

Accepted Manuscript

Effect of Outer Secondary Air Vane Angles on Combustion Characteristics and NO_x Emissions for Centrally Fuel Rich Swirl Burner in a 600-MWe Wall-fired Pulverized-coal Utility Boiler

Shuguang Ti, Zhichao Chen, Zhengqi Li, Kuang Min, Qunyi Zhu, Lizhe Chen, Zhenfeng Wang

PII: S1359-4311(17)30469-6
DOI: <http://dx.doi.org/10.1016/j.applthermaleng.2017.05.180>
Reference: ATE 10495

To appear in: *Applied Thermal Engineering*

Received Date: 21 January 2017
Accepted Date: 27 May 2017

Please cite this article as: S. Ti, Z. Chen, Z. Li, K. Min, Q. Zhu, L. Chen, Z. Wang, Effect of Outer Secondary Air Vane Angles on Combustion Characteristics and NO_x Emissions for Centrally Fuel Rich Swirl Burner in a 600-MWe Wall-fired Pulverized-coal Utility Boiler, *Applied Thermal Engineering* (2017), doi: <http://dx.doi.org/10.1016/j.applthermaleng.2017.05.180>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Effect of Outer Secondary Air Vane Angles on Combustion Characteristics and NO_x Emissions for Centrally Fuel Rich Swirl Burner in a 600-MWe Wall-fired Pulverized-coal Utility Boiler

Shuguang Ti^a, Zhichao Chen^{b,*}, Zhengqi Li^b, Kuang Min^c, Qunyi Zhu^b, Lizhe Chen^b, Zhenfeng Wang^d

^a Faculty of Building Environment Engineering, Zhengzhou University of Light Industry, Zhengzhou 450002, P.R. China

^b Faculty of Energy Science and Engineering, Harbin Institute of Technology, Harbin 150001, P.R. China

^c Faculty of Maritime and Transportation, Ningbo University, Ningbo 315211, P.R. China

^d Faculty of Mechanical and Electrical Engineering, Henan Agricultural University, Zhengzhou 450002, P.R. China

Abstract: To solve the high NO_x emissions associated with a 600 MWe utility boiler with enhanced-ignition axial control low NO_x (EI-XCL) burners, continuous improvement of the previously proposed centrally fuel-rich (CFR) burner technology lies on three aspects: (1) the 36 EI-XCL burners in the original furnace were retrofitted with CFR burners; (2) the 26 over fire air (OFA) ports in two layers have been added above the burners along the top row of the furnace; (3) the designed OFA ratio was 25%. Industrial-size measurements (i.e., adjusting outer secondary air vane angle of 20°–30°) uncovered that, compared with the prior EI-XCL burners, the CFR burner exhibited the same good ignition performance and the O₂ concentrations near the side walls were found to be above 6% when the secondary air mass flow rate of the burner decreases about 37% for all three outer secondary air vane angles. The NO_x emissions decrease from 316 to 237 mg/m³ (O₂=6%) when outer secondary air vane angle varies from 20° to 30°. Under the optimal outer secondary air vane angle, NO_x emissions were found to decrease by 60.50% at a load of 600 MWe subsequent to retrofitting of the boiler.

Key words: NO_x; burner; pulverized coal; boiler; outer secondary air vane angle

*Corresponding author: Tel.: +86 451 86413231; Fax: +86 451 86412528.
Email address: chenzc@hit.edu.cn (Z.C.Chen)

Download English Version:

<https://daneshyari.com/en/article/4991243>

Download Persian Version:

<https://daneshyari.com/article/4991243>

[Daneshyari.com](https://daneshyari.com)