

Supporting Information for
Influence of Staged-air on Airflow, Combustion Characteristics and
NO_x Emissions of a Down-fired Pulverized-coal 300 MWe Utility
Boiler with Direct Flow Split Burners

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Figure Caption

FIGURE S1. Small-scale cold experiment system and layout of the measurement points.

Note:

Introduction to four types of down-fired boilers and the major differences between them

Four types of down-fired utility boilers are manufactured: the Foster Wheeler (FW) boiler, the Babcock & Wilcox (B&W) boiler, the Stein boiler and the Mitsui Babcock Energy Limited (MBEL) boiler. The major differences between them are the burner's type and arrangement and air distribution into the furnace.

FW boilers are equipped with direct flow pulverized-coal burners enriched by double-cyclones and circular primary air nozzles, while B&W boilers employ swirl pulverized-coal burners. Stein boilers utilize direct flow split pulverized-coal burners without enrichment of primary air/fuel mixture flow. MBEL boilers also use direct flow split pulverized-coal burners but with primary air/fuel mixture flow enriched by cyclones.

With respect to the arrangement of the burners and air distribution, MBEL boilers have an uneven grouping on arches, but the other three types have burners uniformly arranged on arches along the furnace width. FW boilers have fuel-rich and flow-lean flows arranged on arches and secondary air injected from the front and rear walls into the furnace. For both B&W and Stein boilers, the primary air/fuel mixture flow and secondary air are arranged on arches, while the vent air and staged-air are sent into the furnace from the front and rear walls. However, fuel-rich and flow-lean flows and secondary air for MBEL boilers are all arranged on arches, and only staged-air is sent into the furnace from the front and rear walls. Air mass flux ratios are about 80% on arches and 20% below arches for B&W, Stein and MBEL boilers, while the ratios for FW boilers are about 30% on arches and 70% below arches.

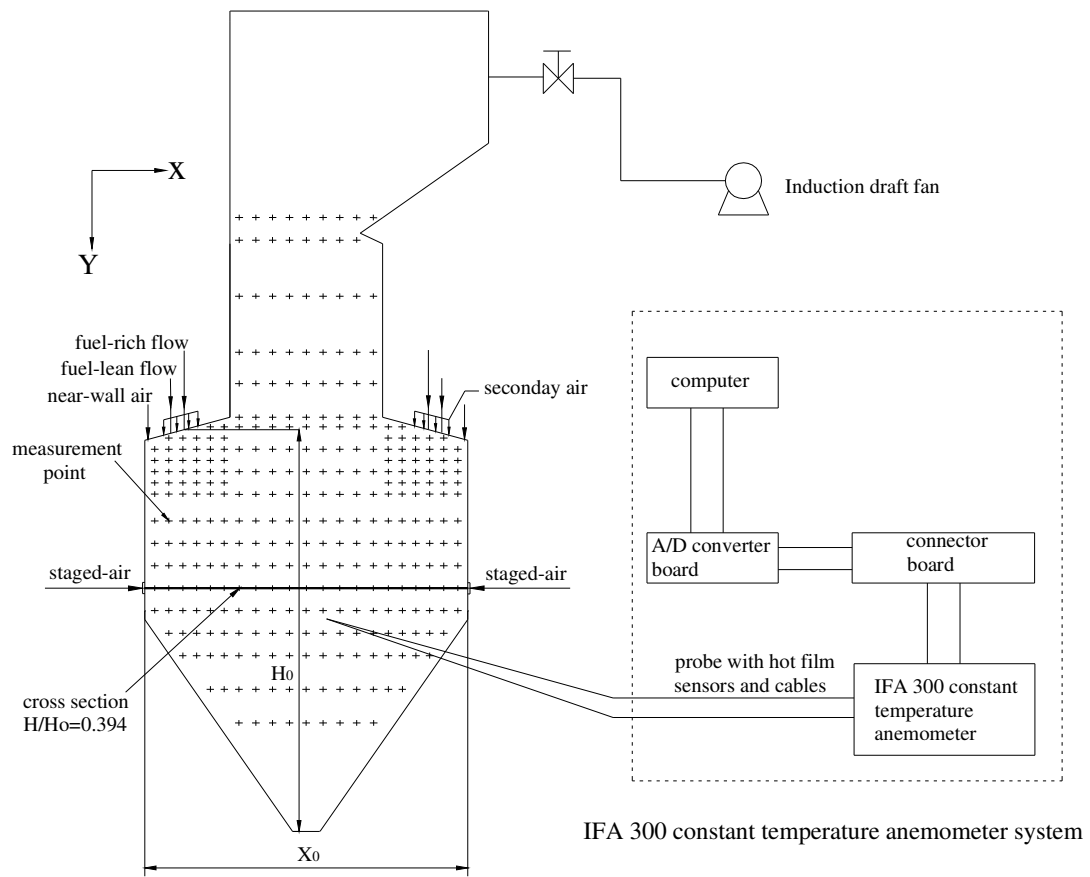


FIGURE S1