

Application**brief**

- Eclipse Product:** Furnnox Burners
- Submitted by:** Alan Roughton and Jack Vinyard, Wirth Gas Equipment, Glendale, CA
- Application:** Forging of Alloy Jet Engine Parts
- Description:**

Carlton Forge Works of Paramount, CA is a leading producer of high quality speciality forgings. When they decided to build two new furnaces, they wanted to utilize burners and related combustion equipment that would produce the lowest possible NO_x emissions. Up to this point their best furnaces were using a competitors burners and were emitting about 45 ppm NO_x and 3% O₂ at 2000°F to 2200°F furnace temperature.

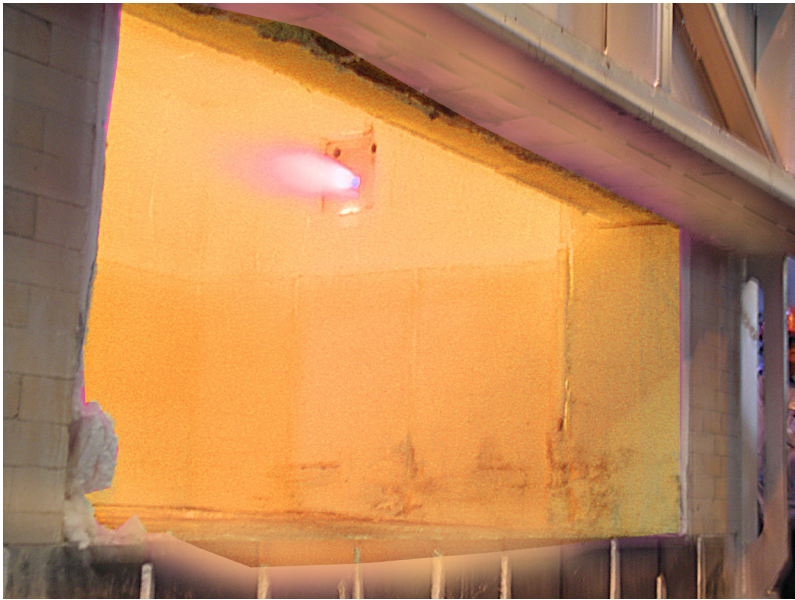
With the help of Wirth Gas Equipment and some on-site testing in a special furnace, it was decided to equip two new furnaces with Eclipse FNx0100 Furnnox burners rated at 1MM Btu/hr maximum. The burners are positioned near the crown on opposite side walls and staggered. The various furnace operations include frequent opening and closing of the front door to move out pre-heated parts and/or put in cooled parts after pressure treatment. The burners are controlled on ratio and 15% excess air, and are modulated to control a furnace temperature of 2000°F to 2200°F. In operation, the Furnnox burner forms a burning jet of rich flame. The addition of secondary air jets completes combustion in the furnace volume. As a result, a NO_x reduction was observed with no carbon monoxide in the furnace exhaust.

The burners were tested by an independent contractor per South Coast Air Quality Management Department (AQMD) test protocols and produced 34 ppm NO_x at 3% O₂ at 2100°F furnace temperature with 3.8% oxygen in the furnace exhaust. A reduction of excess air lead to further NO_x reduction in the furnace exhaust. For example, in one test NO_x was measured at 17.7 ppm at 3% O₂ with a furnace temperature of 1974°F and oxygen content in the exhaust of 1.8%. Carbon monoxide at these settings was only 25 ppm at 3% O₂.

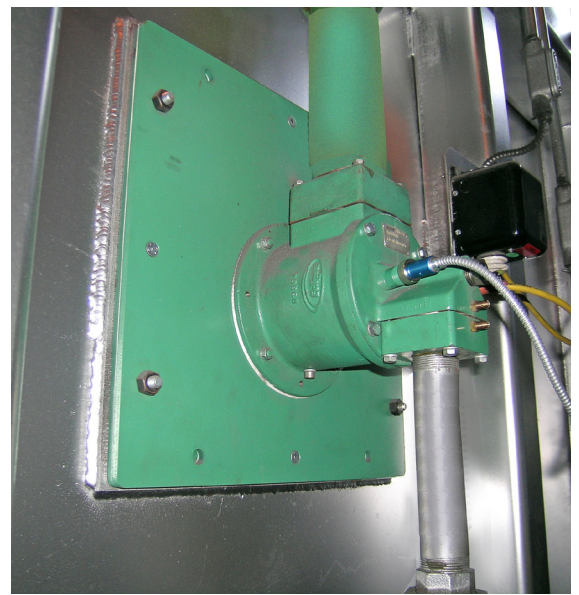
The introduction of the two new furnaces with Eclipse Furnnox burners allowed Carlton Forge to significantly reduce NO_x emissions and meet AQMD requirements. They are currently considering expanding their facility to allow for the construction of additional new furnaces equipped with Furnnox burners.



New forging furnace showing one of two Eclipse Furnnox burners.



Burner at high fire with two secondary air jets



Close up of Furnnox burner on Forging furnace



Views showing burner mounting locations at opposite ends. Burners are staggered to increase circulation and temperature uniformity