KC Cottrell

KC Cottrell Co., Ltd.
Head Office
160-1 Donggyo-dong, Mapo-gu, Seoul, 121-817, Korea
TEL +82.2.320.6114
FAX +82.2.320.6100
www.kc-cottrell.com

Factory
253 Singi-ri, Seoun-myeon, Anseong-si, Gyeonggi-do,
456-853, Korea
TEL +82.31.674.9660
FAX +82.31.674.9670

KC Cottrell China Co., Ltd.
No.9576 Donghuancheng Rd., Changchun Economy &
Development Zone, Changchun City, Jilin Province,
130033, P.R. China
TEL +86.431.8587.7500
FAX +86.431.8587.7522
www.cckc.com.cn

KC Cottrell Vietnam Co., Ltd.
Floor 6, VINAFCO building, No. 36 Pham Hung street,
Tu Liem District, Ha Noi, Viet Nam
TEL +84.4.768.9904/5
FAX +84.4.768.9902

KC Cottrell Co., Ltd. Taiwan Branch
15F-7, No.77, Sec.1, Shintai 5th Rd., Shijr City,
(Far East World Center) Taipei, 221 Taiwan
TEL +886.2.2698.8139
FAX +886.2.2698.8179

KC Cottrell Co., Ltd. Beijing Branch
Room1002 Tianheng Bldg, No. 46 Dongzhimenwai Rd.,
DongchengQu, Beijing, 100027, P.R.China
TEL +86.10.8460.8738/9
FAX +86.10.8460.8732

Lodge Cottrell

Lodge Cottrell Ltd.
21 George St, Birmingham, B3 1QQ, England
TEL +44.121.214.1300
FAX +44.121.200.2555
www.lodgecottrell.com

Lodge Cottrell Inc.
2319 Timberloch Place, Suite E, The Woodlands,
TX, 77380, USA
TEL +1.281.465.9498
FAX +1.281.465.9366
www.lodgecottrell.com

Lodge Cottrell India Pvt. Ltd.
7F Park Centra Tower-B, 32nd Milestone, NH8,
Sec.30, Gurgaon Haryana 122001, India
TEL +91.124.331.5278
FAX +91.124.331.5277

KC Cottrell

De-NOx Systems

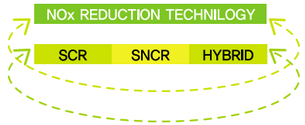
A Global Leader in Air Pollution Control

- People & Technology keeping our planet sustainable...

The main removed method of NOx gas, that is created by Fuel burning processes, is using a reducing agent. This process converts NOx into harmless gases, N_2 and H_2O. The reducing agents usually are Anhydrous Ammonia, Aqueous Ammonia, Urea Solution. The injection amount and position are decided based on the De-NOx method and removal efficiency.

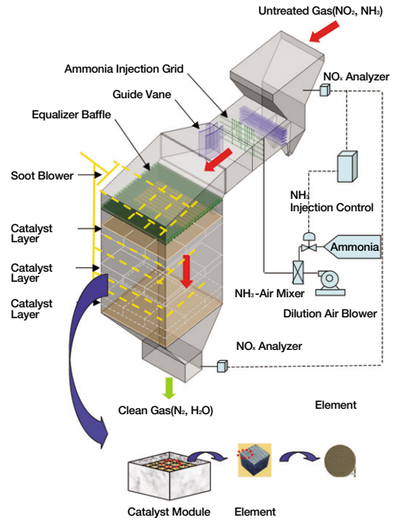
$$4\ NO + 4\ NH_3 + O_2 \rightarrow 4\ N_2 + 6\ H_2O$$
$$2\ NO + (NH_2)_2CO + 1/2O_2 \rightarrow CO_2 + 2N_2 + 2H_2O$$

• Main Reaction for NOx Reduction



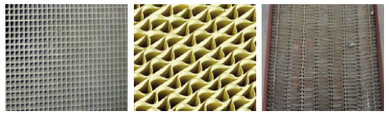
1 SCR (Selective Catalytic Reduction) Process

SCR technology enables reduction of nitrogen oxide even with low activation energy by passing flue gas through a catalyst layer after mixing a reducing agent. The SCR process uses a catalyst that selectively reacts with nitrogen oxide in flue gas. It has the highest removal efficiency among de-NOx technologies and stable operation.



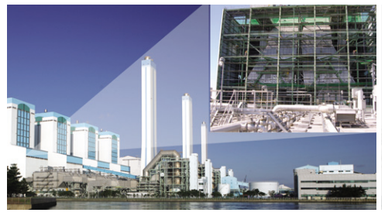
Advantages
- High NOx removal efficiency (over 90%)
- Minimal NH_3 slip due to use of optimal amount of reducing agent
- Operation at high SO_2 concentration
- Low conversion rate of SO_2 to SO_3
- Equipped with device for even flue gas distribution into the reactor
- Regular catalyst activation test and reporting
- Savings in catalyst replacement cost due to catalyst regeneration and reuse
- Optimal reactor design using CFD
- High quality technical service
- Ease in injecting and decomposing catalyst

Reducing agents & Types of Catalyst
- Reducing agents : Anhydrous ammonia,
  Aqueous ammonia,
  Urea solution
- Catalyst : Formation $V_2O_5/WO_3/TiO_2$



• Honeycomb Type Catalyst • Corrugated Type Catalyst • Plate Type Catalyst

Projects
- Dangjin Thermal Power Plant Units 1~4 500MW X 4, Korea (2006)
- Taishan Thermal Power Plant Unit 5 600MW, China (2006)
- Gwangyang Ferronickel Plant (POSCO), Korea (2007)
- Gwangyang Sintering Plants 1~4 (POSCO), Korea (2008)



• Dangjin Thermal Power Plant

• Taishan Thermal Power Plant

• Gwangyang Ferronickel Plant

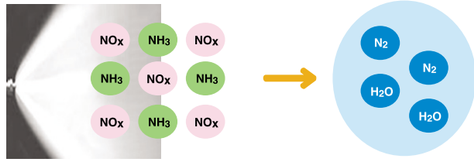
• Gwangyang Sintering Plants 1~4

2 SNCR (Selective Non-Catalytic Reduction) Process

SNCR technology is used to remove nitrogen oxide in a high temperature range (850℃~1050℃) by directly injecting a reducing agent into the sidewall or duct of a furnace. The required NOx removal efficiency can be obtained through precise injection within an appropriate temperature range. A key design factor for performance is the location of the injection nozzle for the reducing agent.

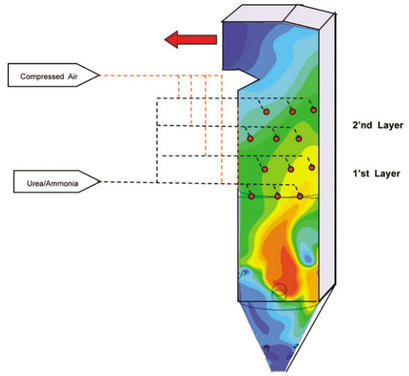
• CFBC Boiler, LG Chem

Advantages
- Low investment
- Can be used during low load operation of the boiler
- NOx removal efficiency
- Stable NOx removal efficiency
- Minimal NH_3 slip due to use of optimal amount of reducing agent
- Optimal nozzle location through CFD
- High quality technical service



• Two fluid Nozzle

Reducing agent
- Anhydrous ammonia
- Aqueous ammonia
- Urea solution



• SNCR Process

Projects
- Sunglim Oil & Chemical company, Korea (2003)
- Taiwan Taoyua International Airport (Chiang Kai-shek International Airport), Taiwan (2000)
- Yoecheon Plant, KCES company, Korea (2004)
- CFBC Boiler, LG Chem company, Korea (2008)

3 Hybrid System (SCR + SNCR)

A hybrid process combining the merits of SCR and SNCR can be arranged depending on a plant's features and economic analysis.