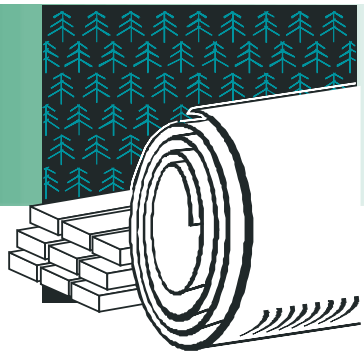
FOREST PRODUCTS

Project Fact Sheet



Laboratory Development of High-Capacity, Gas-Fired Paper Dryer

Benefits

- Minimized steam consumption
- Increased efficiency
- Decreased specific energy consumption
- Reduced NO_x emissions
- Higher drum temperatures
- Increased drying capacity
- Quick installation times
- Lower initial capital investment

Applications

The process improves the conventional drying process of paper and paperboard. This gas-fired dryer can be installed in new or existing equipment. Other potential applications include preheating, hot pressing, incremental drying, moisture profiling, and hot calendering.

Novel Combustion System Can Increase the Efficiency of the Drying Process

Paper drying is the most temperature-critical and energy and capital-intensive aspect of papermaking. In an effort to improve traditional drying systems, the Gas Technology Institute (GTI) is developing an innovative, new approach to drying paper that can significantly increase efficiency. The technology proposed by GTI is a natural gas-fired system that uses small dimples or cavities for combustion in a cylinder dryer. This innovative approach replaces current steam dryers, whose productivity is limited by drying capacity. By improving drying efficiency, this process can increase paper machine speeds and thus improve production rates.

GTI's objective is to design the natural gas-fired process to be more thermally efficient. Because of its higher heat transfer rate, the combustion system can increase the temperature reached by steam dryers. With drum temperatures of over 600°F, this process achieves drying rates that are significantly higher than those attained by the conventional system. High heat transfer rates also lower flame temperature in the dryer, substantially cutting NO_x emissions.

Gas-fired Combustion System Improves Drying Rates

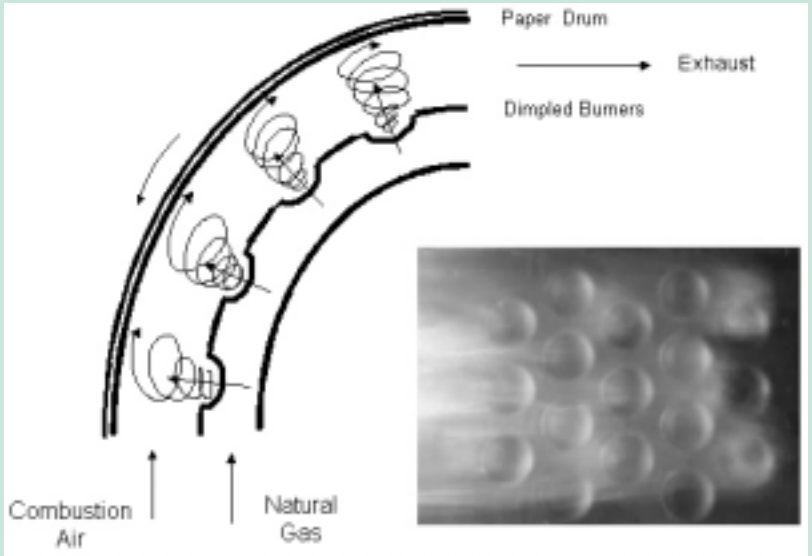


Figure 1. Gas-fired paper dryer dimple combustion concept.

Project Description

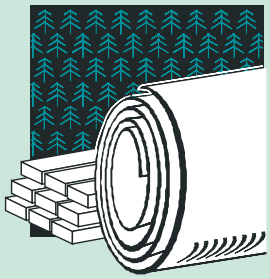
Goal: Provide experimental confirmation of the technical and economic feasibility of the dimple combustion concept for retrofits and new installations.

This natural gas-fired cylinder dryer involves combusting natural gas and combustion air in small dimples or cavities. Natural gas is injected into the dimples, while combustion air is supplied from the outside and normal to the dimples. The air flow creates vortices within each dimple, resulting in highly stable mini flames and uniform drum surface temperatures. The expected dryer efficiency is high because diffusion firing allows high levels of heat recovery to preheat combustion air. Additionally, since both radiant and convective heat transfer is accomplished, the exhaust temperature should be lower.

This two-phase project will begin with bench-scale laboratory testing. GTI will use stationary dimpled elements to define air and gas velocities and specifications for cavity diameter, depth, pitch, and patterns. During the second phase, researchers will build a pilot-scale dryer drum to be installed and evaluated at a pilot paper dryer site by project partners.

Progress and Milestones

- Researchers are currently designing a bench-scale unit for testing and optimizing combustion.
- Researchers will build, install and evaluate various performance metrics of a pilot-scale unit at a pilot paper dryer site.
- The resulting technology is expected to yield the following results:
  - Total energy savings of 5 trillion Btu annually
  - Total NO_x reduction of 700 tons annually



Project Partners

Boise Cascade Corporation
Boise, ID

Eclipse Combustion
Rockford, IL

GL&V/Black Clawson-Kennedy
Hudson Falls, NY

Gas Technology Institute
Des Plaines, IL

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