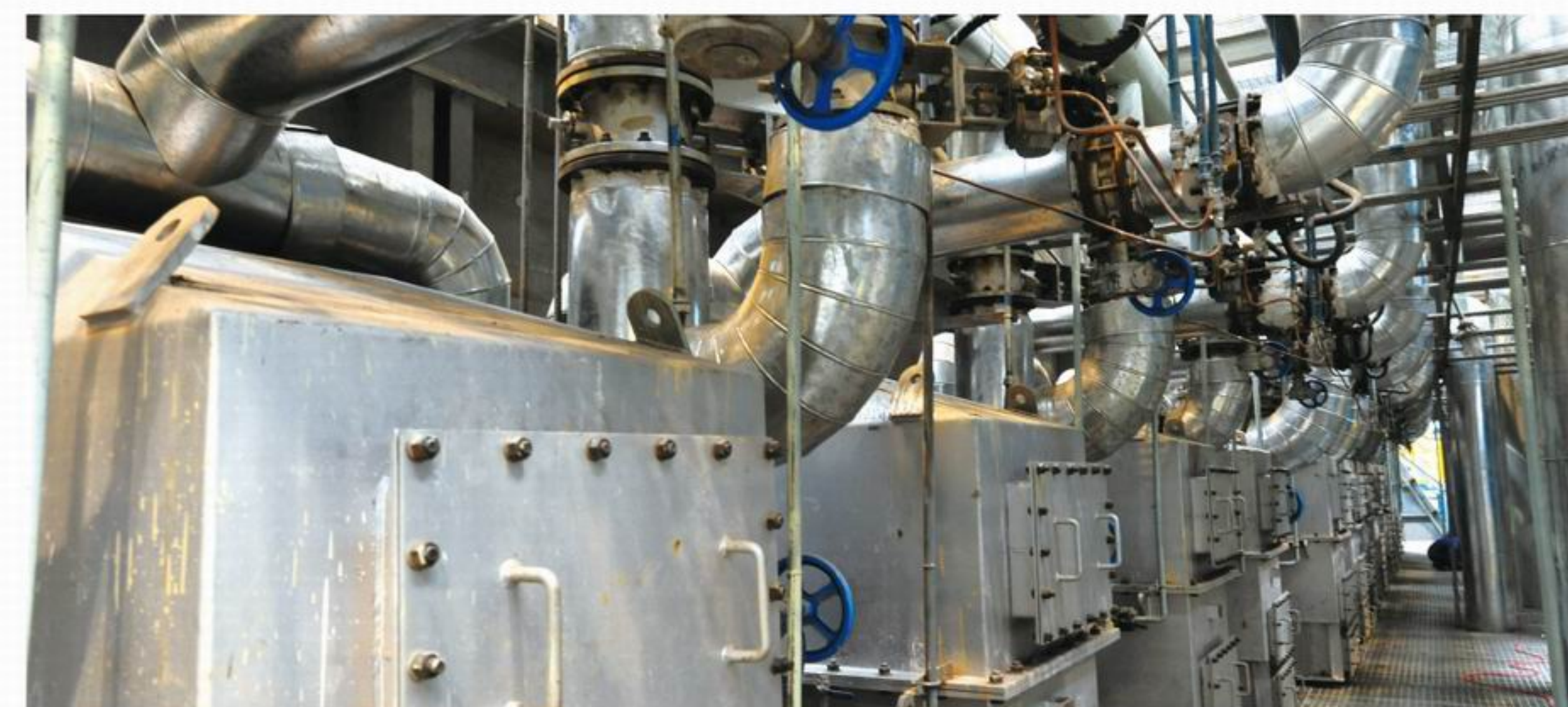
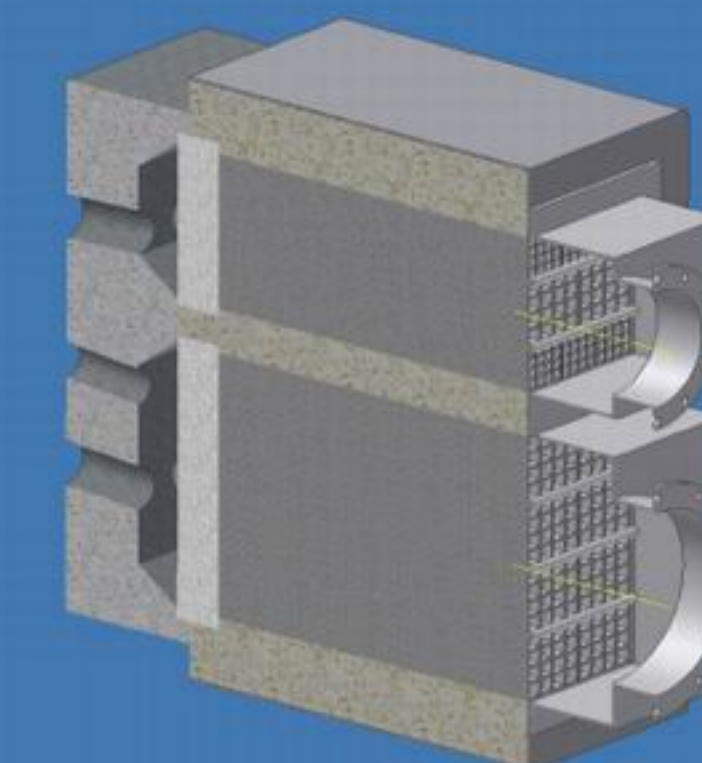
平焰烧嘴 Flat flame burner

双蓄热烧嘴

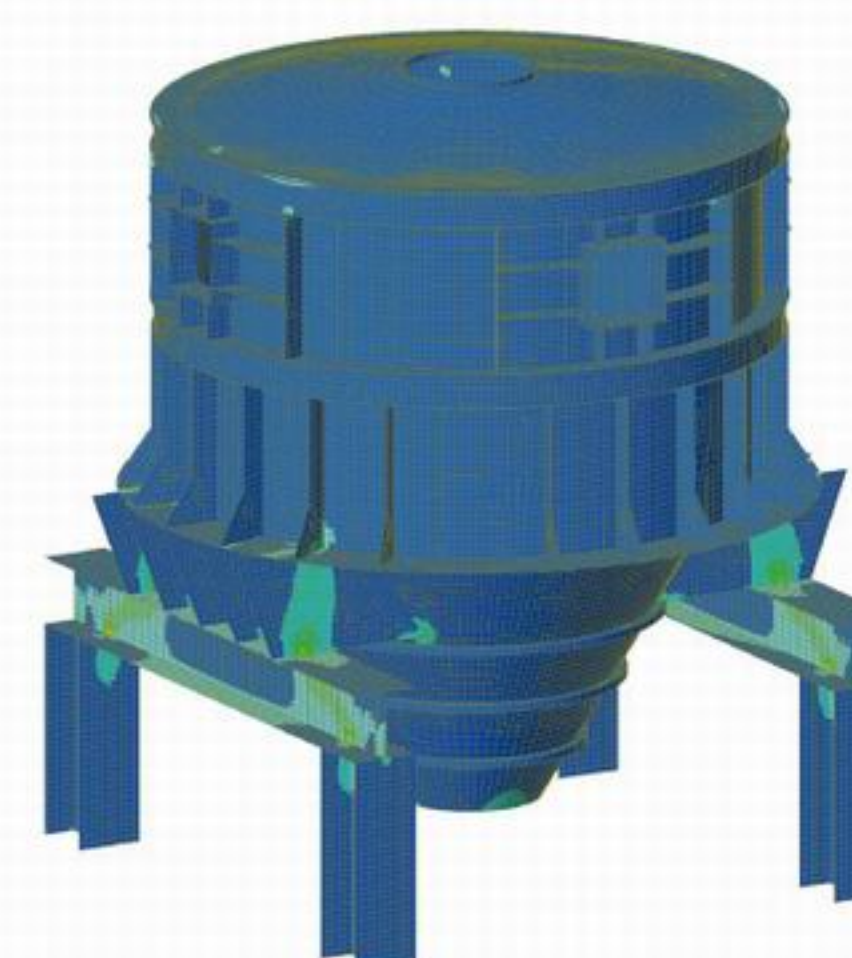
特点：蓄热能力强、火焰温度均匀、结构耐用、寿命长

Dual regenerative burner

Characteristics: powerful regenerative capacity, uniform flame temperature, durable structure, long service life



蓄热式烧嘴 Regenerative burner



MIDAS/Gen
POST-PROCESSOR
PLN STS/PLT STRS
SIG-EFF ABS MAX
2.63735e+002
2.57942e+002
2.32146e+002
2.06355e+002
1.80561e+002
1.54768e+002
1.28974e+002
1.03181e+002
7.73872e+001
5.15937e+001
2.58003e+001
6.75955e-003

HDRI储料罐

特点：耐高温，结构可靠，可盛放高温球团等颗粒物

Material bin of HDRI

Features: high temperature, structural reliability, Can bloom high temperature granular objects such as baseball

轧钢加热炉业绩列表

序号 NO	用户名称 USER NAME	炉子名称 FURNACE	产量 T/h	数量 Q. TY	燃料 FUEL	投产日期 DATE OF PRODUCTION
1	首钢300 小型轧钢厂 Shougang 300 bar mill plant	150t/h推钢式炉 150t/h pushing furnace	150	1	重油煤气 Heavy fuel,gas	多次改造 Several times reconstructions
2	首钢中型厂 Shougang medium mill plant	80t/h步进底式炉 80t/h walking bottom furnace	80	2	重油 Heavy fuel	1987.03
3	首钢中板厂 Shougang medium plate mill plant	150t/h步进底式炉 150t/h walking bottom furnace	150	2	重油 Heavy fuel	1988.03
4	首钢冷轧厂 Shougang cold roll plant	罩式退火炉 hood-type annealing furnace	—	—	混合煤气 mixed gas	1990.03
5	印尼马士达工程 Indonesia Mashida project	40t/h无水冷炉 40t/h furnace no cooling water	40		重油 Heavy fuel	1991.06
6	首钢第三线材厂 Shougang No.3 wire rod mill plant	200t/h梁底组合步进式炉 200t/h beam-bottom walking furnace	200	1	混合煤气 Mixed gas	1992.03
7	首钢秦皇岛中板厂 Shougang Qinghuangdao medium plate mill plant	80t/h推钢式炉 80t/h pushing furnace	80	2	重油 Heavy fuel	1993.05
8	津巴布韦钢铁公司热带厂 Zimbabwe iron & steel company medium mill plant	65t/h步进梁式炉 65t/h walking beam furnace	65	1	混合煤气 mixed gas	1993.08设计 design in 1993.08
9	首钢特钢无缝钢管工程 Seamless steel pipe project, Shougang special steel plant	环形炉 rotate heating furnace	φ 14m	1	重油 Heavy fuel	1995.08设计 design in 1995.08

PERFORMANCE REFERENCE OF REHEATING FURNACE FOR STEEL ROLLING

序号 NO	用户名称 USER NAME	炉子名称 FURNACE	产量 T/h	数量 Q. TY	燃料 FUEL	投产日期 DATE OF PRODUCTION
10	首钢特钢无缝钢管工程 Seamless steel pipe project, Shougang special steel plant	步进梁式再热炉 walking-beam reheating furnace	—	1	重油 Heavy fuel	1995.08设计 design in 1995.08
11	首钢特钢650车间 650 workshop, Shougang special steel plant	60t/h推钢式炉 60t/h pushing furnace	60	2	重油 Heavy fuel	1997.05
12	印尼BUDIHARM工程 Indonesia BUDIHARM projet	45t/h轧钢炉 45t/h mill furnace	45	—	重油 Heavy fuel	1997.03
13	承钢无缝改造工程 Seamless steel pipe reform project, Chengde	斜底式炉 sloping hearth furnace	—	—	混合煤气 Mixed gas	1997.06
14	邢钢高速线材工程 High speed wire rod mill plant, Xing gang	100t/h步进梁式炉 100t/h walking beam furnace	100	—	混合煤气 mixed gas	1998.10
15	宣钢高速线材厂 High speed wire rod mill plant, Xuan gang	100t/h步进梁式炉 100t/h walking beam furnace	100	1	混合煤气 Mixed gas	2000.12
16	首钢钢丝厂轧钢车间 Rolling workshop, Shougang steel wire plant	蓄热式环形炉 Φ9.000m regenerative furnace	Φ10m	1	轻柴油 light diesel oil	2001.10
17	天铁集团崇利轧钢有限公司 Chongli Rolling Co.Ltd., Tiantie Group	60t/h蓄热推钢式炉 60t/h regenerative pushing furnace	60	1	转炉煤气 converte-r gas	2001.12
18	首钢中板厂2#炉 2# furnace, Shougang medium plate mill plant	100t/h蓄热推钢式炉 100t/h regenerative pushing furnace	100	1	混合煤气 Mixed gas	2002.03
19	首钢型材厂三车间 NO.3 workshop, Shougang Sectional bar plant	160t/h蓄热推钢式炉 160t/h regenerative pushing furnace	160	1	转炉煤气 LDG	2002.02

轧钢加热炉业绩列表

序号 NO	用户名称 USER NAME	炉子名称 FURNACE	产量 T/h	数量 Q. TY	燃料 FUEL	投产日期 DATE OF PRODUCTION
20	新抚钢高速线材厂 New fugang high speed wire rod mill plant	100t/h蓄热步进梁式炉 100t/h regenerative walking-beam furnace	100	1	煤气重油 Heavy fuel and gas	2002.06
21	天津第二轧钢厂 Tianjing NO.2 milling plant	60t/h推钢式炉160t/h pushing furnace	60	1	发生炉煤气 producer gas	2002.10
22	新疆八一钢厂中型厂 Xinjiang Bayi steel company medium mill plant	65t/h蓄热步进梁式炉 65t/h regenerative walking-beam furnace	65	1	混合煤气 Mixed gas	1997.08
23	云南楚雄德胜公司棒材厂 Chuxiong Desheng bar mill plant,Yunnan province	130t/h蓄热推钢式炉 130t/h regenerative pushing furnace	130	—	焦炉煤气 COG	2003.05
24	首钢富路仕彩涂板生产线 Shougang Fulushi colour plate plant	化学涂层烘干炉、初涂烘烤炉、精涂烘烤炉 furnace for dry the immersion coating	—	3	焦炉煤气 COG	2003.03
25	新疆八一钢厂中型厂 Medium-sized mill plant Xingjiang-Bayi,steel plant	70t/h步进梁式炉 70t/h walking beam furnace	70	1	混合煤气 Mixed gas	2004.10
26	山西中阳高速线材厂 Zhongyang high speed wire rod mill plant,Shanxi province	120t/h步进梁式炉 120t/h walking beam furnace	120	1	混合煤气 Mixed gas	2004.07
27	首钢精品棒材厂 Shougang high quality bar mill plant	140t/h步进梁式加炉 140t/h walking beam furnace	140	1	高、焦炉混合气 Mixed gas	2005.10
28	西昌钢铁公司棒材厂 Xichang steel&iron company bar mill plant	100t/h蓄热推钢式加热炉 100t/h regenerative pushing furnace	100	1	高炉煤气 BF gas	2006.6
29	首钢中板厂1#炉 Shougang medium plate mill plant 1# furnace	120t/h蓄热推钢式加热炉 120t/h regenerative pushing furnace	120	1	混合煤气 Mixed gas	2005.04

PERFORMANCE REFERENCE OF REHEATING FURNACE FOR STEEL ROLLING

序号 NO	用户名称 USER NAME	炉子名称 FURNACE	产量 T/h	数量 Q. TY	燃料 FUEL	投产日期 DATE OF PRODUCTION
30	首钢（一线材）精品线材厂 Shougang high quality wire rod mill plant	120t/h步进梁式炉 120t/h walking beam furnace	120	1	天然气 Natural Gas	2005.12
31	首钢中板厂2#炉 Shougang medium plate mill plant 2# furnace	120t/h蓄热推钢式加热炉 120t/h regenerative pushing furnace	120	1	混合煤气 Mixed gas	2006.5
32	迁钢公司2160mm热带轧机工程 Shougang Qianan 2160mm Hot Strip Mill	250t/h步进梁式加热炉 250t/h walking beam furn	250	4	混合煤气 Mixed gas	2006.12
33	首钢京唐钢铁公司2250 mm 热带轧机工程 Shougang Jingtang 2250mm Hot Strip Mill	350t/h步进梁式加热炉 350t/h walking beam furnace	350	4	混合煤气 Mixed gas	2008.8
34	京唐钢铁公司1580 mm 热带轧机工程 Shougang Jingtang 1580mm Hot Strip Mill	280t/h步进梁式加热炉 280t/h walking beam furnace	280	4	混合煤气 Mixed gas	2010.4
35	迁钢公司1580 mm 热带轧机工程 Shougang Qiangang 1580mm Hot Strip Mill	270t/h步进梁式加热炉 270t/h walking beam furnace	270	2	混合煤气 Mixed gas	2009.12
36	迁钢公司1580 mm 热带轧机工程 Shougang Qiangang 1580mm Hot Strip Mill	150t/h高温硅钢加热炉 150t/h silicon steel reheating furnace	150	1	混合煤气 Mixed gas	2010.4
37	迁钢公司1580 mm 热带轧机工程 Shougang Qiangang 1580mm Hot Strip Mill	高温电磁感应加热炉 Electromagnetic induction heating furnace	—	1	电加热 Electricity	2010.8
38	迁钢公司1580 mm 热带轧机工程 Shougang Qiangang 1580mm Hot Strip Mill	220/445型罩式炉 220/445 bell type furnace	Max. 96t	12	天然气 Natural Gas	2010.12
39	迁钢公司冷轧项目 高温环形退火炉 High temperature rotary hearth annealing furnace of cold rolling mill Qiangang	环形转底炉、保护气氛 Rotary hearth furnace, protective atmosphere	100卷/炉 100coil/ furnace	2	天然气 Natural Gas	计划2011.06投产 Expected start-up time 2011.06