

Development of high performance radiant tube burner for indirect heat treating facilities

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This study has been carried out to minimize NO_x emission and to enhance temperature uniformity of the radiant tube burner. Full-scale combustion tests were performed for various types of burners using the experimental furnace and a field line. In this study, burners for 6 in. and 7 in. radiant tubes were tested and developed independently. It has been known that the conventional air-staged combustion was not satisfactory to suppress the NO_x emission of lower than 150 ppm. NO_x emission from 6 in. radiant tube was higher than that from 7 in. tube probably due to higher combustion intensity in the radiant tube. As additional measures for NO_x reduction, a biased fuel nozzle and a combustion tube enabling internal gas recirculation were designed and tested to show improved combustion performance. Optimization tests for the combustion tube and flow simulation were carried out to derive design criteria of the burner. By adopting internally recirculating combustion tube, temperature uniformity and low NO_x performance were greatly enhanced. NO_x emission of less than 130 ppm was accomplished with the developed burner.