

# 2019

## 餐余垃圾处理系统沼气能源站





## 企业介绍 Enterprise Profile

南京东南工业装备股份有限公司是一家在全国中小企业股份转让系统（新三板）挂牌的公众公司。股票简称：东南股份，证券代码 832124。

东南股份于 2003 年成立，具备高新技术企业和双软企业资质。基于多年在机械故障早期发现与解决方案的研究，开发出柴油机主轴承温度及磨损监测系统、油雾浓度报警、油品质检测及过滤等产品，同时联合清华大学等高校开发出船用柴油机尾气脱硫脱硝一体化产品。

公司取得中国船级社 ISO9001:2015 质量管理体系认证、法国 BV 工厂认可、德国 GL 焊接工厂认可及 CCS、DNV-GL、LR、BV、ABS 及 NK 等世界主要船级社的船用产品证书。

Nanjing Southeast Industrial Equipment Corporation is a public company on the list of National Equities Exchange and Quotations (NEEQ). The abbreviation is Southeast Share and stock code is 832124.

Established in 2003, SECORP is a new high-tech enterprise and double software enterprise. With years of research on early detection of mechanical failure and finding solutions for it, we have developed diesel engine bearing temperature & wear monitoring system, oil mist concentration detection and alarm device, oil quality detection and oil filters, and jointly developed integrated marine engine exhaust gas desulphurization and denitrogenation products with Tsinghua University, etc.

We have obtained ISO90001:2015 Quality Management System Certification from China Classification Society, BV Factory Approval Certificate, and GL Recognition Certificate for Welding Workshop Process, and products certificates from CCS, DNV-GL, LR, BV, ABS, NK and other main classification society certificates of the world.

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## 项目背景 Enterprise Profile

垃圾处理的原则是无害化、减量化、资源化。垃圾焚烧发电因大大减少填埋而能够节约大量的土地资源，同时也减少了填埋对地下水和填埋场周边环境的大气污染。

根据我国现行政策，城市生活垃圾焚烧发电技术将以机械炉排炉为主导，辅以煤－垃圾混烧流化床垃圾焚烧技术和其他技术。按照日处理 1800 吨二段往复式垃圾焚烧设备计算，年发电量可达 1.6 亿千瓦时，可节约标准煤 4.8 万吨，年减少氮氧化物排放 480 吨、二氧化硫排放 768 吨。

“煤层气、生活垃圾填埋气、氧化氮等，是造成全球气候变暖的重要来源。”英国辛迪克碳基金中国及亚太地区总裁韩野炬认为，垃圾发电主要受一些技术或工艺问题的制约，比如发电时燃烧产生的剧毒废气长期得不到有效解决，所以有效减排的关键是采用先进技术。

据了解，我国年产城市生活垃圾约 1.5 亿吨，其中填埋占 70%，焚烧和堆肥等占 10%，剩余 20% 难以回收。其中垃圾发电率还不到 10%，相当于每年白白浪费 2800 兆瓦的电力，被丢弃的“可再生垃圾”价值高达 250 亿元。

根据《全国城镇环境卫生“十一五”规划》，2010 年全国城市生活垃圾清运量将达到 1.8 亿吨，无害化垃圾处理将达到 60% 以上。专家指出，如果到 2010 年，垃圾焚烧处理量占总垃圾产量的 10%，焚烧热能用于发电和供热，那么从现在到 2010 年，则需要新建日处理能力为 3.2 万吨的垃圾焚烧设备。

。垃圾发电与常规火力发电基本过程相同，但需设置密闭垃圾堆料仓，以防止污染环境；需设辅助燃料油供给系统，以解决垃圾热值低难以点燃的问题；废气要严格净化处理，以防止二次污染。

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## 项目案例 Project case



南京市鼓楼医院  
江北国际医院

南京鼓楼医院江北国际医院位于江北新区浦珠中路 359 号，属江北新区国际健康城的核心功能区，紧邻江北大道快速路，交通便利，是南京江北新区体量最大、医疗品质最高的综合医院，医院 1 期建筑面积 16.7 万，设有门急诊、病房、医技等部门，组建医疗“小综合体”，借助优化的流程设计、先进的诊疗设备，着力打造多个高精尖特色专科。

From simple generator to large-scale of transmission line, monitor any power of generation and distribution plants. Continuing development of power industry need efficient and reliable system in this field, SCADA , HMI and automation software are playing more and more important roles.

[illegible]

南京鼓楼医院江北国际医院（以下简称江北院区）位于江北新区浦珠中路 359 号，属江北新区国际健康城的核心功能区，紧邻江北大道快速路，交通便利，是南京江北新区体量最大、医疗品质最高的综合医院，能为江北及周边地区居民提供全方位高水平的基础医疗服务和部分高端特需服务。

From simple generator to large-scale of transmission line, monitor any power of generation and distribution plants. Continuing development of power industry need efficient and reliable system in this field, SCADA , HMI and automation software are playing more and more important roles.

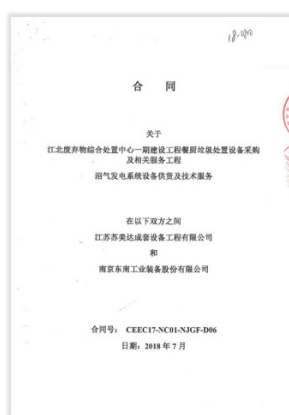


## 南京市江北废弃物综合处置中心（一期、二期）



南京江北废弃物处置中心一期工程二阶段新建 300 吨 / 天餐厨废弃物处理设施，包括预处理系统、湿式厌氧及脱水系统、沼气净化及利用系统、污水处理系统、沼渣干化系统等及配套的辅助生产设施。工程在现有一期工程用地内建设，项目建成后总餐厨垃圾处理规模 650 吨 / 天。

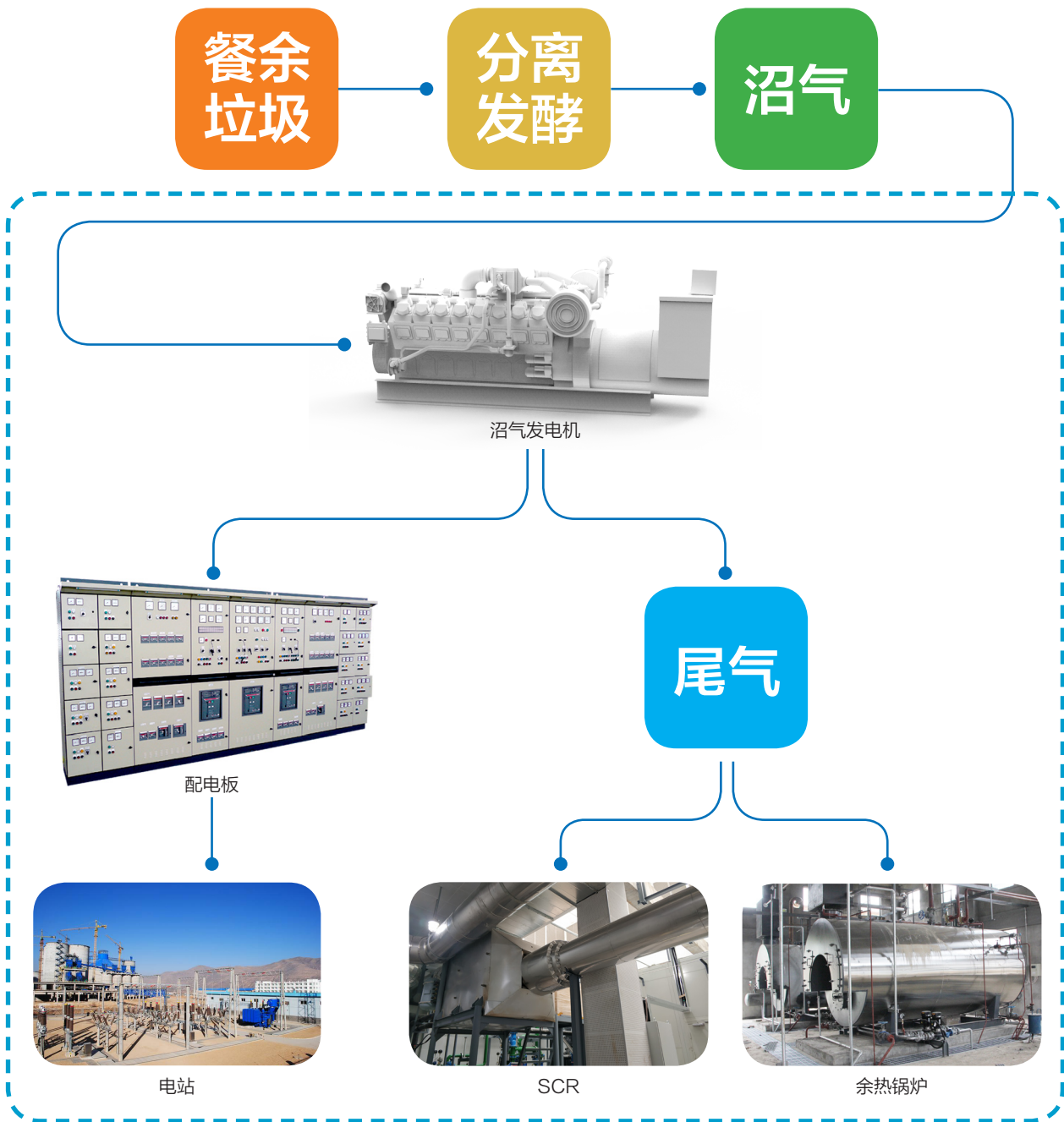
From simple generator to large-scale of transmission line, monitor any power of generation and distribution plants. Continuing development of power industry need efficient and reliable system in this field, SCADA , HMI and automation software are playing more and more important roles. From simple generator to large-scale of transmission line, monitor any power of generation and distribution plants. Continuing development of power industry need efficient and reliable system in this field, SCADA , HMI and automation software are playing more and more important roles.



项目一期合同



项目二期合同



## 供货范围 Scope Of Supply

- 气体机
- 选择性催化还原系统( SCR )
- 配电产品
- 数据采集与监视控制系统

Selective Catalytic Reduction system  
 Selective Catalytic Reduction system  
 Electrical Products  
 SCADA



# 全球服务 Global Services



## SE-CORP 东南股份

我们为陕柴重工在安提瓜与巴布达进行了服务  
我们为中高柴油机在巴基斯坦进行了服务  
我们为西霞口船厂在新加坡提供了服务  
我们为Consort在新加坡提供了服务  
我们为隆顺渔业在台湾提供了服务  
我们为中国建材在伊拉克提供了服务  
我们为紫金矿业在俄罗斯提供了服务  
我们为BPOB-RPCL PROERGEN LTD.,在孟加拉提供了服务  
.....  
我们还将继续在全球为我们的用户提供优质服务

We provided service for project of Shanxi Diesel Engine Heavy Industry Co., Ltd. in Antigua and Barbuda

We provided service for project of Consort in sigapole

We provided service for project of ZGPT Diesel Heavy Industry Co. Ltd. in Pakistan

We provided service for project of Xixiakou shipyard Co., Ltd. in Singapore

We provided service for project of LongShun Fishing Company in Taiwan.

We provided service for project of CNBM in Iraq.

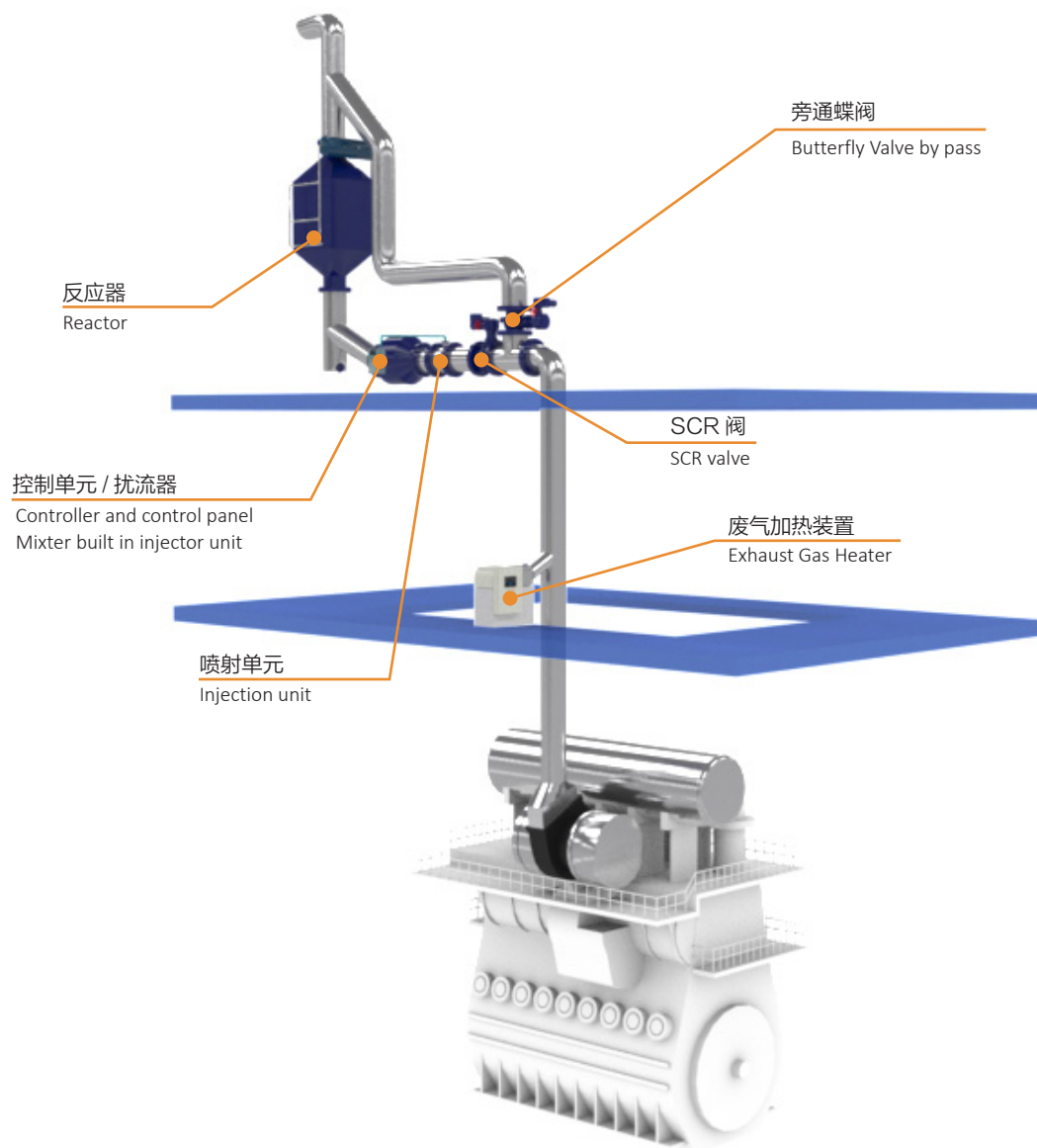
We provided service for project of Zijin Mining Group Co., Ltd in Russia.

We provided service for project of BPOB-RPCL Proergen LTD., in bengal

.....

We will continue to provide high-quality service for our users all over the world.

# 东南股份 SCR 系统 SECORP'S SCR System



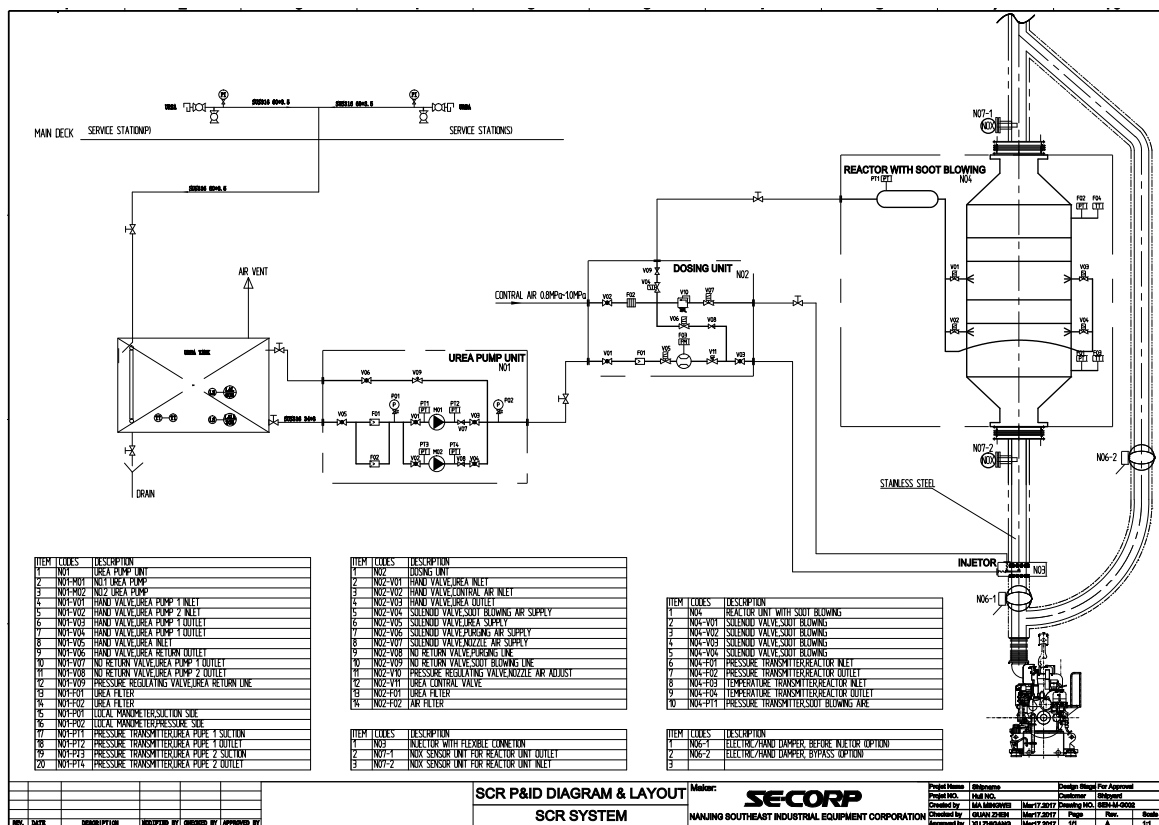
## SCR 系统配置表

### SCR System Configuration Table

- |  |   |                                       |
|--|---|---------------------------------------|
| 01. 反应器 (内置催化剂)<br>Reactor (built-in catalyst)   | 04. 扰流器<br>Mixer built in injector unit                       | 06. SCR 阀 (选配)<br>SCR valve           |
| 02. 控制单元 (内置尿素泵)<br>Controller and control panel | 05. NO <sub>x</sub> 测量单元<br>NO <sub>x</sub> detector (Option) | 07. 废气加热装置 (选配)<br>Exhaust gas heater |
| 03. 喷射单元<br>Injection unit                       |   | 08. 旁通阀 (选配)<br>Bypass valve          |



## 系统原理图 System Principle Diagram



## 工作原理 Working Principle

选择性催化还原是指：利用喷入的还原剂（尿素水溶液），在 300–450℃ 温度范围内，通过 SCR 催化剂作用，将烟气中的  $\text{NO}_x$  还原成  $\text{N}_2$  和  $\text{H}_2\text{O}$  的过程。该反应一般分为两个步骤进行：

Selective Catalytic Reduction refers to: the process to make the  $\text{NO}_x$  in the exhaust gas reduced to  $\text{N}_2$  and  $\text{H}_2\text{O}$  by SCR catalyst, with the injection of the reducing agent (ammonia water), under a temperature of 300-450℃. This reaction is generally divided into two steps:

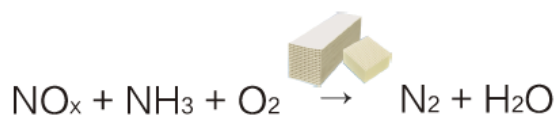
尿素溶液由于高温分解成  $\text{NH}_3$  和  $\text{CO}_2$

The high temperature induces thermal decomposition of the urea solution into  $\text{NH}_3$  and  $\text{CO}_2$



$\text{NH}_3$  在催化剂作用下与  $\text{NO}_x$  发生反应，将其还原成氮气  $\text{N}_2$  和水  $\text{H}_2\text{O}$

The  $\text{NH}_3$  reacts with  $\text{NO}_x$  under the action of catalyst to reduce it to  $\text{N}_2$  and water  $\text{H}_2\text{O}$ .

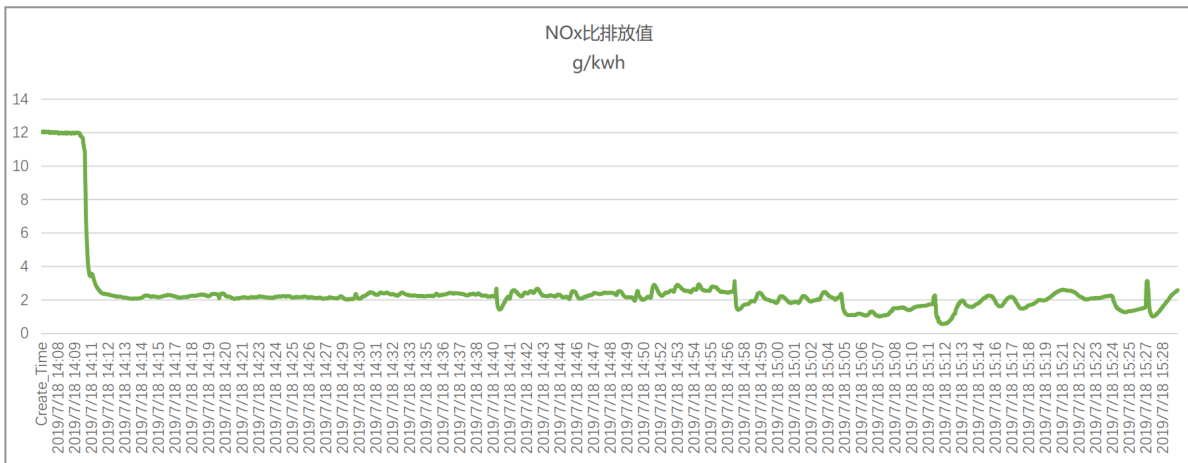


## 产品保障 Product Guarantee



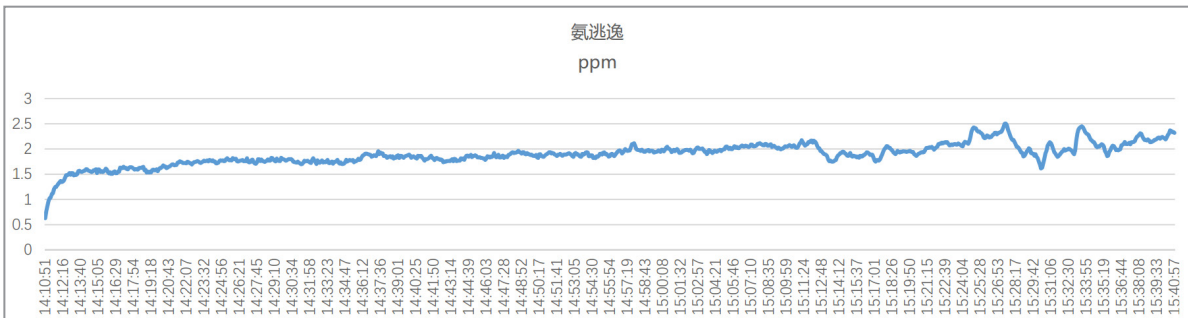
2019年7月18日, SCR 实机试验通过, 经过专业权威检测氨逃逸为 3ppm 以内。

On July 18, 2019, SCR's second real machine test passed, ammonia escape within 3 ppm was detected by professional authority.



根据试验数据以及加权系数, 得出实际 NOx 比排放值为 2.13g/kwh, 小于船级社要求标准。

Based on the test data and the weighting coefficients, it is concluded that the actual NOx emission ratio is 2.13g/kwh, which is less than the requirement of classification society.



根据试验数据, 实际氨逃逸浓度值平均值 1.96ppm, 小于船级社要求标准。

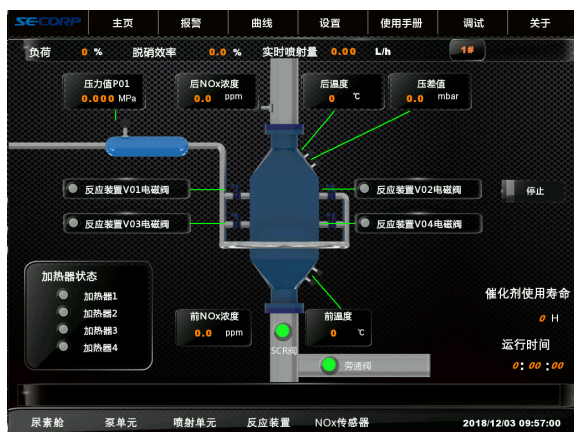
Based on the test data, the average value of actual ammonia escape concentration is 1.96 ppm, which is less than the requirement of classification society.



## 操作界面 Operation interface

优化的人机交互系统，操作者更加智能便捷的操作 SCR 系统。

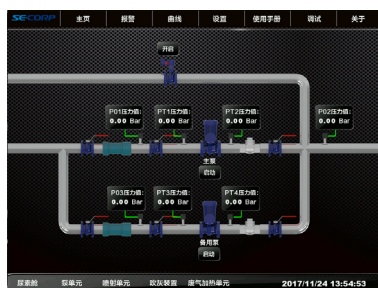
The optimized man-machine interaction system can make the operator to operate the SCR system intelligently and conveniently.



主页面 Main page



报警页面 Alarm page



泵单元 Pump unit



喷射单元 Injection unit

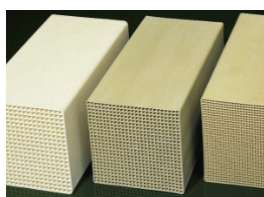


尿素舱单元 (选择项) Urea module unit(Optional)

## 关键部件 Key Components



喷嘴 Nozzle



催化剂 Catalyst



控制器 Controller

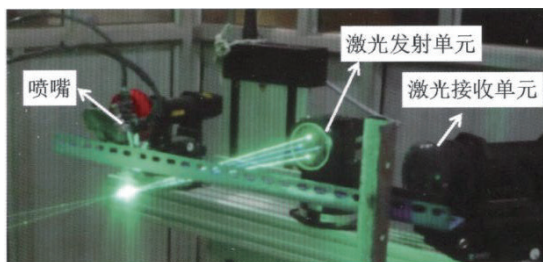
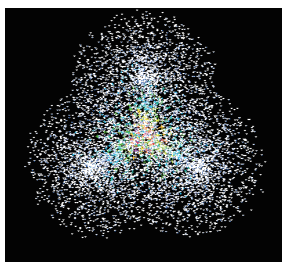
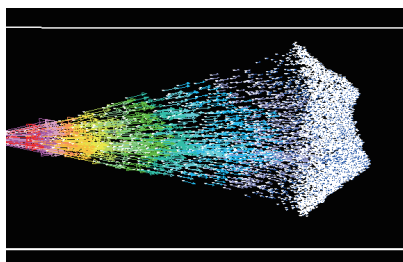


NO<sub>x</sub> 传感器 NO<sub>x</sub> Sensor

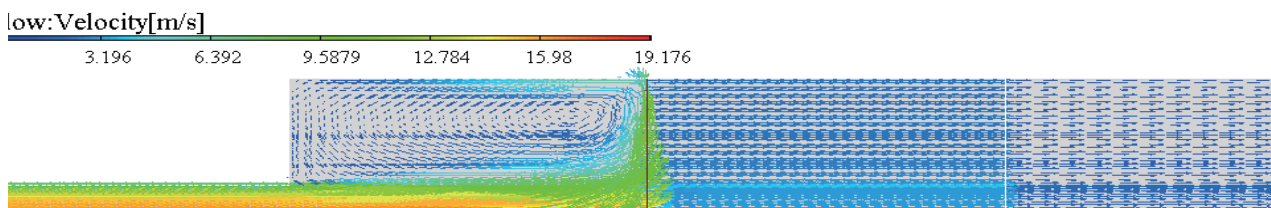


反应器 Reactor

## 尿素喷射设计 Design of urea injection



利用 PDPA 测量喷雾颗粒  
Measure mist by PDPA



催化器中的流场仿真  
Flow field simulation in catalytic converter



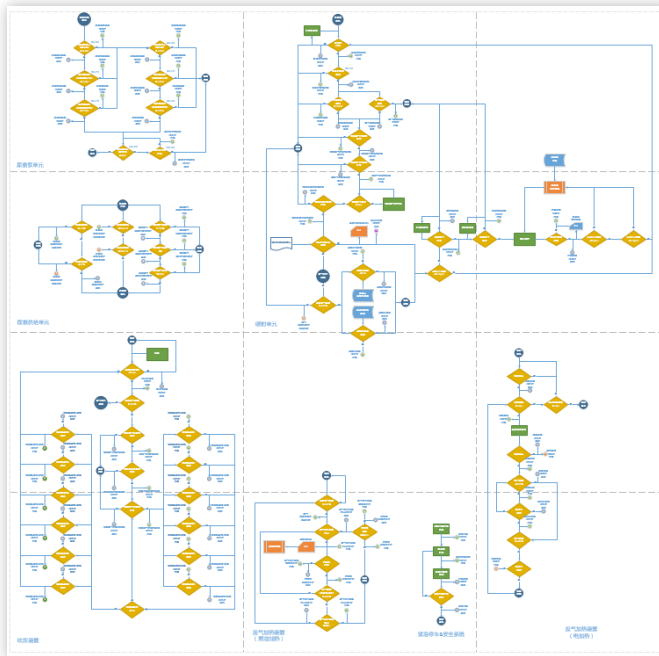
喷雾发展过程高速摄影图片  
Mist development process high-speed photography pictures

优化喷嘴和流场设计，能够更好的达到雾化效果，从而使反应剂和尾气充分混合反应，提高脱硝效率，降低氨逃逸。

The optimized nozzle and flow field design can achieve better atomization effect, so that the reagent and exhaust can be fully mixed to improve denitrification efficiency and reduce ammonia escape.



## 控制策略 Control Strategy



采用闭环控制策略，根据传感器反馈信号，提前预估 / 修正还原剂供应量，确保  $\text{NO}_x$  脱除效率的同时，减少氨逃逸现象。

我司 SCR 采用闭环控制策略，实时监控氮氧化物浓度，根据氮氧化物浓度控制喷氨，迟滞时间不超过 30S；同时，我司 SCR 中的催化剂采用微孔形式，具有一定的储氨功能。避免氨逃逸的问题。

With closed-loop control mode, estimate/modify the supply of reducing agent according to the feedback signal of sensor, to make sure the removal efficiency of  $\text{NO}_x$  and reduce the ammonia escape.

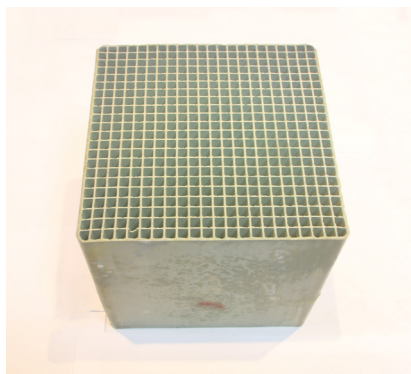
The SCR uses closed-loop control mode. It monitors the concentration of the  $\text{NO}_x$  real-time and control the ammonia spray according to the concentration with a delay no more than 30s. In addition to, the catalyst is microporous which can store some ammonia and avoid ammonia escape.

## 催化剂可再生 Catalyst regeneration

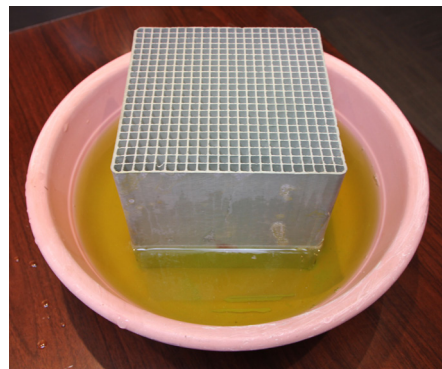
我司自 2003 年成立以来专注于设备安全保护与控制领域，通过柴油机的控制系统直接检测和控制 SCR 系统，达到柴油机和外围 SCR 系统的良好配合，公司拥有催化剂低温再生技术及催化剂配方的相关专利。

Since its establishment in 2003, the company has focused on the field of equipment safety protection and control. The SCR system can be directly detected and controlled through the control system of diesel engine, so that a good cooperation between diesel engine and peripheral SCR system can be achieved.

The company owns the related patents for catalyst regeneration under low temperature and catalyst formula.



再生完成的催化剂  
Regenerated catalyst



正在水洗的催化剂  
Washing catalyst

## 柴油机 SCR Diesel engine SCR

SCR 烟气脱硝技术最高可达 90% 以上的脱硝效率，是最为成熟可靠的脱硝技术。该技术的关键是在保证脱硝效率的同时有效控制  $\text{NH}_3$  的逃逸率和  $\text{SO}_2$  的转化率，以保证 SCR 系统的安全稳定运行。

SCR De- $\text{NO}_x$  technology is the most mature and reliable denitration technology with a maximum denitration efficiency of more than 90%. The key to this technology is to effectively control  $\text{NH}_3$  escape rate and  $\text{SO}_2$  conversion rate while ensuring denitration efficiency, so as to ensure the safe and stable operation of SCR system.



### 产品适用范围

- 船舶废气
- 重油电站
- 燃油与燃煤锅炉

### Scope of application

- Ship exhaust gas
- Heavy oil power station
- Oil-fired and Coal-fired Boilers

## 气体机 SCR Gas engine SCR

燃气机由于气源中的碳氢化合物含量波动较大，导致尾气中热力型  $\text{NO}_x$  波动较大，如还原剂喷射量不能及时适应，可能造成氨逃逸或  $\text{NO}_x$  超标排放，在气源中的碳氢化合物较高时，缸内燃烧温度较高，也造成排温达到  $550^\circ\text{C}$  以上。催化剂寿命剧减。

The content of the hydrocarbons in the gas of gas engine changes frequently that makes the thermal  $\text{NO}_x$  in the exhaust changes frequently, if the injection of reducing agent can't adapt these changes timely, it may cause ammonia escape or  $\text{NO}_x$  emissions excessive. When the hydrocarbons content in the gas is high, the combustion temperature is more than  $550^\circ\text{C}$ . The catalyst life is greatly reduced.



### 产品适用范围

- 瓦斯电站
- 沼气电站
- 天然气电站
- 燃气锅炉

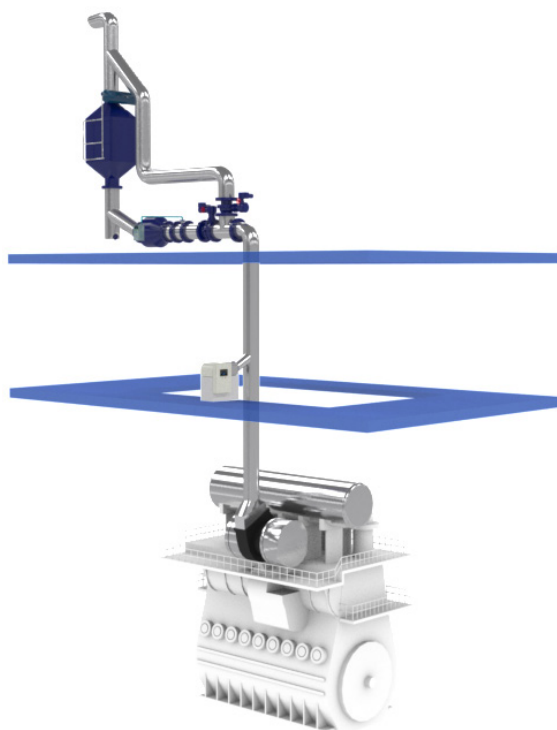
### Scope of application

- Gas power station
- Biogas power station
- Natural gas power station
- Gas fired boiler

## 布置图 Layout drawing

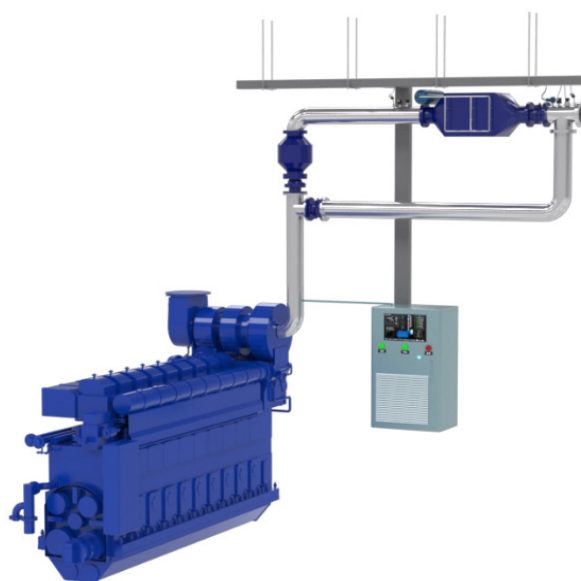
### 低速机布置图 Layout for low-speed engine

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### 中高速机布置图 Layout for high-speed engine

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MD190-M 船用组合型低压开关柜（以下简称 MD190-M）是 ABB 采用模数化组合型低压开关柜理念，专门为船舶和近海工程研发设计的低压开关柜。

技术标准符合 IEC60092、AS3439-1、BS5486-1、EN60439-1、IEC60439-1 等国际标准和 GB/T11634-2000、GB7251-1 等中国标准。同时满足 CCS、LRS、ABS、DNV、BV、GL 和 NK 等船级社的规范要求。

MD190-M combination low-voltage switchgear cabinet (hereinafter referred to as MD190 - M) for marine is a kind of low-voltage switchgear cabinet designed for marine and offshore engineering by ABB based on the concept of modularized combination low-voltage switchgear cabinet. The technical standards conform to the international standards IEC60092, AS3439-1, BS5486-1, EN60439-1 and IEC60439-1, the, and the Chinese standards, GB/T11634-2000 and GB7251-1. It also satisfy the specification requirements of the classification society of CCS, LRS, ABS, DNV, BV, GL and NK.

## 产品特点 Product features

- 采用 ABB 全系列低压电器元件，包括：Emax 空气断路器、Tmax 塑壳断路器、A 系列接触器、TA 系列热继电器、PST \ PSTB 软启动器、PLC 可编程控制器和变频器等，组成完善及可靠地低压配电系统。  
ABB full series of low-voltage electrical components are used, including Emax air circuit breaker, Tmax series molded case circuit breaker, A contactor, TA series thermal relay, PST \ PSTB soft starter, PLC programmable controller and frequency converter, which consist of a complete and reliable low-voltage distribution system.
- 柜体采用高强度的型材以及螺栓连接，增加开关柜结构的稳定性。  
The cabinet body is made of high strength profiles and connected by bolts, which increase the stability of the switch cabinet structure.
- 采用模数化框架的柜体，其宽度、深度和高度可根据设计方案灵活变化。  
The width, depth and height of the modular cabinet framework can be varied according to the design plan.
- 固定分隔式和抽出式单元组件可自由组合，通用性好、组装灵活、适应性强。  
The fixed cellular type and draw-out unit components can be combined freely, make the cabinet universal, assembly flexible and adaptability strong.



ABB 为了拓展船舶配电产能，考核了国内具有相关资格的工厂。我司于 2017 年 4 月通过 ABB Licence 考核并获得 ABB 品牌授权和专利授权。

ABB 公司将会对授权厂家提如下四个方面来确保我司配电相关产品达到 ABB 产品的国际质量要求。

In order to develop marine power distribution capacity, ABB visited and examined the domestic factories with relevant qualification. In April, 2017, our company has passed the ABB Licence examination and obtained the ABB brand licensing and patent licensing.

ABB present following four aspects for licensees to ensure the related power distribution products can reach the international quality requirements of the ABB products.

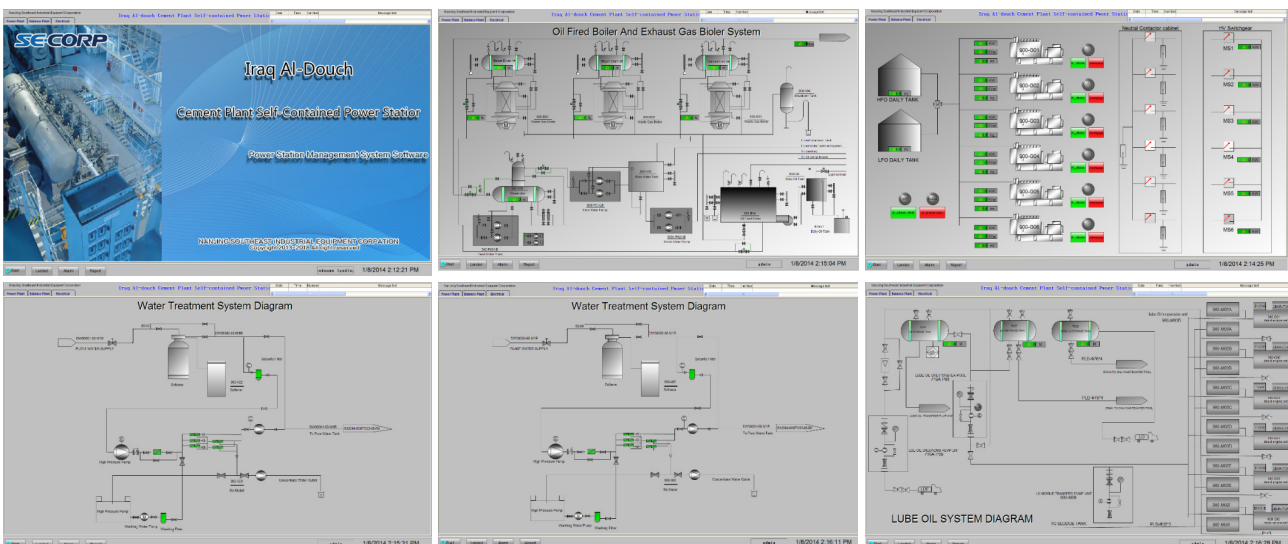
- 技术支持：ABB 提供设计、安装、工艺、调试等培训及技术指导。  
Technical support: ABB provides training and technical guidance for design, installation, process and commissioning.
- 生产辅助：ABB 提供元器件、柜型及专业技术人员驻场监造，满足 ABB 质量体系。  
Production assistant: ABB provides components and panel type, and assign technical personnel for field supervision, to meet the ABB quality system.
- 质量检测：ABB 进行质量管控及检测，确保达到国际标准并授予 ABB 品牌标识。  
Quality inspection: ABB carries out quality control and testing, to satisfy the international standards and award ABB brand identity.
- 售后服务：ABB 公司船舶业务全球服务网络中心提供全球售后服务。  
After-sales service: ABB vessel global business services network center provides global after-sales service.



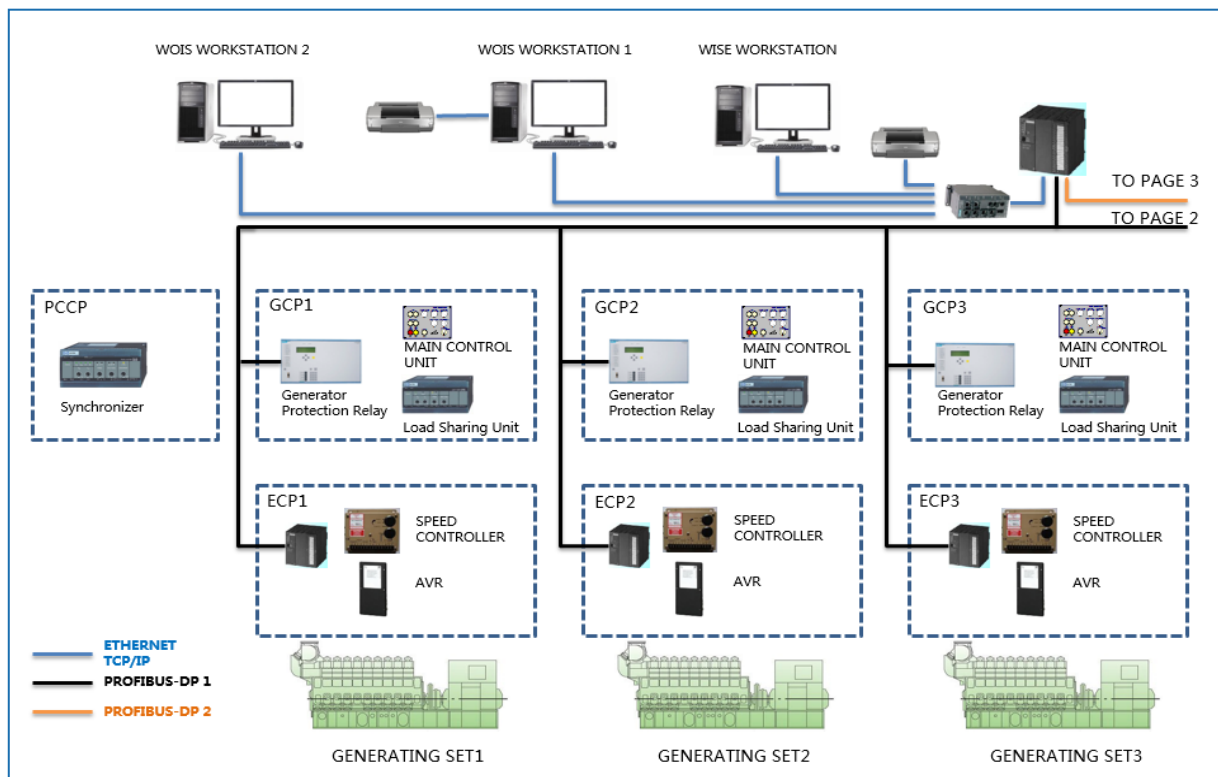
# 数据采集与监视控制系统 SCADA



- 电力工业的基本要求是：一个高效的配电系统和短暂的停机时间。  
Basic requirements for electric power industry: efficient distribution system and short downtime.
- 东南公司提供的解决方案能够有效地监控电力生成系统。  
We offer solutions to monitor the electricity generation system effectively.
- 从简单的发电机到大规模的传输线，能监控任何的电力生成和分配工厂。电力工业的持续发展需要高效可靠的系统因此在这个领域，SCADA，HMI 和自动化软件正在起着越发重要的作用。  
From simple generator to large-scale of transmission line, monitor any power of generation and distribution plants. Continuing development of power industry need efficient and reliable system in this field, SCADA , HMI and automation software are playing more and more important roles.







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