

OHIO STATE IS #1



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The Ohio State University's students, with support from faculty and advisors from its Center for Automotive Research, along with industry sponsors, are building the world's first hydrogen fuel cell powered landspeed streamliner. The Buckeye Bullet 2 (BB2) will bring hydrogen fuel cell (HFC) powered land-speed racing to the Bonneville Salt Flats for the first time in history this coming August. And if you don't think engineers are athletes – you should see the BB2 pit crew in action!



The BB2 Program is taking land-speed racing to a new level with innovations in driver safety, driveline, electronics and packaging. BB2 is expanding the legacy of its predecessor, the BB1. The BB1 currently holds both national and international land-speed records at 315 mph and 272 mph, respectively, and was the first electric vehicle to break the 300 mph barrier. The successes and setbacks provided by the Buckeye Bullet 1 Program have set the current BB 2 team up for success in 2007. Simulations predict speeds for BB2 in the 350-370 mph range.

Why are we so excited about this project? There are lots of reasons. First – it bodes so well for our future that Ohio State is producing such brilliant students who will be directing and guiding our automotive community in just a few years. Second – who doesn't love such shining success stories that began with a drawing on a napkin just six years ago? Third – the BB2 vehicle will be testing at TRC Inc. before heading to Bonneville's Salt Flats. And fourth, the driver of the BB1 who will once again drive the BB2 is TRC Inc.'s own performance driver, Roger Schroer. Roger is only one of 60 members of the Bonneville 300-MPH Club.

continued next page

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Ohio State, Ford, Ballard Power Systems and Roush Industries have teamed up to advance automotive hydrogen fuel cell technology by announcing they will attempt dual land speed records at Bonneville's Salt Flats this August. Ford consulted on the BB2 and Roush built the carbon fiber body and driver capsule, as well as the 1/3 scale model wind tunnel model. Both are BB2 main sponsors along with Ballard, who provided the fuel cells, and OSU CoE. They join other industry giants in sponsorship of the Bullet, such as

International Truck and Engine, Penske Technology, Goodrich, Mac Tools and TRC Inc. Ohio State's motor and fuel cell will also power the Ford Fusion HySPEED #999 production-based fuel cell vehicle.

The teams of Ford/OSU/Roush/Ballard have chosen TRC Inc. to test both of these unique cars because of TRC's close proximity to those industries, the test facility's ability to test land speed-designed cars, their confidence in capability to safely test fuel-cell vehicles, and TRC Inc.'s sponsorship of Ohio State's BB1 and BB2. The HySPEED is the first Original Equipment Manufacturer's HFC land speed racer and the first high performance HFC-powered car built

on a production platform (Fusion). Watch www.buckeyebullet.com



and www.buckeyebullet.blogspot.com for BB2 team updates, and www.scta-bni.org for more on-the-edge racing at the Salt Flats. Go Bucks, go faster, and go Roger!



TEST PLAN EVOLUTION: TEXT TO AUDIO

Talkin' 'bout a revolution – no wait – that's a song title, but how relevant it is! TRC Inc. strives to constantly improve our services, and one recent improvement is in the development of more user-friendly test plans. Although our drivers are thoroughly trained for each particular vehicle's driving cycle, in-car reminder aids are also needed. With track speeds up to 99 MPH, the last thing they should be doing is referring to a voluminous test plan. Over the years these drivers, dedicated to providing quality and professional service to our customers, developed "driving aids" (aka "cheat sheets") to help them accomplish this daunting task. At issue was that many of these "aids" sometimes did not accurately reflect every nuance of the test plan, they were uncontrolled documents and, most importantly, their mere presence and use constituted potential safety hazards.

In an effort to solve these issues, the "driving aids" were standardized and electronic copies were created and included as an attachment to the test plan. Establishing them

as controlled documents ensured the latest version was being used. Laminated, in-vehicle driving flip charts were developed to give drivers facility drawings instead of verse to read.

Recently one of TRC Inc.'s test drivers suggested that test plans be created in an audio format. Our objectives included: (1) to enable the driver to "listen" rather than "read" (2) to provide easy step-by-step instructions, (3) to facilitate quick revisions, (4) to allow timing flexibility for the driver, and (5) to permit simple repeating of the instruction or effortless fast forwarding as necessary.

Speech technology, or TTS software, allowed us to type in a line of instruction and create a file. This file, when downloaded into the software, automatically converts to an audio file. Revisions are easy to make, and it can convert the audio files to multiple languages.

iPods™ turn out to be ideal to organize and transmit these instruction files to the driver. Using iTunes™

software, each audio file is recognized as a song. These files are then transferred to a music library, with play lists being created as driving modes. These play lists are downloaded to the iPod™ where the lighted screen shows the mode, driving cycle, and revision. Using a transmitter/charger the audio can be played over the car's audio system keeping the iPod™ continuously charged. Talk about a revolution!

Several benefits can be realized through this technology. We expect to see: (1) improved test performance accuracy, (2) lowered turnover rate in drivers by reducing difficulty and stress of memorizing cycles, (3) reduced training time and cost, and (4) improved safety by eliminating reading while driving.



INDUSTRY PARTICIPATION

Several times a year, at numerous industry conferences, TRC Inc. staff are given the opportunity to present their research and opinions to spur dialogue among industry partici-

pants. From June 18- 21, 2007 the 20th International Enhanced Safety of Vehicles Conference (ESV) took place in Lyon, France, where research topics focused on innovations for safety, and more specifically the opportunities and challenges involved.

From the crash avoidance group, several of TRC Inc.'s staff members co-authored papers that were submitted and presented at the ESV Conference. Mohamed Kamel Salaani, of TRC Inc., along with Paul A. Grygier and W. Riley Garrott of National Highway Traffic Safety Administration (NHTSA), Gary J. Heydinger of The Ohio State University, and Chris Schwarz, Tim Brown, and Michelle Reyes of the University of Iowa, submitted a paper for presentation titled, "Study of Heavy Truck Air Disc Brake Effectiveness on the National Advanced Driving Simulator." Larry Smith and Robert Jones of TRC Inc., along with Frank S. Barickman of NHTSA submitted a paper titled, "Lane Departure Warning System Research and Test Development." Devin Elsasser and Bryan O'Harra, of TRC Inc. co-authored with Garrick Forkenbrock, of NHTSA, a research paper titled, "Light Vehicle ESC Performance Test Development." All three research papers were presented by Dr. Mohamed Kamel Salaani. Michael Sword, from TRC Inc., authored and presented his paper, "NHTSA Research on Improved Restraints in Rollovers" at the ESV Conference, as well.

Research from the biomechanics group included a technical paper publication and presentation, as well as, a poster presentation. The technical paper titled, "Pedestrian GTR Testing of Current Vehicles," was authored by Ann Mallory and Jason Stammen of TRC Inc., and S. Meyerson of NHTSA. NHTSA's Bruce Donnelly, Ed Probst, and TRC Inc.'s Josh Shaw, presented their research poster titled, "Evaluation of the 95th Percentile HIII Large Male Dummy."



TRC INC. MAINTAINS PACE™

Transportation Research Center Inc. (TRC Inc.) is proud to announce that for the sixth consecutive year we are again a sponsor of the Automotive News PACE™ (Premier Automotive Suppliers' Contributions to Excellence) Awards.



Now in its 14th year, the PACE™ Award honors automotive suppliers who have embraced innovation or adapted and reinvented themselves to meet the demands of the original equipment manufacturers. This prestigious award sets the standard for innovation and excellence and is recognized around the world as the industry symbol of innovation. Annually, hundreds of automotive suppliers around

the globe submit their innovation to win this distinguished award. An independent panel of judges select finalists, and conduct comprehensive site visits of finalist companies to evaluate both their innovations and management teams. Annually, during the SAE (Society of Automotive Engineers) International Exposition in Detroit, PACE™ Award winners are honored at a special ceremony.

TRC Inc.'s President, Rick Gildow, stated, "The PACE™ Awards are a natural tie-in for TRC Inc. Many of the innovations featured are ultimately validated at our proving ground. This also gives us the opportunity to support our customers and their efforts in the marketplace by acknowledging their hard work." Companies interested in applying for the 2008 Awards may download applications on TRC Inc.'s website at www.trcpg.com/pace.htm or at www.automotivenews.com/PACE

Additional information be found on the above websites or by calling TRC Inc.'s Marketing Department.



3RD ANNUAL INJURY BIOMECHANICS SYMPOSIUM

The Ohio State University (Ohio State), in conjunction with TRC Inc., hosted the Third Annual Injury Biomechanics Symposium from May 20, 2007 through May 22, 2007. Industry partners for this event included Honda Research Americas, National Highway Transportation Safety Administration's Vehicle Research and Test Center, Nationwide Insurance, and Columbus Children's Hospital Center for Injury Research. Program sponsorship was provided by: Denton, Inc.; First Technology Safety Systems, Inc.; Nissan Technical Center North America; and Toyota. Continuing with the success from the

first two years, a full complement of 85 attendees from both industry and 13 universities from various countries were on hand to view the 12 posters and 9 oral presentations.

The symposium kicked off with a welcome reception held at The Varsity Club on Ohio State's campus, then moved to an on-campus hotel for the presentations, followed by an awards banquet at the Buckeye Hall of Fame Café, and concluded with the Hines Awards and closing remarks.

An inspiring keynote address was delivered by Dainius Dalmotas, Road Safety and Motor Vehicle Regulation

Directorate of Transport Canada, Retired. A panel discussion, "Occupants with Special Needs," was presented by: Dr. Andrew Morris, Senior Research Fellow, Vehicle Safety Research Center, Loughborough University; Dr. Harold Weiss, Associate Professor and Director, Center for Injury Research and Control, University of Pittsburgh; Dr. Stefan Duma, Director, Center for Injury Biomechanics, Professor of Mechanical Engineering, Virginia Tech; and Dr. Marilyn Bull, Morris Green Professor of Pediatrics, Indiana University School of Medicine, IUPUI, Indianapolis.

An additional highlight was the awards presentation of the Dr. Margaret H. Hines Award (plaque and monetary award) given to the best oral presenter and best poster presentation. Dr. Hines initiated

the Injury Biomechanics Research Program at The Ohio State University over 15 years ago and was conducting research on shoulder trauma when she passed away in 2004. Two students were recognized for their efforts at the banquet. Paul C. Ivancic, from Yale University, received the award for his oral presentation on the Mechanism of Cervical Spinal Cord Injury During Bilateral Facet Dislocation. Anthony Lau, from the University of Virginia, received the award for his poster presentation on Material Properties of Calcifying Costal Cartilage.

The Symposium is an extension of Ohio State's collaboration with TRC Inc. to create a nationally recognized center for trauma research. Dr. John Bolte IV, assistant professor of anatomy, is leading this effort for Ohio State's state-of-the-art labo-

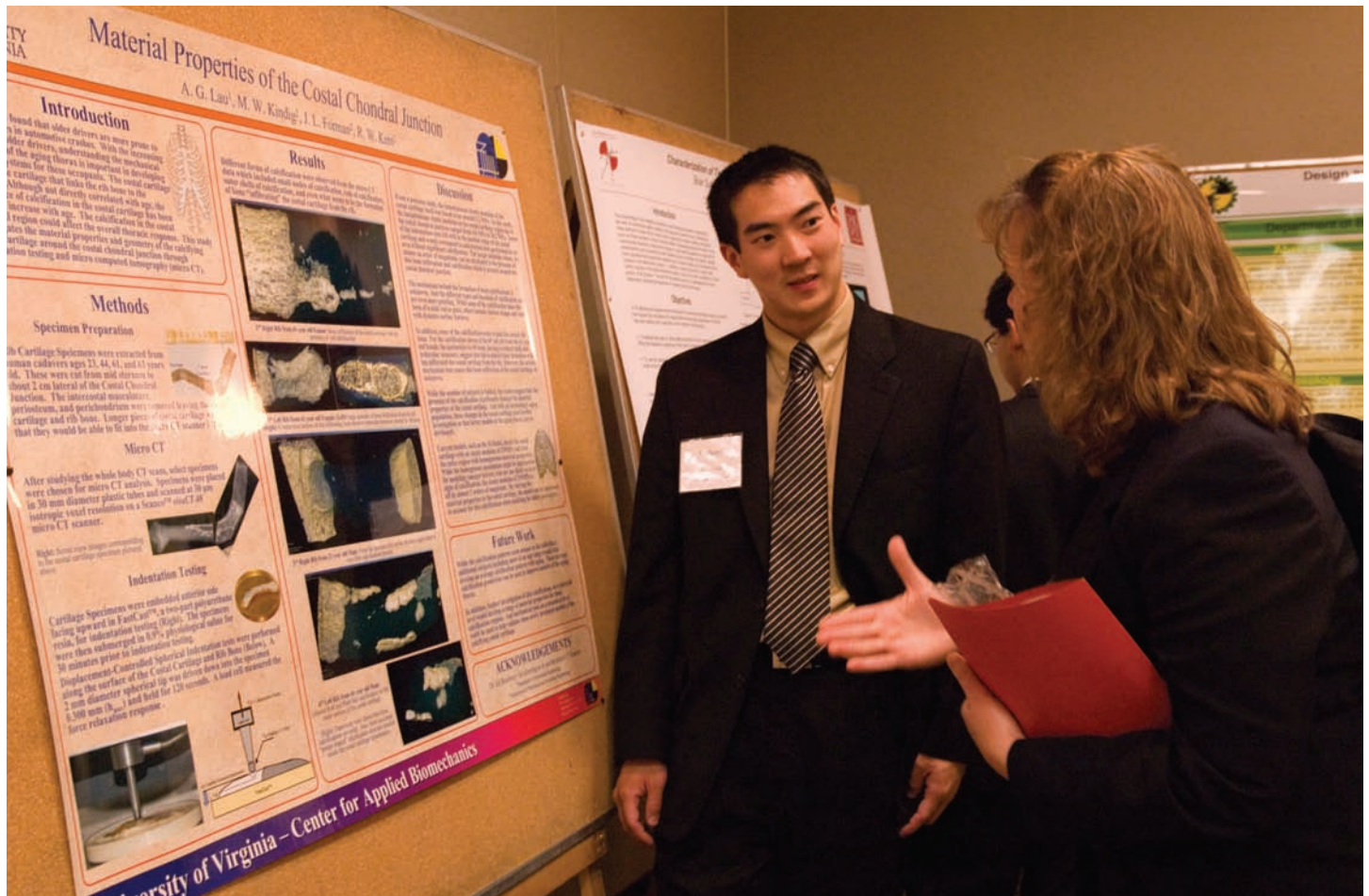
raries that are complemented by TRC Inc. laboratories, which include calibration for measurement instrumentation and test dummies, along with full-scale crash testing, and the HYGE impact simulator facilities. Additional information can be found at: <http://medicine.osu.edu/ibr/>



INJURY BIOMECHANICS
RESEARCH LABORATORY



THE OHIO STATE UNIVERSITY



Poster presentation winner, Anthony Lau, a Ph.D. candidate at the University of Virginia majoring in Biomedical Engineering, is pictured above with his poster, "Material Properties of Calcifying Costal Cartilage."