

## Development of a partial combustion burner for oxygen preheating

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This study has been carried out to develop a heat-resistant oxygen preheater for enhancing coal combustion rate in the blast furnace. An experimental apparatus enabling partial combustion of gaseous fuel was prepared. Several burner models were fabricated to test the preheating performance and to optimize design parameters required for oxygen preheater. As a result, a two-staged oxy-fuel burner was developed to supply oxygen for combustion and cooling independently. The overall oxygen ratio was determined as 10 with same ratio of oxygen supply into cooling and combustion section. It was found that the fuel velocity is the key factor for the temperature distribution on the burner surface. It was important to inject fuel faster than oxygen to avoid hot spot at the vicinity of the fuel nozzle. The oxygen temperature issuing from the preheating burner was strongly dependent on the oxygen ratio. The preheating temperature was reduced with the increase in the oxygen ratio. Under proper burner design and operating conditions, the developed burner showed acceptable combustion performance for oxygen preheater for high temperature application.