

## Application**brief**

- Eclipse Product:** Emission Reduction System with Preheated Combustion Air
- Submitted by:** Allan Roughton, Wirth Gas Equipment
- Application:** Aluminum Heat Treating
- Description:** Retrofit of Aluminum Heat Treating Furnace with Flue Gas Recirculation

A southern California aluminum heat treating facility wanted to increase production and reduce NOx emissions on their 1000°F Drop Bottom Aluminum Heat Treating Furnace. The furnace was originally equipped with 16 Eclipse TFB075 burners installed in 3.5 inch diameter U Tubes, firing at a maximum rate of 325 KBtu/hr each or 5.2 MMBtu/hr for the furnace.

The company enlisted the assistance of Robertson Instrument Company, Inc. of southern California to redesign the furnace. The furnace was rebuilt with sixteen 6 inch diameter U tubes and Eclipse TFB075 ThermThief burners with Bayonet recuperators (BR6) and Flue Gas Recirculation (FGR) devices. The BR6's were added to provide preheated combustion air, improving efficiency. The FGR device reduces NOx emissions by entraining flue gas with the preheated combustion air and supplies that to the burner. The effect reduces peak flame temperature and local oxygen concentration thus lowering NOx emissions. Each burner was to fire at 450 KBtu/hr giving a total gross input of 7.2 MMBtu/hr with preheated combustion air.



The South Coast Air Quality Management Department (AQMD) in California required that the total NOx production not be increased. The TFB075 burners alone were emitting around 75 ppm @ 3% O<sub>2</sub> (.091 lb/MMBtu) or .47 lb/hr NOx. The TFB burners with recuperators and FGR devices produced 45ppm @ 3% O<sub>2</sub> (.055 lb/MMBtu) or .40 lb/hr NOx.

The burners were tested by an independent contractor per AQMD test protocol and produced 40-45 ppm NOx. The installation was a huge success. Productivity was improved as the gross input was increased by 38% and the total surface area of tube was increased close to 65%. Overall costs were reduced as efficiency was increased all while lowering the NOx emissions 17%.



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**Eclipse Combustion**

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