

Local scientists develop unique concrete testing

By **TIM MEKEEL**
New Era Staff Writer

Physicist Nat Hager III and chemist Roman Domszy are concrete thinkers.

Four years of hard thought has led to a unique, high-tech way to test whether concrete has properly and safely cured, preventing construction accidents.



Hager

Their innovative system won a patent two weeks ago and was featured in the Nov. 1 issue of the *Journal of Applied Physics*.

Now the Lancaster residents are hoping to turn their work into a commercial product.

"We know there's a market for this," said Hager on Tuesday.

The system was developed by their company, Material Sensing & Instrumentation Inc., which tests and measures the electrical properties of materials, especially at high frequencies.

Helping to fund the endeavor was a \$100,000 grant from the National Science Foundation's Small Business Innovation Research (SBIR) program.

The "Time-Domain-Reflectometry Concrete Cure Monitoring

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Rapid electrical pulses at very high frequencies are bounced off the sensor by this system.

The reflections provide molecular signals indicating how two key ingredients in concrete, water and cement, are interacting. In particular, the signals show how two chemical phases of water are combining with the cement.

Hager said this computerized method gives far more detailed assessments of the curing process, in which concrete dries and hardens, than other methods.

These other methods include measuring the reaction heat emitted by the concrete as it cures, and crushing a concrete sample placed in a mold that's stored under the same conditions as the construction site.

Hager, who also is an adjunct physics professor at Elizabethtown College, and Domszy were assisted in their research of the curing-measuring technology by Elizabethtown College students.

The business partners, who met about 20 years ago when both worked at Armstrong World Industries, are seeking funding to help them turn their innovation into a commercial product.

Hager said it might take two years for the system – which now requires both a laptop computer and a large mainframe data recorder/monitor – to be available for sale, at a projected price of about \$10,000 to \$20,000 per system.

"That's the whole point of an SBIR, to transfer the expertise from the big box (the mainframe) into something more field-portable," he said.

Users could include manufacturers of cement and cement additives who want to learn how to optimize the curing process, contractors who build with concrete and want a new way to test the curing of the material, testing laboratories and engineering design firms.



Domszy