

Combustion control of a boiler based on the simultaneous measurement of oxygen and carbon monoxide

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This study has been carried out to improve combustion control system of a boiler by applying oxygen control technology incorporated with CO measurement. A gas analysis station composed of a flue gas sampling system, an infrared analyzer and zirconia-based oxygen analyzers was installed at the flue of the boiler. On the basis of measured concentrations of oxygen and carbon monoxide, a feedback control of oxygen concentration was enabled to control air flowrate adequately.

It was shown that the present control system works well with sufficient accuracy and reliability. A simulation for the target concentration of oxygen in the flue gas was performed to show that the optimal value of oxygen concentration is little affected by the changes in fuel flowrates and compositions. The optimal concentration of oxygen varied in the range of 1.3 to 1.5%, which suggested fixing the set point value for oxygen control. The measurement of CO concentration was effective for precise control of oxygen concentration to minimize heat loss of the flue gas to the environment.