



# Technovations in Transportation

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## Region X UTCs Sign Memorandum of Understanding

A Memorandum of Understanding between Region X's UTCs and DOTs forming the Region X Transportation Consortium was finalized.

The purpose of the consortium is to provide the means for member institutions to collaborate on research and education projects of mutual interest. Members agree to meet twice yearly and to regularly exchange information on research and educational needs, interests and programs. The Consortium will be able to promote interest in transportation-related fields within the region and develop shared educational and training programs. The Consortium is expected to stimulate interest in transportation research from other research institutions and funding sources to address transportation challenges in the Northwest.

Four regional task forces have already been established by the consortium members, focusing on education, research, training and teleconferencing.

Four state DOTs and eight universities from four UTCs form the Region X Consortium.

### Pooled Fund Projects

The Consortium also has agreed to leverage research by establishing a pool of funds from which projects of interest to the region can be funded. Details are yet to be determined, but selection of initial projects is expected to take place in 2008.

### Student Participation

Students from the participating universities have already benefited from collaboration among the UTCs. An annual student conference has been held since 2003.

This year's conference, sponsored by Portland State University, took last November. Students were able to present their research and exchange ideas with their peers in an environment that does not exist in the classroom or in other conferences. Professor Brian Taylor from UCLA gave the keynote address. A highlight of the conference was presentations of student posters.



The student conference was coordinated with the ITE Traffic Bowl, sponsored yearly by the Oregon Section of ITE.

## Coral Sales Scholarships Awarded



Uriah Jones and Ashley Hobbs were honored as outstanding civil engineering students by Tom McFarland, representative of the Coral Sales Company. The Coral Sales Company/Douglas P. Daniels Scholarship was awarded in recognition of the students' outstanding leadership qualities and participation in extracurricular activities.

Ashley is a junior civil engineering major, secretary of the student chapter of the Institute of Transportation Engineers and secretary of the UI chapter of the Society of Women Engineers. In her application for the scholarship, Ashley notes that transportation engineers need to be innovative in developing tools to meet the changing needs of society, especially focusing on "more efficient methods of transportation in order to reduce the effect on the environment." After receiving her BS, Ashley plans to continue her education at the University of Idaho as a graduate student.

Uriah began graduate school this spring. He began working with NIATT researcher Dr. Michael Dixon in the summer of '05. He has worked on projects involving video detection, software simulation and green time utilization as a performance measure for intersection operations.

## Research Progress--Catalytic Ignition Process

A final report for the project, "Fundamental Studies of the Catalytic Ignition Process," was submitted by faculty principal investigator Dr. Judith Steciak and two of her graduate students, Robert Lounsbury and Katie Leichter. The project supported development of catalytic igniters for environmentally friendly alternative fuels such as aqueous ethanol. The report (**N08-03**) describes the installation, calibration and preliminary testing of a catalytic plug-flow reactor after the new laboratory's electrical and plumbing upgrades were completed.



The reactor was moved from Moscow, Idaho, to the new laboratories in Boise, Idaho. The team calibrated a hot wire anemometer, used the anemometer to remeasure the plug-flow region of the reactor, and began testing and modeling of a platinum (Pt) wire catalyst exposed to a lean propane-oxygen-nitrogen mixtures.

A hot-wire anemometer is an instrument capable of reflecting small changes in voltage. From these voltage readings the velocity can be determined. However, prior to using a hot-wire anemometer it is necessary to establish a base line value of voltage vs. velocity. Thus for a given voltage the velocity is known.

To do this, the team had to construct a device with a known pressure and velocity. The picture at the right is the hot-wire calibration apparatus they devised. A nozzle with a precise shape and known exit diameter was attached to the top of a two-liter bottle. Straws were inserted to straighten the flow, ensuring that the flow would be laminar and the velocity constant for a given pressure.

The nozzle was designed in SolidWorks and built in the IdeaWorks lab on the Moscow campus specifically for this application. The nozzle functions as a flow conditioner, increasing the flow velocity so that the hot-wire anemometer could detect changes in the velocity or vorage, and it smoothes the flow to allow for an even more constant velocity profile for calibration.

Compressed air was used to calibrate the hot-wire anemometer. However, prior to running the compressed air through the nozzle it was necessary to clean the air. An air filter purified the compressed air down to 5-microns and a second coalescing filter eliminates oil from the air to 0.5-microns.

Because the nozzle was designed with a known exit diameter the velocity of the air for a given pressure could be determined from the Bernoulli and continuity equations.

## NIATT Student Researchers Come from across the UI Campus

Although a majority of NIATT graduate and undergraduate students are studying for their degrees either in civil or mechanical engineering, the research done with UTC funds involve students from a number of other departments.

Students from the Biological and Agricultural Engineering Department have been working with the biodiesel research for many years.

Four undergraduate students were involved in the design and fabrication of the alcohol recovery system for the Biodiesel Demonstration Plant (KLK421). Tony Pastrama, a BAE sophomore, a non-traditional student experience in private industry, did all of the plumbing on the flash unit. Scott Burn, who completed his junior year, is also a non-traditional student who came to the BAE department after seven years in the Navy and another year in the biodiesel industry. He was instrumental in fabricating the frame and contributed ideas for the design. Luke McCall is finishing up his BS in Agricultural System Management. He has worked for BAE in the work study program and as an IH student for four years. He was involved in the electrical side of the project, running conduit and mounting components for the main power controls. Brice Starr, a freshman in the department, was awarded a Work and Learn Scholarship in 2008. He did some fabrication on the superstructure for the distillation column.

Another department from which NIATT students come is the Electrical and Computer Science Department. Dr. Richard Wall, Dr. Brian Johnson and Dr. James Frenzel have recruited a number of undergraduates and graduates to work on a variety of projects, starting with NIATT's Controller Interface Device, and now concentrating on the development of "Smart Signals":

Andy Huska	Dustin DeVoe	Troy Cuff
Eresh Suwal	Ben Hamlett	Gabriel DeRuwe
Ying Zhou	Ivan Anderson	Kyle Ryan
Anne Mousseau	Craig Craviotto	Sanjeev Giri

Many of these ECE students are co-authors on publications and have made presentations at Transportation Research Board meetings, an IEEE ITS Conference, and an International IEEE Intelligent Transportation Systems Conference.

Matthew Benke, who was NIATT's 2007 Student-of-the-Year, came from the Computer Science Department. He worked on three projects dealing with the survivability of intelligent transportation

systems along with Paul Oman, his computer science mentor, and Dr. Ahmed Abdel-Rahim of civil engineering and Dr. Brian Johnson, professor in computer and electrical engineering.

## NIATT Advisory Board Meeting Set for April

The Annual Advisory Board Meeting is set for the end of April, coinciding with the University of Idaho's annual Engineering Exposition. A number of board members take part as judges in the Expo or take time to talk with the participating students about their exhibits and posters.

A banquet is planned for the opening of the meeting and the board members and other guests will have an opportunity to hear from Guillermo Madrigal, NIATT's 2008 Student-of-the-Year and Nick Harker, leader of NIATT's clean snowmobile team.

A tour of the newly completed IDEAWorks lab is planned for the closing of the meeting.

Board members have been sent proposals developed by NIATT researchers seeking funding for the 2008-2009 academic year. They are expected to meet with the researchers to discuss their proposals and learn about accomplishments from previous research, and make recommendations for funding for the next fiscal year.

## Clean Snowmobile Team Captures Second Place

NIATT's Clean Snowmobile Team is no stranger to excelling in competition. The team successfully re-engineers of existing snowmobiles to reduce pollution and noise emissions while maintaining the performance characteristics that the snowmobile market demands.

The snowmobile this year used direct-injection, two-stroke engine technology that doubles snowmobile fuel economy and reduces pollution by 80 to 85 percent. This technology won the competition in 2007 and achieved second place this March in Houghton, Michigan.

This year, the team concentrated on utilizing an ethanol blend fuel (E85) and improving the combustion chamber to reduce mechanical noise emission, while exhaust noise was diminished with use of a non-standard exhaust silencer.

Team advisor Karen Den Braven explains, "Our snowmobile meets Yellowstone National Park Best Available Technology (BAT) noise emissions and is very close to meeting their pollution emission standards with a two-stroke engine. This is quite a feat, as all of the current BAT snowmobiles use four-stroke engines."

Besides capturing second place, the team won the additional awards:

- Best Acceleration
- Quietest Snowmobile
- Cold Start Award



- Best Oral Presentation
- Kreider Award (best internal combustion written paper)

## Idaho Board of Education Awards HERC Grants

The Idaho Higher Education Research Council (HERC) and an evaluation panel recommended funding for two projects submitted to the Idaho State Board of Education by NIATT researchers.

Judi Steciak, Steve Beyerlein, Karen Den Braven and Ralph Budwig were granted \$274,900 for their proposal, "Sustainable Transportation Engine and Fuel Systems," research that resulted from previous UTC projects and which will enhance their future work.

The application states their their research and development focus is on sustainable transportation fuels and engine technology, with special focus areas on two-stroke engine development and homogeneous charge catalytically assisted compression ignition.

In explaining how their objectives would be realized, the researchers describe their approach to research and education:

*We [NIATT researchers] conduct research that leads to technology products and new knowledge. Our faculty members are committed to purposefully integrating research and education. Our research projects must not only meet critical transportation needs, they must also provide opportunities to immerse students in practical, learning-centered engineering or science environments.*

Richard Wall and James Frenzel received a one-time grant of \$75,00 for their project, "Advanced Interactive Signals for Able-Bodied and Disabled Pedestrians," which focuses on traffic and pedestrian safety.

Their application details the support of industry partners in time, expertise, equipment and funds. The Campbell Company is contributing \$5000 in funds plus equipment. Intelight contributed equipment valued at approximately 43300, and Econolite contributed traffic controller equipment. Other partners in state agencies and private industry have agreed to serve on the Technical Oversight Committee for the project.

# University of Idaho

## **National Institute for Advanced Transportation Technology**

University of Idaho  
875 Perimeter Dr. MS0901  
Moscow, ID 83844-0901  
Phone: (208) 885-0576  
Fax: (208) 885-2877  
E-mail: [niatt@uidaho.edu](mailto:niatt@uidaho.edu)  
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