



Trenchless Technology Center *Newsletter*

March 2009

TTC Partners with Cues Inc. on Pipe Inspection

Cues Inc. and TTC were recently awarded a \$3.2 million research grant from the National Institute of Standards and Technology's (NIST) Technology Innovation Program. The technology, originated at Louisiana Tech University, is aimed at detecting the presence of sinkholes around buried pipes by using robotics to inspect the pipe wall and the surrounding soil envelope.

The technology, called FutureScan, uses an innovative radar system to look for potentially dangerous areas in pipelines and culverts by producing high-resolution images from a scanning robot that travels inside the pipes. In addition to the \$3.2 million award, a 100 percent match is being committed to the project by the participants. The funds received by TTC will total about \$900,000 over three years. The University's business incubator is also involved in the project by housing a start-up company named Beyond Vision that will provide the outlet for the new technology developments. The project started Feb. 1, and Erez Allouche, Associate Professor at Louisiana Tech University and Associate Director of the TTC, will be the Principal Investigator for the TTC work. Joe Purtell will lead the project at Cues Inc. and faculty from the physics program at Louisiana Tech, Neven Simicevic and Klaus Grimm, plus TTC Research Associate, Arun Jaganathan, will form the core of the TTC research team.



From left: Arun Jaganathan, Erez Allouche, Klaus Grimm and Neven Simicevic.

November 2008 TTC IAB meeting in Ruston

TTC typically holds three Industry Advisory Board (IAB) meetings each year. Two short update meetings are held at UCT in January and at the NASTT No-Dig Show later in the spring. However, the main event is the fall meeting held at Louisiana Tech in which the industry members, faculty and

students get together for two days of presentations and discussions, wrapped around several very enjoyable social events. A social highlight of the Ruston meeting is the "Croatian" barbecue hosted by Neven and Jadranka Simicevic held as a get-together on the evening before the board meeting commences.

The meeting itself has around 20 different presentations on TTC research projects and the graduate students normally present their own research activities to the board. Since it is difficult for large numbers of faculty and students to travel to the major national conferences, the meeting in Ruston serves the important purpose of allowing the direct interaction between the Board and the researchers. Feedback from the Board about the value of the meeting is very positive — in terms of learning about the latest research under way, being in a position to contribute the board members' experience to the research efforts and being able to network with other industry colleagues, owners and consultants. Inquiries about participation in TTC activities as an IAB member or sponsor are welcomed. The IAB is a key part of the TTC success providing critical financial and intellectual support.



2009 Municipal Forum Program

The TTC Municipal Users Forum program for trenchless technology will get under way in March for the 2009 season. The forum is designed to allow local/regional municipalities or utility agencies to share information on their experiences in using trenchless techniques and in dealing with other issues related to the construction and management of buried utilities. The forum is designed as a three-quarters day program with low participation cost (\$35 to \$50). This year most of the forums will be held only once per year so that the number of separate forum locations can be expanded. The Colorado and Northwest forums will be held in March, followed by the Louisiana and Houston forums in April. The spring series will conclude with a forum in Columbus, Ohio, in May and a forum in Minneapolis, Minn., in June. Additional forum details can be found at the TTC Web site www.ttc.latech.edu. The fall schedule is still being set but the following forum locations are expected: Alberta, Boston, California, Dallas, New York and Virginia. Inquiries about making presentations at forum meetings or municipal participation in the forums are welcomed and can be made by calling or e-mailing the TTC.

Testing Spray-Applied Structural Coatings

Due to the lack of design guidelines regarding the needed thickness of spray-on coating for rehabilitation of pressurized pipelines, a study was completed at TTC at Louisiana Tech University aimed at evaluating the internal pressure resistance rating of a spray-on rigid polyurethane coating system. Based on the experimental data an empirical predictive equation was derived for calculating the pressure rating of spray-on coating for a known coating thickness, maximum gap diameter in the host pipe and a safety factor value.

The experimental program consisted of testing panels of the commercially available spray-on polyurethane "Spraywall" coating provided by Sprayroq Inc. in a specially designed pressure cell with a circular opening to simulate a deteriorated host pipe. The experimental setup was designed and built by Dr. Mike Baumert to determine both the burst pressure, as well as the amount of deformation the panel underwent as the internal pressure increased.

The testing frame consists of two main components: the pressure side and the opening side. The pressure side of the frame is designed to apply a uniform pressure to one side of the panel. The opening side of the frame consists of a variable sized opening in the center of the rigid steel plate to simulate a portion of waterline either heavily corroded or missing altogether from the host pipe wall. A pressure supply system designed to provide up to 1,000 psi consists of a high-pressure nitrogen tank supplying pressure to an interface chamber, which in turn pressurizes the water within the cavity on the pressure side of the frame. Pressure was applied in 50- to 100-psi increments of pressure until failure occurred. This process was repeated for 12 panels using a 3-in. diameter circular opening and 11 panels with a 4 1/2-in. diameter opening. The testing of the panels was performed by graduate student Eric Steward with the help of TTC Lab Technician Nathan Pettit along with student workers Eric Burke and Eric Slusser.

The data from the testing was used to generate an empirical design equation to determine the needed thickness of a polyurethane lining given the internal operating pressure of the pipe and an estimated damage zone in the host pipe. This study also provides pertinent data regarding the amount of deformation or bulge the material would undergo under pressure. The experimentally measured deformation of the panel during testing was compared with predictions obtained from an analytical model and a finite element simulation in an effort to gain additional insight into the governing failure mechanisms. The researchers are currently working on expanding the testing program to other types of spray-on coatings in an attempt to develop a generalized equation that incorporate key mechanical properties of the coating material. The detailed results of the testing program and analysis have been submitted for papers/presentations at the upcoming ASCE Pipelines Conference and WEFTEC.

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