PRAXAIR®

Making our planet more productive℠

DOC Technology for Forge Furnaces

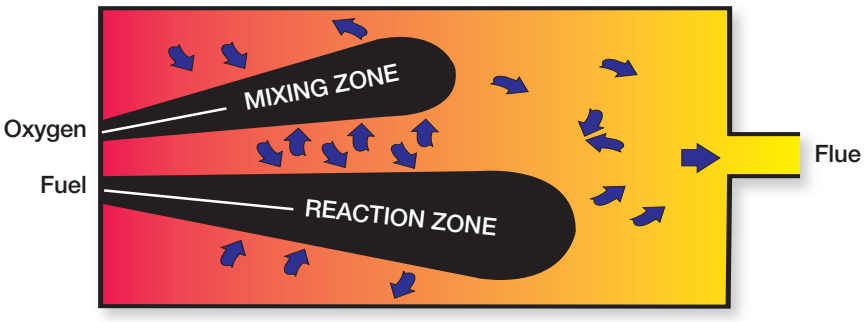
Praxair's Dilute Oxygen Combustion Technology Improves Forge Furnace Performance While Lowering Greenhouse Gas Emissions

Praxair's DOC technology provides forge furnace operators with a flexible, low cost solution to increase productivity, decrease fuel consumption and operating costs, as well as reduce emissions. This technology is based on decades of oxy-fuel combustion experience and represents the next generation of flameless combustion for steel reheating. DOC technology injects the fuel and oxygen into the furnace through separate ports, to create a diffuse, dilute oxy-fuel flame. The reactants mix with the hot furnace gases before reacting with each other. This dilution effect prevents high peak temperatures, creates high mixing and recirculation rates and more uniform temperature distribution in the furnace. The temperature distribution can be well within ±15° F of average temperature when surveyed per AMS-2750D. In addition, Praxair's DOC technology provides for excellent temperature response to upsets, such as the opening of furnace doors, reaching desired temperature ranges quickly and with minimal overshoot.

Temperature Uniformity

Setpoint (F)	Max Temp (+)	Min Temp (-)
1550	9	13
1850	10	14
2300	11	12

DOC burners are extremely compact, even allowing them to be retrofitted within the existing air firing system. This unique advantage provides operators with ease of installation and the flexibility to return to an air based firing system should the benefits of oxy-fuel combustion no longer be required.



DOC technology has been installed on:

- Forge furnaces
- Continuous steel reheat furnaces
- Batch reheat furnaces for steel and non-ferrous material

Praxair for Better Metals Production

Our DOC technology is just one example of how Praxair's dedicated team of engineers is working full time to provide our customers with the most advanced industrial gas supply and application technologies. This team is constantly working on new ways to discover how metals producers can use industrial gases to:

- Increase productivity
- Reduce costs
- Improve quality

For more information, call us at **1-800-PRAXAIR** or visit our website at **www.praxair.com.**

Commercial Results

- Superior control of temperature uniformity, exceeding specification of +/- 15° F of average temperature when measured per AMS-2750D. See chart.
- Fuel savings of 30 to 60% over conventional air-fuel combustion depending on specified soak temperature and load factor
- Excellent response to door opening upsets; reaching set-point within 2 minutes with minimal overshoot

Additional Benefits

- Productivity increase of 10-35%
- NOx emission levels less than 0.015 lb/MMBTU, equivalent to 12 ppm from air-fuel combustion
- Reduction of CO_2 emissions
- Simple, low-maintenance combustion system

Project Scope

When commissioning DOC technology at the customer's facility pursuant to a contract, Praxair typically will:

- Perform a full technical evaluation
- Design, manufacture, and install burners, including retrofit into existing air burners
- Provide gas flow control skid and control system
- Start up system and optimize results

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