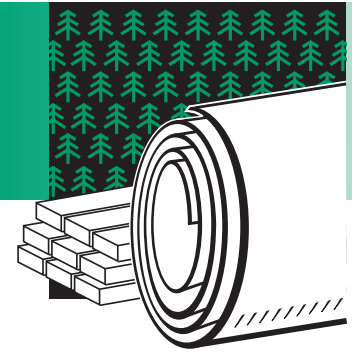


FOREST PRODUCTS

Project Fact Sheet



ACOUSTIC HUMIDITY SENSOR

BENEFITS

- Energy savings totaling as much as \$100,000 in a single paper mill annually
- Eliminates overdrying and improves product quality by measuring humidity precisely
- Rugged construction adds reliability and the ability to operate in hostile paper drying environments
- No moving parts
- Uses commercially available transducers
- May reduce the incidence of paper breaks during production
- Capital investment is small

APPLICATIONS

This sensor is designed to be used as part of a humidity control system in any application where the humidity of an exhaust stream is of concern, particularly in the paper and textile industries.

MEASURING HUMIDITY ACOUSTICALLY IMPROVES PAPER QUALITY, LOWERS ENERGY USE

Manufacturers of paper and textiles tend to overdry their products in the drying phase of production in order to assure a high quality product with fewer production problems, but overdrying wastes energy. By lowering the drying temperature producers save energy but risk problems with condensation in the dryer. A rugged, accurate humidity sensing device would allow manufacturers to lower temperatures and save money and energy while controlling condensation.

While most currently available sensors are too fragile to work well in harsh drying environments, the acoustic sensor now in development shows great promise. It measures sound waves in the dryer, comparing them to waves in a nearby closed dry air tube, thus predicting humidity precisely without any moving parts. Condensation on the tube walls and the presence of water drops and dust have no influence on the speed of sound.

ACOUSTIC HUMIDITY SENSOR



The paper and textile industries spend more than \$1 billion per year in fuel for drying operations in the United States. Because underdrying can pose serious problems, manufacturers typically overdry products, wasting energy.



Project Description

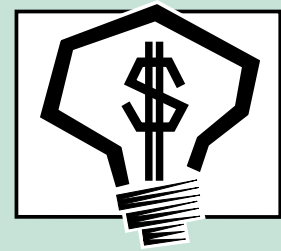
Goal: The goals of the project are to build an engineering prototype sensor, accompanying electronic assembly, and a software program to allow the sensor to operate, then install it in a mill and test, analyze, fine-tune, and report on the system's operation.

Because sounds are affected by the humidity of the air through which they pass, this invention works by sending a sound pulse through the air in the paper dryer and comparing it to a sound pulsed through a closed dry air tube at the same temperature. The sensor is made to be integrated into a humidity control system that measures and corrects the humidity in the dryer. By allowing the dryer to operate, at the lowest temperature possible, the sensor can effect energy savings while avoiding condensation problems that are caused when the temperature is too low.

Sparktech is developing this new technology with the help of a grant funded by the Inventions and Innovation Program through the Department of Energy's Office of Industrial Technologies.

Progress and Milestones

- The technology was well defined and tested at the laboratory level.
- The technology was demonstrated in a video.
- Results of trials were published in trade journals.
- Several foundries are interested in testing the prototype.
- A patent has been granted.



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

Sparktech
Duarte, CA

FOR PROJECT INFORMATION, CONTACT:

Dr. Parthasarathy Shakkottai
262 Gardi St.
Duarte, CA 91010
Phone: (818) 354-4808

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, DC 20585

INDUSTRY OF THE FUTURE—FOREST PRODUCTS AND AGENDA 2020

In November 1994, DOE's Secretary of Energy and the Chairman of the American Forest and Paper Association signed a compact, establishing a research partnership involving the forest products industry and DOE. A key feature of this partnership was a strategic technology plan—**Agenda 2020: A Technology Vision and Research Agenda for America's Forest, Wood and Paper Industry**. Agenda 2020 includes goals for the research partnership and a plan to address the industry's needs in six critical areas:

- Energy performance
- Environmental performance
- Capital effectiveness
- Recycling
- Sensors and controls
- Sustainable forestry

For each of these areas, task groups including industry, university and government representatives have developed detailed research agendas called research pathways—all of which are consistent with Agenda 2020's goals.

OIT Forest Products Team Leader: Valri Robinson (202) 586-0937.



DOE/GO-10099-680
January 1999