

# NOx

가

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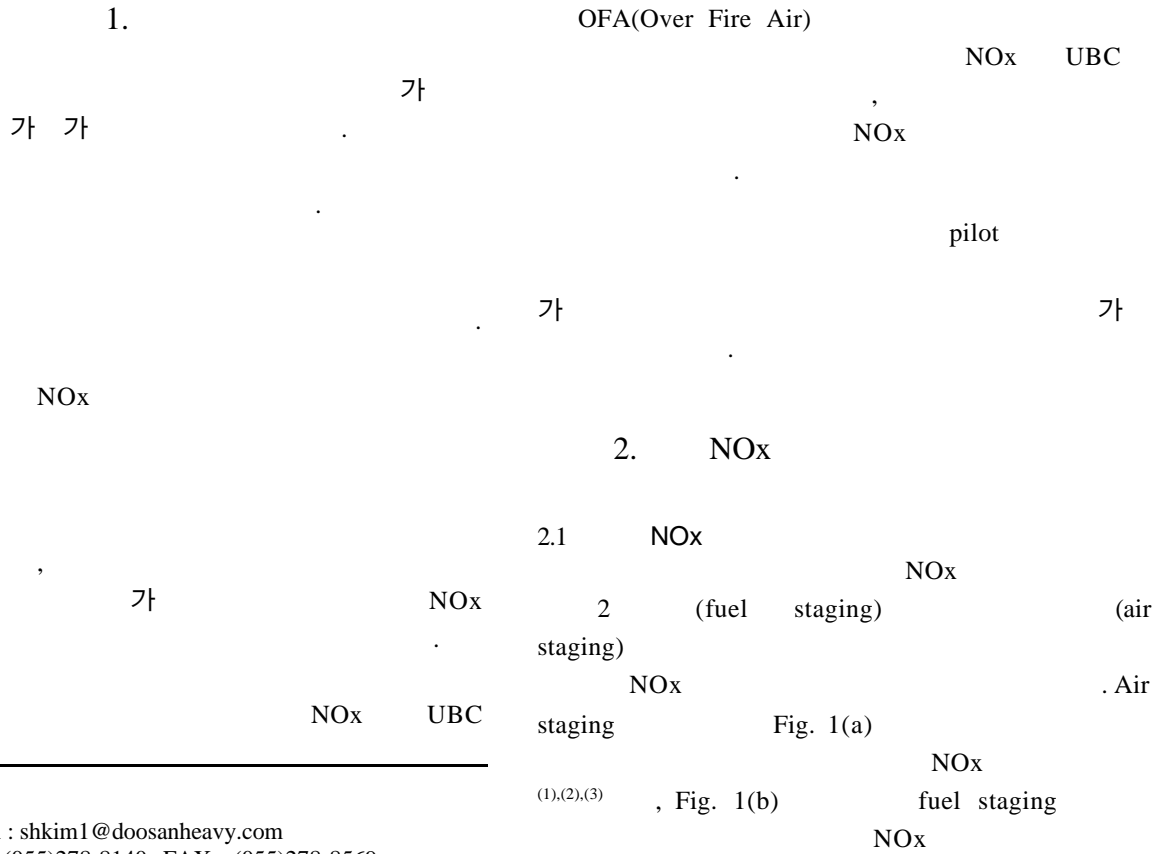
## Performance of Low NOx Coal Burner in Industrial Coal Fired Boiler

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**Key Words :** Burner( ), Boiler( ), Coal( ), NOx( ), UBC( )

### Abstract

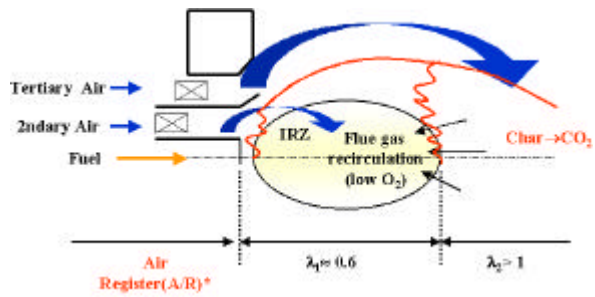
Increasing environmental pressures to reduce NOx emission are being placed on coal-fired boilers. To meet the environmental requirements, Doosan Heavy Industries & Construction Co., Ltd.(Doosan) has developed low NOx pulverized coal burner. Low NOx pulverized coal burner has already delivered, and it's combustion performance was evaluated to the NOx and Unburned Carbon(UBC) during the commissioning tests. The test results are shown that the strong relationship is existed between NOx and OFA flow rate, and also fuel-N fraction of coal has effected on NOx emission.



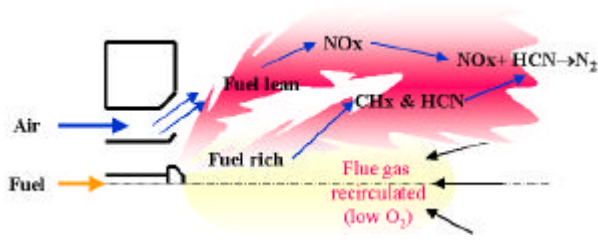
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(a) Air staging



(b) Fuel staging

**Fig. 1** Combustion Concept of Low NOx Burner

Fuel staging    air staging

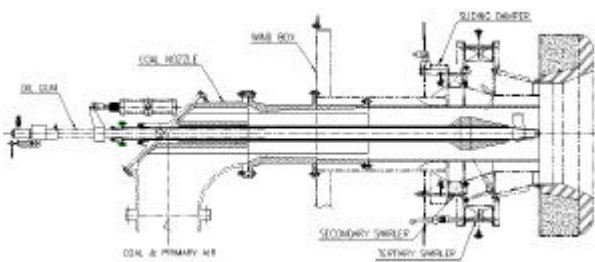
AR(Air Register)  
air staging

fuel staging

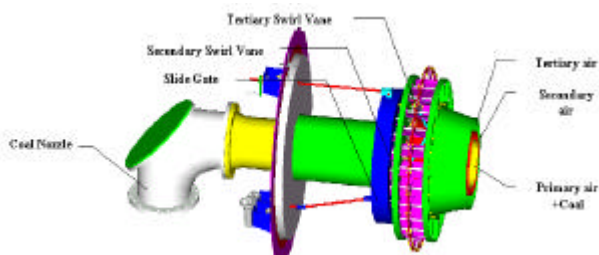
pilot

CFD

NOx



(a) Sectional View of Low NOx Burner



(b) Low NOx Burner

**Fig. 2** Low NOx Burner

NOx

Fig. 2(a) (b)

NOx

가

2 3  
2

slide

damper

air staging

3

(Swirler)

(4),(5)

HUVIS( )

4000kg/hr

NOx

2.2

1987

HUVIS( )  
100kg/cm<sup>2</sup>, 520°C

130ton

130ton/hr

HUVIS

가가

2003

NOx

NOx

250ppm(@6% Q)  
가 가

OFA port

가

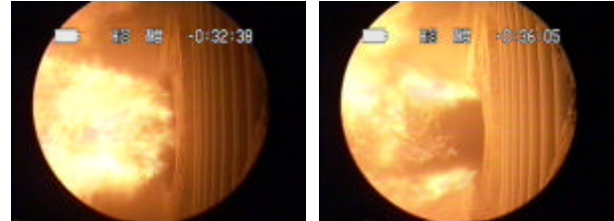
OFA port 2

Picture 1



Picture 1 Installed Burner

, picture 3 OFA 가 가 가  
가 가  
가



(a) 88% load (b) 100% load

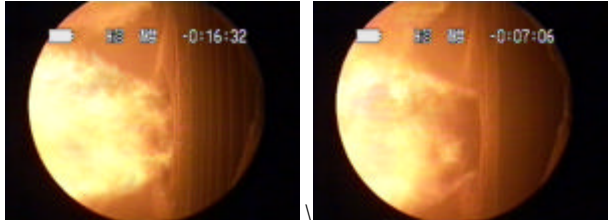
Picture 2 Flame Shape with Boiler Load

3. 가

3.1 가 가

NOx 가가 가 , NOx  
UBC 가 . 가

table1 .



(a) OFA/TCA= 9.3 % (b) OFA/TCA= 13.9%

Picture 3 Flame Shape with OFA Flow

Table 1 Coal Analysis

(wt%)		(wt%)
7.18	C	76.30
8.33	H	4.63
31.71	N	0.86
52.78	S	0.41
100.00	Ash	8.97
	O <sub>2</sub>	8.83
(kcal/kg)		100

3.3 NOx UBC

NOx UBC Fig.3  
가 NOx 가  
UBC 가 가  
NOx 가 가  
가 가

NOx UBC 가  
sampling probe 가 UBC NOx  
TESTO 350 XL 가 O<sub>2</sub>, CO, CO<sub>2</sub>  
NOx  
UBC  
endoscope

thermal NOx 가 가  
NOx 가 . 가 가  
가  
50%  
가 NOx 가

3.2

OFA  
OFA

. Picture 2

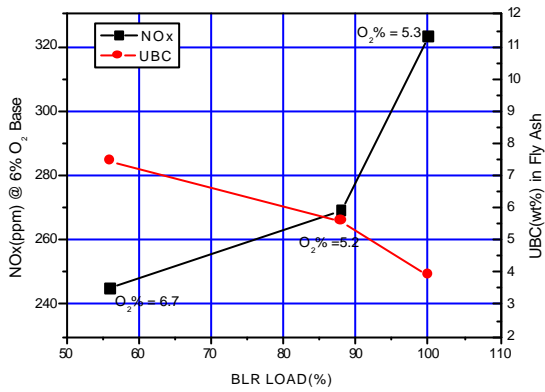


Fig. 3 Emission vs. Boiler Load

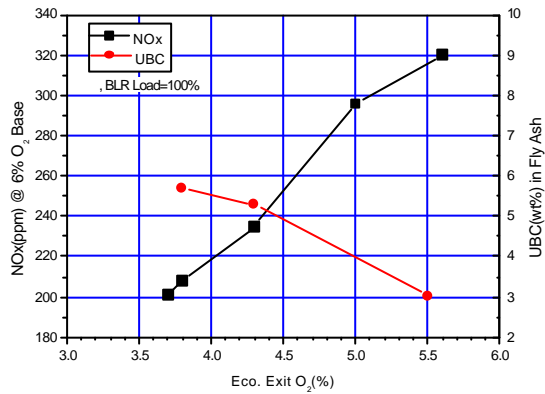


Fig. 4 Emission vs. Eco. Exit Oxygen Concentration

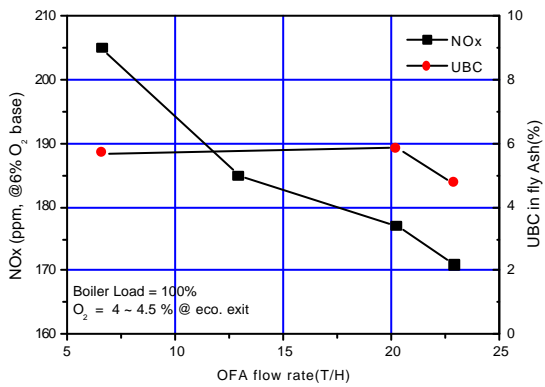


Fig. 5 Emission vs. OFA Flow Rate

Figure 4

가 NOx  
 NOx UBC  
 NOx

가 UBC  
 NOx  
 OFA port  
 가 Fig.5  
 가 NOx  
 , UBC  
 . UBC 가 NOx  
 OFA 가

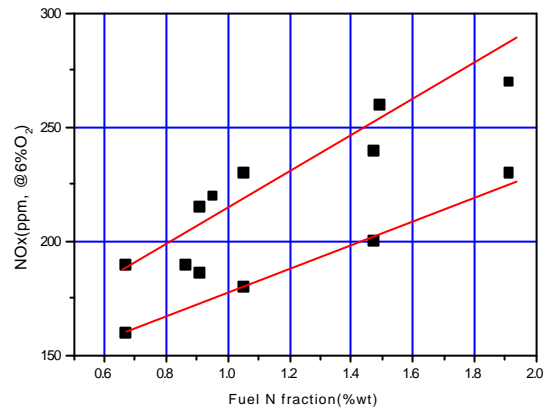


Fig. 6 Characteristic Curve between NOx and Fuel-N Fraction

Fig.6  
 NOx fuel-N  
 가 fuel-N NOx  
 가 (6),  
 (7),  
 (8) NOx  
 가 (9)

4.

Pilot  
 NOx  
 130ton/hr  
 가 NOx

250ppm(@6% O<sub>2</sub>)

Loss Combustion Technology on Pulverized Coal Combustion (Part3)", CRIEPI Report, W88031

가 가  
 NOx 가 UBC  
 NOx UBC  
 가  
 2 (OFA)  
 NOx  
 가

HUVIS( )

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