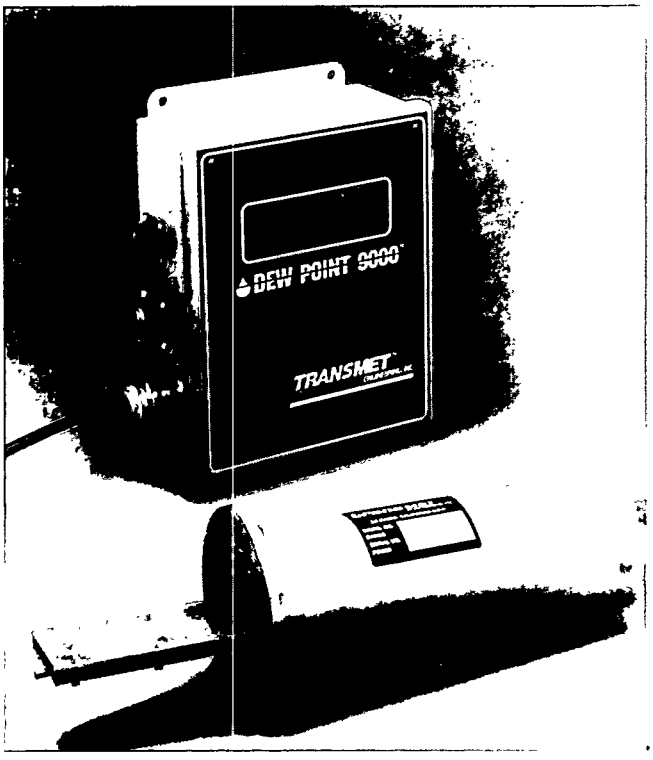


The dew-point hygrometer can withstand harsh industrial-dryer exhaust gases.

One sensor capable of withstanding these types of conditions is the heat-flux dew-point hygrometer, developed by Trans-Met Engineering with funding from DOE. This hygrometer is insensitive to dust and grease and can operate in temperatures up to 500°F and in relative humidities between 50% and 100%.

A prototype unit of the new sensor was successfully tested at a textile mill. The hygrometer was subsequently commercialized and is being used in the food processing, pulp and paper, chemical, cement, and textile industries. Energy savings associated with this sensor are projected to be 10.5 trillion Btus in 2010.

Optical Humidity Sensor

The pulp and paper industry has long recognized the value of accurate humidity measurements during drying operations to optimize process control and minimize energy consumption. Although many types of humidity sensors were developed, they experienced reliability problems during operation in mill atmospheres.

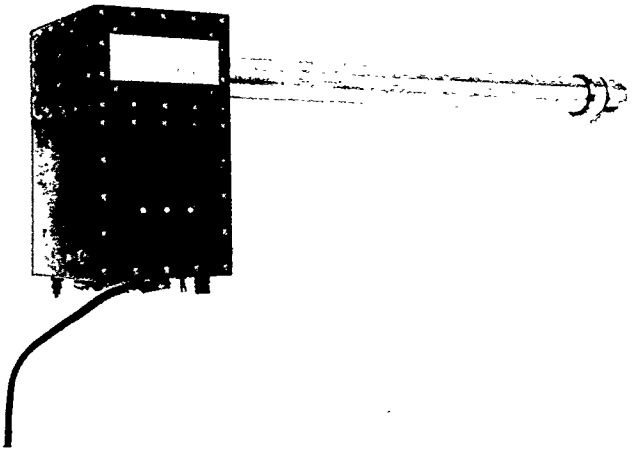
With DOE support, Spectral Sciences and Pacer Systems developed a new hygrometer that determines humidity by measuring the absorption of ultraviolet light. Because the absorption of ultraviolet light is a property of the water vapor in the medium (air or process gas), the optical elements of the sensor can be kept from direct contact with the medium, protecting the sensor from contamination.

The primary applications of humidity measurement in the pulp and paper industry are to control the drying of paper and paperboard. The new hygrometer can be used as a feedback device in the control of a dryer loop, helping to maximize drying efficiency by optimizing the balance of exhausted air and makeup air. Achieving this balance results in energy savings and improved product quality.

After successful field testing, the hygrometer was commercialized and is installed in several pulp and paper mills. The sensor also has applications in the textile, food, and other industries. Energy savings in 2010 are projected to be 17.3 trillion Btus.

Rapid Solidification of Metals

The future of many high-efficiency energy systems depends on the development of metallic alloys that possess properties at high temperature beyond those that can be obtained from conventional processes. DOE-supported research shows that alloys with



The optical humidity sensor uses ultraviolet light to measure humidity in industrial drying applications with temperatures of up to 950°F.