

Windsor Automotive



Canada's Automotive University

Dr. Colin J. Novak, P.Eng.

Associate Professor of Mechanical & Automotive Engineering

Director – NVH and Psychoacoustics Research Group

Windsor Automotive is...

- Located in the heart of the global auto industry;
- The home of Canada's first program in automotive engineering in 1998 with over 600 graduates to date;
- The host of the national automotive research network – AUTO21 (unanimously elected by nearly 30 universities in 2000);
- The largest concentration of automotive research and educational capability at any university in Canada;
- Nearly 100 faculty researchers PLUS:
 - *several hundred graduate students in business, engineering, human kinetics, science & other faculties;*
 - *nearly 200 Automotive Engineering undergraduate students;*
 - *dedicated Automotive Engineering building and specialized labs;*
 - *strategic partnership with OEM's including two large industrial R&D facilities;*
- Focused on educating the next generation of automotive leaders and creating new knowledge solutions for the future auto industry.

Working with Windsor

Automotive: *Policies on IP*

- Windsor has over 40 years of experience working with industry partners on R&D programs;
- Unique collaborative arrangements that respect industry's priorities to get new products developed rapidly and cost effectively while respecting the need for confidentiality & IP ownership;
- Intellectual Property Policy:
 - *Industry & UofW agree on a business portfolio of research topics;*
 - *Jointly developed IP within the portfolio is owned by Industry;*
 - *Jointly developed IP outside of the portfolio is owned by the Researcher / University;*
 - *Industry takes the lead in determining whether or not a topic is within the portfolio;*
- This policy was developed with our OEM partners and it has worked without difficulty or disputes for nearly 15 years.

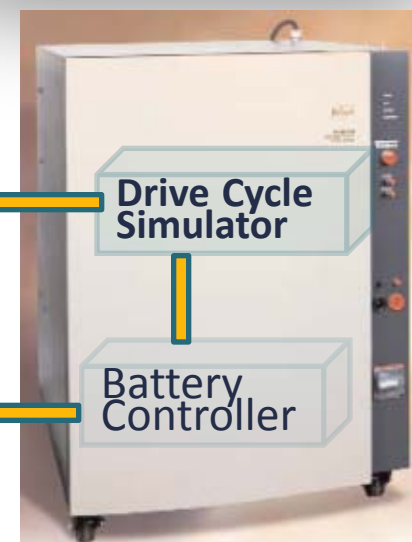
Windsor Automotive Capabilities

Alternative powertrains including HEV, PHEV, EV & FCV

- Motor drives & energy management systems for HEV/PHEV/EV
- Electric motors and control systems
- Design and test of battery management systems & chargers



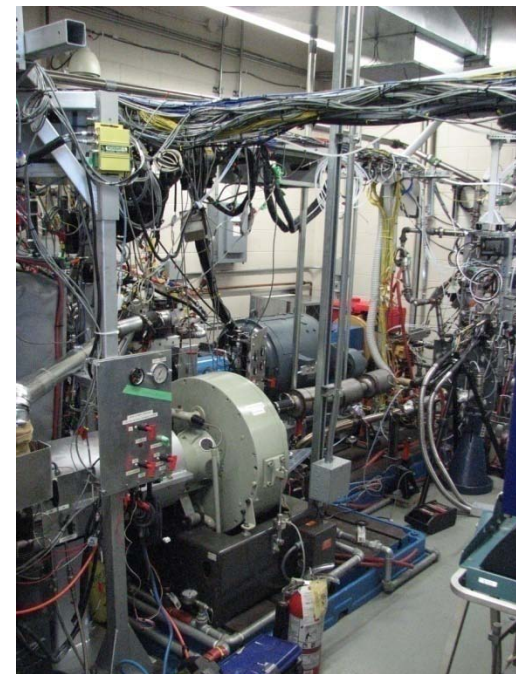
Battery Pack



Windsor Automotive Capabilities

Clean Diesel, HC/CI and Alternative Fuels

- Windsor's *Clean Diesel Research Lab* is one of the most advanced IC engine labs in any North American university;
- Extensive experience in aftertreatment and combustion control technologies;
- New test cells for diesel-electric hybrid drive research & optimization (Fall 2010);
- Fleet vehicle (police/EMS/delivery) idle reduction research for better fuel economy & reduced emissions;
- Performance optimization of fuel mixtures including ethanol, biodiesel and hydrogen;
- Collaborative relationships with leading engine manufacturers and technology companies around the world.



Windsor Automotive Capabilities

Automotive coatings process and materials development

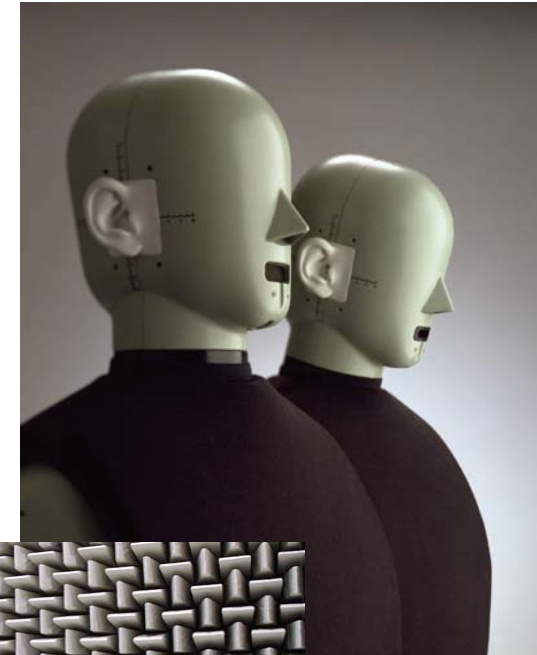
- World's largest 4000m² (40,000+ sq. ft.) automotive coatings research facility – partnered with Chrysler Canada;
- Full-scale production equipment – a complete paint line instrumented and dedicated to R&D in vehicle coatings;
- R&D in coating materials & processes;
- Evaluation of production equipment including new robots and application hardware & software;
- Precision measurement of application parameters including film build and dehydration temperature
- Improved environmental performance of coatings including reduced energy use, elimination of VOC's & odour, faster cycle time & improved quality.



Windsor Automotive Capabilities

Automotive acoustics, vibration, NVH, sound quality and psychoacoustics

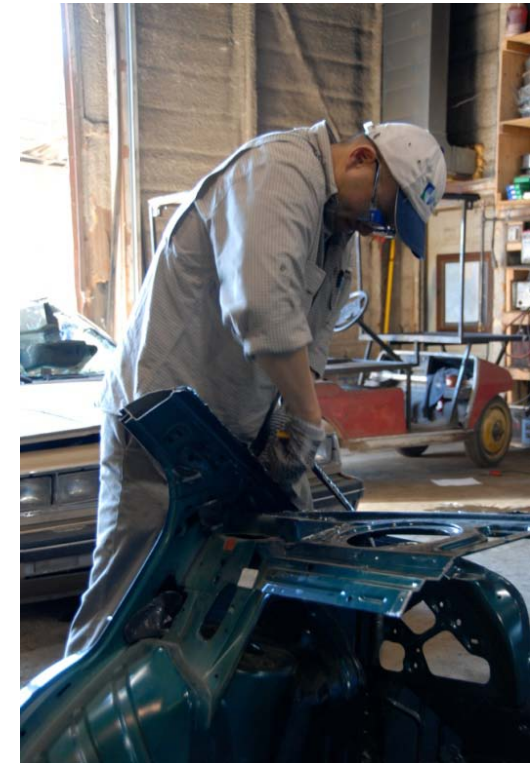
- Improvement of automotive materials and components for sound quality
- Structural modal analysis for optimization of strength and weight;
- Large anechoic chamber with full instrumentation;
- Acoustic optimization using a *B&K™* NVH Driving Simulator



Windsor Automotive Capabilities

Life cycle analysis of automotive material and processes

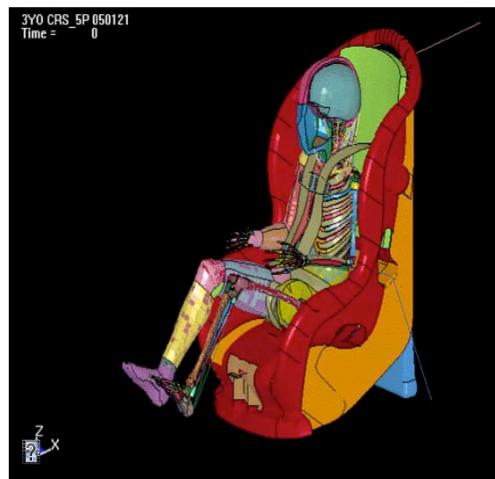
- Material recycling, inventory, recoverability and sustainability
- Development of end-of-life strategies
- Process and product development for sustainability & regulatory compliance



Windsor Automotive Capabilities

Crash and safety research simulation

- Advanced modeling of children & child restraint systems for improved safety;
- Development of education & intervention programs to enhance regulatory compliance;
- Development of structural automotive components for improved crashworthiness



Windsor Automotive Capabilities

Casting and tribology of lightweight materials

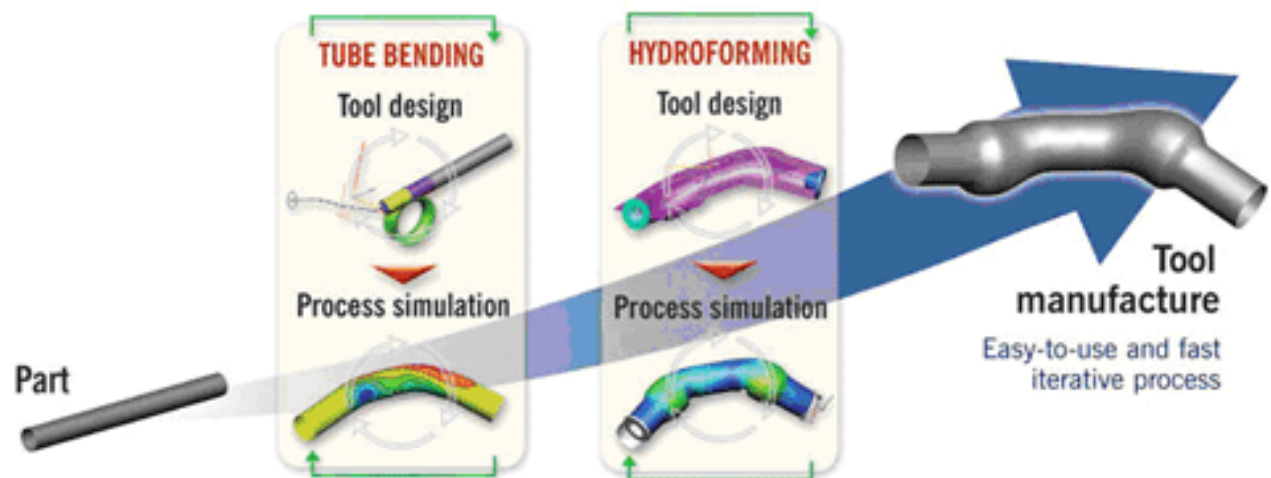
- Research in aluminum & magnesium alloy development, casting processes and on-line sensors;
- Proven experience in solving production problems;
- Improvement of friction & wear performance of lightweight alloys & composites for powertrain and other applications;



Windsor Automotive Capabilities

Sheet metal and advanced tube forming

- State-of-the-art modeling capabilities to support, advance and innovate metal forming manufacturing processes;
- Experimental validation of more accurate constitutive models for material behaviour, friction behaviour and failure prediction;
- Development of more advanced metal forming manufacturing strategies;

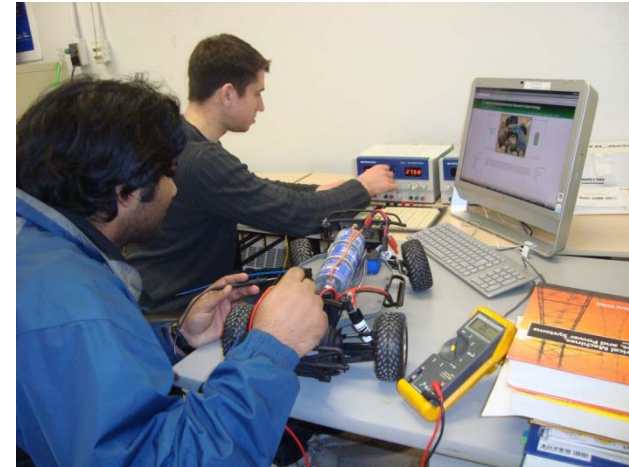


Windsor Automotive Capabilities

Real-world expertise, knowledge & experience + industry friendly policies on IP and partnerships

Windsor Automotive can help you to solve real problems using the latest technologies:

- Information technology & wireless machine communications systems for on-board and in-plant applications;
- RTS methodology development & optimization;
- Business analysis of automotive investments;
- Anti-collision radar systems (new low cost, lightweight tri-mode 77 MHz system under development);
- Ultrasonic blind spot detection and parking assist sensors;
- Machine vision systems and pattern recognition;
- Mechanical design, plant efficiency studies & design optimization through DFMA;
- Automotive telecommunications & infotainment;



Industrial Partnerships

University of Windsor – Chrysler Automotive R&D Centre (ARDC)

- 20,000m² (200,000+ sq. ft.) facility – opened May 1996;
- 4000m² (40,000+ sq. ft.) *Automotive Coatings Research Facility*;
- World's largest *Automotive Lighting Tunnel* 110m (361 ft.) long;
- *Rapid prototyping*;
- 9-bay Garage & Vehicle Recycling & Corrosion Research Lab;
- Pilot assembly area;
- 6-cell RTS Facility (*MTS 12-DOF & 4 poster including full environmental cell*)



Industrial Partnerships

Univ. of Windsor-International Truck & Engine Corp. (Navistar) *Centre for Innovation*



- Modern 17,000m² (155,000 sq. ft.) facility with heavy lift cranes;
- Prototype assembly bays, engine test area, fabrication shop;
- Engineering and executive offices and 80 seat lecture theatre;
- Clean diesel research program including exhaust aftertreatment R&D.

Research and Teaching Facilities

Centre for Automotive Research & Education - CARE

CARE Sponsors include:

- Linamar Corp.
- Canadian Imperial Bank of Commerce
- Chrysler Canada Inc.
- Ford Motor Co.
- General Motors of Canada
- Honda Canada Inc.
- Toyota Canada Inc.
- Bruel & Kjaer A/S
- International Truck & Engine Corp.
- Robert Bosch
- Schaeffler Group KG
- Mahle Automotive
- Valiant Machine Group
- Ontario Superbuild Corp.
- Centreline (Windsor) Ltd.
- NSERC & CFI

.....and many others



CARE Mechanical Dissection Lab

– Learning practical engineering know-how



Windsor Automotive Engineering students dissect and operate small engines that contain virtually every material and process used in modern vehicles as well key knowledge that all manufacturers need:

- *precision measurements;*
- *tolerances & stack-ups;*
- *manufacturability and serviceability;*

Learning the links among cost, customer needs, commercial reality and engineering design, materials and manufacturing capabilities.

**Lab equipment and specimens furnished by:
Ford Canada, Chrysler Canada and the Linamar Corp.**

...and now under construction....



Windsor's new *Centre for Engineering Innovation*

Centre for Engineering Innovation (CEI)

- Over 30,000m² (300,000 sq.ft.) / \$112M;
- Automotive manufacturing, design, test, & materials labs;
- Electrical & computer systems engineering including hybrid drive laboratories;
- Green energy, alternate fuels, wind tunnels & vehicle thermal management labs;
 - ✓ *Phase I – opening March 2011;*
 - ✓ *Phase II – opening June 2012;*

The *CEI Industrial Courtyard*

A unique concept to bring industry into the academic environment...

- a 2000m² (20,000+ sq. ft.) space inside the CEI;
- large secure, serviced high-bay spaces for industry R&D, product development, pilot activities;
- cost effective, confidential, well equipped;
- less than 500m from the Detroit border crossing;
- co-op & internship placements;
- sharing of research and teaching infrastructure.

The *CEI Industrial Courtyard* has been designed in consultation with industry – to serve industry needs and assist in solving industry problems.



Windsor Automotive

How can we help you?

Contact: Executive Director of Automotive Research & Studies
University of Windsor, Windsor, ON Canada
(519) 253-3000 ext. 4127
email: EDARS@uwindsor.ca