



## LP Amina Hybrid SNCR/SCR Technology Dairen Chemical, Jiangsu, China

- > *NO<sub>x</sub> reduced below 0.08 lbm/MMBtu*
- > *Ammonia slip less than 2 ppm*
- > *UBC values at pre-retrofit levels*
- > *Simplified system design that uses smaller amount of reagent reducing initial investment and future capital cost*

## Dairen Chemical Corp.

Dairen Chemical Corporation (DCC) is a joint venture between Chang Chun Group (Chang Chun Petrochemical and Chang Chun Plastics) and Nan Pao Resins in 1979. The main function of DCC is to manufacture and supply VAM, a main raw material for production of PVA and PVAc. Company is headquartered at Taipei, Taiwan and has multiple plants throughout China and South East Asia. LP Amina installed its proprietary Hybrid De-NOx technology at the DCC's plant at Jiangsu Province, China, achieving high performance NOx reduction with a cost-effective customized solution.

### Customer & Location

Dairen Chemical Corporation  
China, Jiangsu Province, Yangzhou Industrial Complex

### Plant Equipment

UG-75/5.3-M8 boilers provided by Wuxi Boilers Co. Ltd  
Natural circulation, single drum, corner fired coal boilers  
Boilers operate at 75 metric t/h, with the drum pressure of 5.3 MPa

### Reagent

40% aqueous urea

### Objectives

- Under normal operations, NOx emissions after the retrofit less than 0.08 lbm/MMbtu (6% O<sub>2</sub>, dry);
- Post retrofit ammonia slip less than 3ppm;
- SO<sub>2</sub>/SO<sub>3</sub> conversion rate of the boiler guaranteed to be less than 1%;
- NOx concentration after the SOFA system should be less than 0.3 lbm/MMbtu (6% O<sub>2</sub>, dry);
- 5 year catalyst life, with the usage of current type of coal guaranteed;
- Total system pressure drop must be less than 500 Pa.

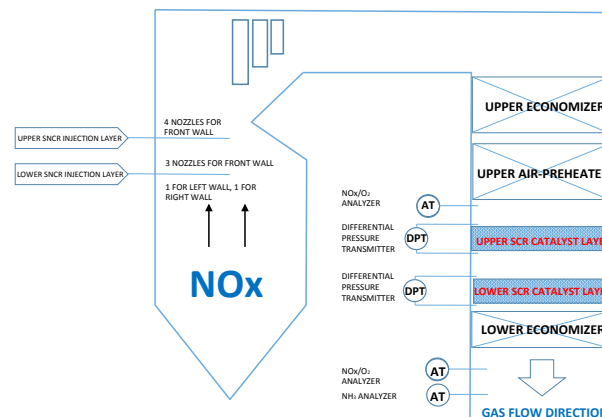
### Challenges

- Limited space for installation of catalyst and the steel support, after moving lower economizer downward;
- De-NOx system must be adjustable and efficient at different loads.
- The Hybrid project for Dairen Chemicals was a turnkey EPC solution, with a tight retrofit schedule and very challenging requirements from the client.

### LPA Solution

LP Amina carried out an assessment and analysis of the existing boiler, and made the first step of the Hybrid retrofit by performing boiler modifications that improve combustion system and eventually reduce NOx generation. This in-furnace boiler modifications is also known as an "LNB+SOFA", a pre-combustion solution that is cost effective, yet very efficient when paired with post-combustion technologies. As the second step, LP Amina applied its Hybrid technology to further capture NOx. The spraying area and the position of spraying guns were carefully chosen after precise CFD simulations of in-furnace temperature, duct airflows and reagent spraying area. LP Amina also replaced the old air preheater with a more efficient and anti-blocking tube air preheater to provide more space for catalyst.

LP Amina's unique hybrid De-NOx design utilized the reagent that didn't react at the SNCR stage and pushed it over to SCR area, thus significantly lowering the amounts of catalyst used and reducing the ammonia slip.



Schematic Arrangement of In-Duct SNCR & SCR



Boiler Flue Gas Duct



Ammonia Storage Tanks

### Results

Very successful retrofit, with overall NOx reduction of 82%. Post retrofit NOx emissions don't exceed 0.08 lbm/MMbtu. Ammonia slip is less than 2 ppm and UBC values unchanged from pre-retrofit levels. Moreover, LP Amina's Hybrid design reduced overall amount of the catalyst consumed, lowering the initial investment and future capital cost.