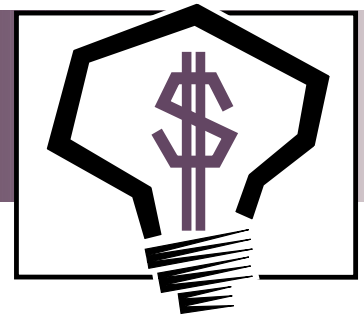


INVENTIONS & INNOVATION

Project Fact Sheet



MONOLITHIC REFRACTORY MATERIAL

BENEFITS

- Saves energy by reducing fuel requirements and heat loss
- Provides one-third the thermal conductivity of conventional material
- Outlasts conventional material by 5 to 8 times
- Allows processing in the "clean burn" range
- Increases rotary kiln production
- Significantly reduces downtime

APPLICATIONS

This material can be used by any industry using rotary kilns, including the forest products industry, and in varying applications in the steel, aluminum, and glass industries.

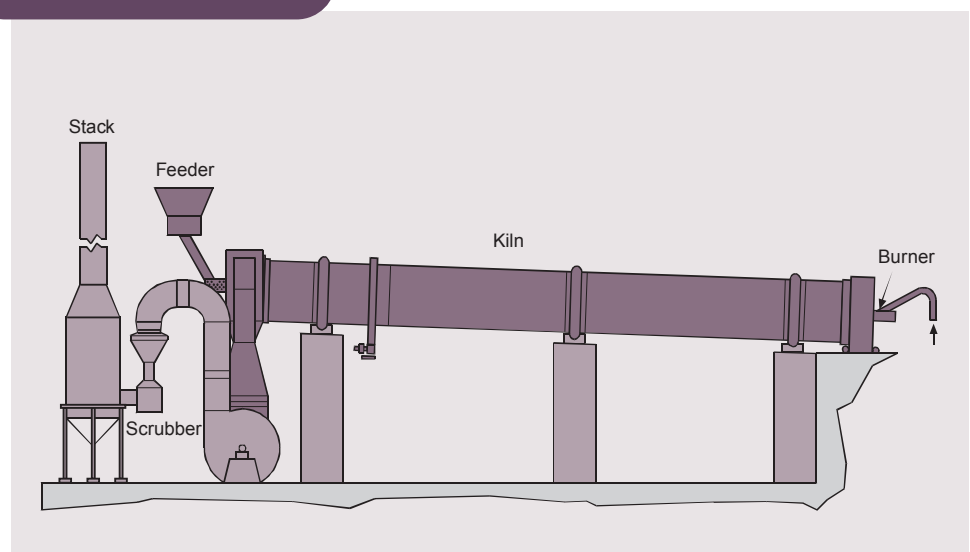
HIGH-TEMPERATURE REFRACTORY CERAMIC SAVES ENERGY

Industries worldwide have been searching for a refractory material that can handle higher operating temperatures and maintain wear resistance and thermal shock. Conventional materials have temperature limitations and require frequent replacement from wear and thermal shock. After many years of research, Trillium Thermo Technologies has developed G-5—a new refractory material. The new material offers greater dimensional stability, increased wear resistance, improved thermal shock characteristics, and lower thermal conductivity than conventional materials—and all at higher operating temperatures. Instead of conventional refractory bricks, G-5 can be sprayed onto the inside surface of the kiln, reducing downtime for refractory replacement.

G-5 improves fuel and process efficiencies in three ways:

- (1) Reduces stack losses by minimizing the volume of flue gas
- (2) Improves the feed-to-product conversion for a given amount of fuel
- (3) Reduces heat losses to the environment by lowering the temperature of the environmentally exposed surface of the process containment.

ROTARY KILN



A new refractory material, G-5, can be sprayed directly onto the inside surface of a kiln, reducing the downtime required to replace traditional refractory materials.



Project Description

Goal: The goal of the project is to test and validate Trilliam's G-5 refractory material. After the tests have been completed and validated, commercialization of the material will begin.

G-5 is designed for processing at elevated temperatures, allowing oxygen enrichment of combustion air for higher fuel efficiency and product capacity. Convection and radiant heat losses account for almost one-half of the energy input required to operate a lime kiln. Reducing surface temperature by 200°F using G-5 would result in a 5% energy input savings. Saving 5% of the heat load in all lime kilns in U.S. Kraft pulp mills would reduce their energy needs by 625,000 barrels of equivalent oil per year. Assuming the same heat load savings in all U.S. cement plants, 4,400,000 barrels of oil could be saved annually.

Trilliam Thermo Technologies is developing this new material with the help of a grant funded by the Inventions and Innovation Program through the U.S. Department of Energy's Office of Industrial Technologies.

Progress and Milestones

- The new material's final composition has been defined.
- Standard tests on the material have been initiated.
- Patents are pending for G-5.
- Test results have been validated to 2000°F.
- Plans are underway to test compression strength, heat transfer, and linear expansion at 4000°F+; to perform abrasion tests at 4000°F+; and to perform beta testing.



The Inventions and Innovation Program works with inventors of energy-related technologies to establish technical performance and 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.

PROJECT PARTNERS

Inventions and Innovation Program
Washington, DC

Trilliam Thermo Technologies
Pacific City, OR

FOR PROJECT INFORMATION, CONTACT:

Charles Flanagan
Trilliam Thermo Technologies
P.O. Box 339
Pacific City, OR 97135
Phone: (503) 965-7196 or
(888) 686-5763
Fax: (503) 965-4505

FOR PROGRAM INFORMATION, CONTACT:

Sandy Glatt
Program Manager
Inventions & Innovation Program
U.S. Department of Energy
1000 Independence Ave., SW
Washington, DC 20585
Phone: (202) 586-2079
Fax: (202) 586-7114
sandy.glatt@ee.doe.gov

Visit our home page at
www.oit.doe.gov

Office of Industrial Technologies
Energy Efficiency
and Renewable Energy
U.S. Department of Energy
Washington, D.C. 20585

