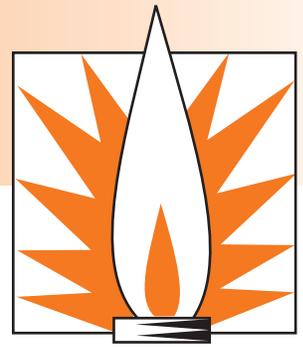


# COMBUSTION

## Project Fact Sheet



## ROTARY BURNER

### NEW ROTARY BURNER DESIGN MORE EFFECTIVELY MIXES AIR AND FUEL IN INDUSTRIAL COMBUSTION PROCESSES TO INCREASE FUEL EFFICIENCY AND REDUCE EMISSIONS

#### Benefits

- Increases fuel efficiency up to 4% versus conventional rotary and stationary burners
- Transfers heat more efficiently through heat radiation and convection processes
- Near perfect mixing of gas and air results in low nitrous oxide emissions
- Rapid combustion prevents flame impingement and quenching, a cause of carbon monoxide emissions and furnace erosion
- Suitable for limited space applications

#### Applications

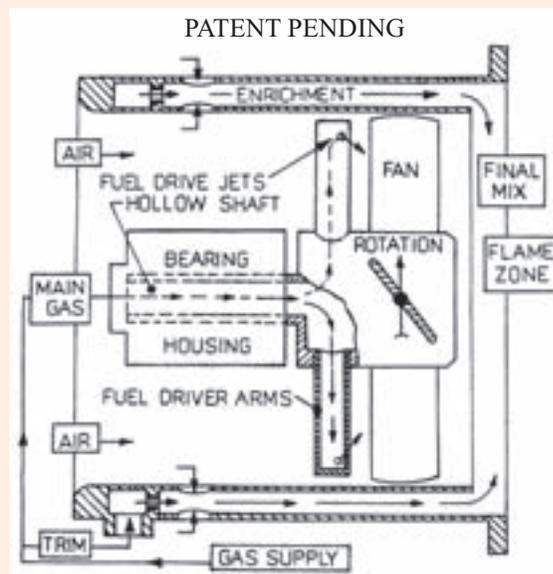
Potential applications for the new rotary burner exist in several industrial segments, including steel and other metals, petrochemical, glass, refineries, boiler, and food processing. Of these industries, the steel industry appears to have the most intense heat-treating and melting applications may be the most appropriate for the rotary burner product, especially in areas involving glass, steel, paint, ceramics, coatings, glass, brazing, curing, and shaping.

Rotary burners are not a new concept—they have been produced for over 60 years. Several companies have manufactured traditional “inspirator” burners for nearly half a century and continue to fabricate these same burners today.

Many substitute burner products are positioned to compete in the low-emission market. But these traditional burners require expensive electrical air-distribution systems to aid combustion. Typically, the air supplied by these distribution systems is not proportional to the gas supplied, resulting in wasted energy and increased emissions.

In contrast, a new rotary burner addresses the need to reduce emissions and energy costs in a variety of industrial-sector manufacturing and processing operations. The rotary burner’s primary distinguishing feature is its potential to provide fuel and electricity savings using a gas expansion technique to more effectively mix air and fuel for combustion, significantly increasing fuel efficiency and reducing emissions.

#### NEW ROTARY BURNER



The new rotary burner provides fuel and electricity savings by using a gas expansion technique to mix air and fuel for combustion.



## Project Description

**Goal:** Complete development and testing of the rotary burner on a prototype scale and move the product toward commercialization.

The rotary burner controls gas pressure to ensure the desired air-to-fuel ratio. Traditional burners allow excess pressure to dissipate wastefully through pressure-reduction valves. These traditional burners are commonly arranged in a multi-point network that requires an oversized air-distribution system to aid combustion, which is expensive due to the fan horsepower required.

Typically, the air supplied by an air-distribution system is not proportional to the gas supplied, resulting in wasted energy and increased emissions. The "free" pressure supplied by controlled gas-expansion eliminates the requirement for electric-fan driven air distribution. Its operation is based on the Bakers-Mill reaction drive principle, similar in concept to the hydrodynamics of a common water sprinkler. The result increased fuel efficiency (up to 4%) and reduced emission (below 0.01 lbs. per MMBtu or 1.0 vppm at low excess air [3.4% oxygen]).

Calcpo Engineering developed this new technology with the help of a grant funded by the Inventions and Innovation Program in the Department of Energy's Office of Industrial Technologies.

## Progress and Milestones

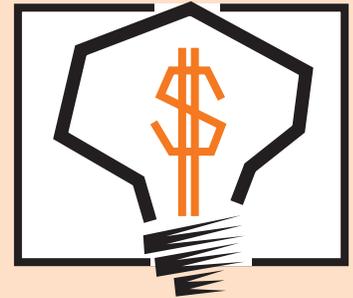
- A prototype, with an upper heat input limit of 5 million Btu, was field tested in a Louisiana gas plant, providing trouble-free continuous service for 4,000 hours and demonstrating the burner's potential reliability.
- In 1984, the rotary burner was assigned U.S. patent 4,480,790. Since then, the developer has improved the design and has a new patent pending.
- Separate work under a different contract is underway.

## Economics and Commercial Potential

The gas burners market is worth \$1.5 billion, including OEM sales, manufacturing, and related burner accessories. The low-emission segment of this market is estimated at \$200 million.

Commercial potential for the rotary burner exists in the glass, steel, petrochemical, metals, and boiler markets, among several others at the industrial level.

Market research has identified several possible opportunities for the rotary burner: a trend for reduced emissions on a national and global scale, a demand in the industry for high quality and reliability, a need for products that help save electricity and fuel costs, and a flexible heat range that allows the product to be utilized in multiple applications and industries. If the technology can successfully complete its development and testing phase, it may be capable of taking advantage of these opportunities.



The Inventions and Innovation Program works with inventors of energy-related technologies to establish technical performance and to conduct early development. Ideas that have significant energy-savings impact and market potential are chosen for financial assistance through a competitive solicitation process. Technical guidance and commercialization support are also extended to successful applicants.

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