

MSU

Developing Sensor for Lumber Mill Emissions



Submitted

By Andrea Cooper

Drying lumber in kilns produces numerous air pollutants, but equipment for real-time measurement of the emissions is not currently available.

A team of researchers at Mississippi State University, however, is developing a new state-of-the-art sensor that monitors air pollution emitted while wood is drying. The MSU scientists are improving a detector produced by Seacoast Science Inc. that will continuously monitor pollutants in real time during materials processing.

"The sensor has the capability to continuously detect minute amounts of compounds emitted during lumber processing, including volatile organic compounds, formaldehyde and methanol," said Rubin Shmulsky, associate professor and interim head of forest products. "Real-time measurements will allow kiln operators to adjust the drying process to reduce emissions."

Wood species, grade of lumber, age and regional source can influence emissions during drying time. Mills often use an average pollution factor per board foot to estimate how much pollution is generated.

"The new technology will constantly monitor emissions and incorporate information into a control system," said Joe Dahlen, a doctoral candidate in the College of Forest Resources. "Emissions are currently measured using total hydrocarbon analyzers, sampling trains, and other expensive and sensitive equipment."

The new sensors offer significant advantages over current monitoring equipment.

"The sensors require little power, are relatively inexpensive, and correct for humidity and temperature differences that vary greatly during the drying process. They are small and do not require any carrier gasses during operations," Dahlen said.

The system can include an array of sensors with different coatings to measure select compounds. The coatings are polymer films uniquely suited to small, low-power, low-cost devices.

Seacoast Science develops the sensors, Amec Forest Industries hardens the sensors for industrial applications, and MSU's Forest and Wildlife Research Center tests the device's performance against standard emissions equipment. The National Science Foundation funds the project through a Phase I Small Business Innovation Research grant.

The collaborative project is expected to provide financial benefits to mill operators and result in significant environmental benefits.

Reducing emissions by 50 percent could result in the elimination of 168 tons of hydrocarbon emissions for a site producing 150 million board feet of kiln-dried lumber per year, Shmulsky said. There are 100 such sites nationwide.

"This could reduce greenhouse gas emissions tremendously nationwide," Shmulsky said. "MSU's forest products department has been researching pollution from mills for the last 15 years. Now that we know what comes out, we are working on ways to reduce emissions."

Mills currently run kilns for maximum speed of output. Emissions may be reduced by adjusting temperature or humidity at critical times in the drying process. The sensors will be able to shut down or adjust the dryers to provide a measure of control for problems encountered during production.

A prototype of the sensor will be tested in industrial mills this fall.

"The lumber industry and kiln manufacturers are eager to try the new sensors," Shmulsky said. "If the sensor proves effective for use during the production of wood products, it can be a major innovation for the cost-effective monitoring of emissions."