TO GREATER HEIGHTS

Pinnacle

AUTOMOTIVE

WHO's next
Child safety sparks innovation and goes global

Highly qualified graduates
Knowledge fuels growth in the auto sector

Talent and dedication
Windsor alumni take leadership roles

UNIVERSITY OF WINDSOR

AUTOMOTIVE: A PINNACLE OF THE UNIVERSITY OF WINDSOR

Last year, our first *Pinnacle* magazine featured Windsor students, professors, alumni and partners involved in the Environment. This second issue highlights the University's role in the renewal and growth of Canada's automotive sector and the re-emergence of the Windsor region as a global source for innovation.

Detroit is known around the world as the home of the automobile industry. Across Canada, Windsor is equally well known as Canada's automotive capital. We can no longer assume that will continue through the 21st century.

The auto industry is undergoing unprecedented change, with huge investments in auto production and superheated markets in Asia. This threatens Ontario's pre-eminent position in the automotive industry and it is very clear that response to the new challenges must be in research, innovation and the development of highly skilled graduates who can compete with the best in the world.

All of this was anticipated more than a decade ago when Ron Ianni and Yves Landry, respectively Presidents of the University of Windsor and DaimlerChrysler Canada, set out a transformative vision for Canada's automotive sector. It included the growing need for high value jobs and innovation in the auto sector, developing and applying new technologies, materials, production processes, systems, and training in close collaboration between industry and academia.

We have been building strongly on that vision, founding Canada's first Automotive Engineering program in 1998 and, a year later, declaring "Automotive" as the first pinnacle area. We have had much success since, working with DaimlerChrysler Canada to build the $600 million Automotive Research and Development Centre into one of the finest such facilities in the world, winning two major research contracts to work collaboratively with International Truck in our new facility on Dezile Road, and launching Tessonics, the spin-off company from the research of Physicist Roman Maev, in 2005. Our NSERC industrial research chairs with Chrysler, Ford and General Motors have contributed significantly to automotive research and development over the past decade.

Windsor's Centre for Automotive Education and Research (CARE) offers a unique combination of theory and hands-on practice that produces the kind of graduates in highest demand from industry. The University's leadership role was underlined in 2004 when a large group of Canadian universities supported our bid to host AUTO21, the Network of Centres of Excellence for the Automobile of the 21st Century. Under the leadership of Peter Frise, AUTO21 has quickly had a major impact on automotive research and education across Canada and firmly established Windsor's leadership in this domaine.

The success of Automotive Engineering at Windsor has spurred us to undertake a massive new development plan for Engineering that starts with the $53 million new home for the Faculty that opens in 2009. As this magazine demonstrates, the University of Windsor has lots to build on as we work together with our academic and industrial colleagues to ensure the continuing success of this vital Canadian industry.

Dr. Ross Paul
President, University of Windsor

Inset on the cover:
Engineering Professor Bill Altenhof drives with his twins in their booster seats facing backwards for extra safety

Pinnacle
Automotive

Editors: John Carrington, Jennifer Barone

Design and Layout: Casey Purdie

Writers: John Carrington

Photography: Tory James, Doug MacLellan, Kevin Kavanaugh, Rolf Kraiker

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Correspondence:

Public Affairs and Communications,
University Advancement, University of Windsor
401 Sunset Ave., Windsor, Ontario, Canada, N9B 3P4
Phone (519) 253-3000 ext. 3240
Fax (519) 973-7067

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UNIVERSITY OF WINDSOR

TO GREATER HEIGHTS

Pinnacle
AUTOMOTIVE

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With 2006 Windsor Formula SAE car are Engineering students on the 2007 team, from left, Ian Greig, Anthony Gambino, Matthew Arbour, Bradford Byers, Peter Serran and Robert Peters

Engineering Professor Colin Novak, second from left, with students during the Formula SAE competition in Germany

Creating highly qualified graduates

Cars and trucks generate an alluring mystique for many young people

Not surprisingly, students from across Canada and the globe are drawn to an engineering program that opens up the world of automobile design and manufacturing.

Brent Olson is from a farm near Cereal, Alberta. He graduated from the Mechanical Engineering Program at Windsor with an option in automotive in fall 2006.

Clint Olsen

In their fourth year of study, future engineers put heart and soul into a capstone project. Olson was part of the project team for Windsor's 2006 Formula SAE® car.

The Formula SAE racing competition is for Society of Automotive Engineering student members to conceive, design, and fabricate cars for competition. The restrictions on the car frame and engine are such that the knowledge, creativity and imagination of the students are challenged. Formula SAE competitions are an annual summit for future engineers and the field gets more competitive every year.

The Windsor team performed exceptionally, placing in the top 25 against nearly 150 entries from the division for the American Midwest and Ontario last spring. In the summer, Olson and his team went to Germany where they were the only North American school entered in the European Formula SAE.

Brent's brother, Clint Olsen, will learn all about this first-hand. He is a second-year engineering student and a junior member of this year's team.

"I enrolled first in a big Alberta university. My professors didn't know me. I felt I was just part of a sea of faces in the large classes," says Clint. "My brother convinced me to switch to Windsor where he said the professors know your name and make time to learn who you are."

Automotive Engineering requires all the knowledge and theories of other engineering specialties. It also requires a depth of practical know-how. That's part of the attraction for Robert Peters of Leamington, just southeast of Windsor, who has been chosen Team Captain and Technical Director for Windsor's 2007 Formula SAE team.

"I have a passion for mechanical challenges. I don't believe the automotive option is offered elsewhere in the full depth that it is offered in Windsor," says Peters. "That's lucky for me because I can get this great education and stay close to home."

Peters says his passion began in the family garage, "wrenching on my 89 Ford Probe. I spent way more time on the power steering, the timing and engine components than the car deserved, but I like getting under the hood and finding out how things work."

Last year, Peters designed and fabricated the front suspension for Windsor's Formula SAE entry. That's particularly impressive, because an assignment requiring that level of expertise normally goes to a fourth-year student, according to the team's academic advisor, Engineering Professor Colin Novak.

The University of Windsor was the first in Canada to offer a specialized degree for budding automotive engineers. Seven years later, Windsor's Automotive Engineering program rides the crest of change within Canada's auto sector.

Professor Randy Bowers is the department head for programs in Automotive, Mechanical and Materials Engineering. He describes the automotive program as a balance that emphasizes practical applications and a solid foundation of theory, plus "complementary" skills such as teamwork, management and the knowledge of how engineers fit into the automotive manufacturing business.

The automotive specialty requires such courses as Automotive Systems Design and Internal Combustion Engines.

Dr. Bowers says courses connect teaching to the needs of the automotive industry in the local region and Southwestern Ontario.

"It is critical for the Canadian industry to have a supply of highly qualified personnel who have knowledge and skills comparable to graduates in Europe and the United States. Ontario needs to invest in education for automotive engineers to ensure our largest manufacturing sector, which is largely foreign owned, is able to compete well in a global economy," he says.

Engineering Dean Graham Reader says the auto industry is undergoing a revolution in business organization and technology. "A great number of professionals are retiring over the next few years. Taking their place will be engineers with a new level of knowledge and skills.

"This is the result of an introduction of lean production technologies, new materials and part-making processes, and advanced simulation and virtual testing techniques. It's all about being faster at bringing high-quality, low-cost products to market. The competition with lower-cost nations is both a challenge and an opportunity for our industry partners," says Dr. Reader.

The industry will require design engineers who have the ability to take a product design through to production by pulling together the expertise in manufacturing systems and complex product analysis.

"It is to the advantage of our automotive engineering grads that they are not only exposed to mechanical and materials engineering but also able to take advantage of electives in manufacturing systems and processes, and in electrical and computer engineering," the dean says. "It may seem like a contradiction, but what the auto industry needs is very specialized generalists."

Bowers says the fourth-year capstone projects, such as Formula SAE, the Baja competition car and the ultra-high fuel efficiency vehicle bring together the knowledge, practical skills, and the teamwork and administrative skills that produce highly qualified personnel for industry in Canada's automotive capital or any place in the world.

Dr. Andrzej Sobiesiak teaches fuels and combustion

Dean of Engineering Graham Reader

One of the veteran professors of the program is Dr. Andrzej Sobiesiak, who came to Windsor in the mid-1990s to accept the position of Industrial Research Chair in Alternate Fuels.

He has worked with students on a range of projects over the years, including the GM pick-up covered with decals known affectionately as the "Corn-Dog".

Originally the Corn-Dog was converted by students for their capstone project to use ethanol fuel. It is now a multi-fuel vehicle, with equipment that can be switched from gasoline to ethanol.

"Even burning gasoline, it is the cleanest-running vehicle in Windsor because it is equipped with four catalytic converters," says Dr. Sobiesiak. "When they took it for an emissions test, the readings were so low the testers said it could not be right and checked it again."

Sobiesiak teaches a third-year course in Applied Thermal Dynamics and fourth-year course in Internal Combustion Engines. He takes his students in groups for demonstrations at the engine lab in the University of Windsor/DaimlerChrysler Canada Automotive Research and Development Centre.

Sobiesiak's research continues to contribute to the knowledge of alternative fuels such as alcohol, bio-diesel, and ethanol. He was recently awarded $100,000 from the Ontario Ministry of Agriculture and Food for further work in bio-fuel.

"We have an explosion of research these days," he says. "We see the results in reductions in emissions and fuel savings every model year."

He looks forward to improved fuel with low levels of sulfur, since this offers opportunities for further engine refinements. He says there are huge potential advantages in variable valve timing and actuation using solenoids instead of camshafts and transmissions that can continuously vary gear ratios. "Staying informed and continuing to make contributions to this flow of new knowledge is so important for our students," he says.

And while Dr. Sobiesiak's emersion in research speaks for itself in his publications, his enjoyment of teaching is equally evident to those who see him in action. In the engine laboratory at the ARDC, with his students gathered around, banks of computers blinking read-outs on either side and the roar of the engine in the sealed lab coming through the observation windows, Sobiesiak becomes animated like a symphony conductor, smiling and nodding as he draws responses from his students.

"Yes, I like teaching. I like to know that my students will be able to go with some confidence into the working world," he says.

At a recent seminar at the Schaeffler Group's INA facility in Troy, Michigan, Sobiesiak spoke with a former student, Anna Strelhau, and recognized three others in the audience there.

"It's a nice feeling to see our graduates doing well," he says.

University of Windsor offers Applied Science Degrees in

- Civil Engineering
- Electrical Engineering
- Electrical Engineering with Communications Engineering Option
- Electrical Engineering with Computer Engineering Option
- Electrical Engineering with Electronics Engineering Option
- Engineering
- Environmental Engineering
- Industrial Engineering
- Industrial Engineering with Automotive Manufacturing Option
- Industrial Engineering with Supply Chain Engineering Option
- Industrial Engineering with a Minor in Business Studies
- Mechanical Engineering
- Mechanical Engineering with a Materials Option
- Mechanical Engineering with an Environmental Option
- Mechanical Engineering with an Automotive Engineering Option (also at Georgian College site)

Computer Science Professors Ziad Kobti and Robert Kent and student Vlad Pavlovic converted BlackBerry software for child safety surveys

UofW and WHO tackle epidemic of child deaths in vehicle accidents

A research and public education initiative led by a University of Windsor nursing professor is reducing the number of deaths of children in vehicle accidents across Canada.

Now, a World Health Organization (WHO) effort has asked Nursing Professor Anne Snowdon to do the same for children in developing countries.

Dr. Snowdon is leading the Canadian Connection, created by the WHO in 2006 to connect Canadian, Middle Eastern and African research groups and their regional communities. This network will collaborate on learning more about the level of knowledge and cultural conditions that may contribute to roadway tragedies in each region and introduce safer practices.

The WHO turned to Snowdon and the University of Windsor for two reasons. One is the

Virtual crash test technology created at the University of Windsor

groundbreaking achievements that her public-health approach to child safety in vehicles has made in Canada. The other is the potential to apply on a global scale the new technologies that were created to support those efforts.

World attention to road safety piqued after a 2004 report showed vehicle accidents were claiming lives at the epidemic level of 1.2 million people annually. That was 3,200 deaths every day in 2004 and it's been on the rise ever since. Another 50 million people receive disabling and often life-changing injuries each year, the WHO report estimates.

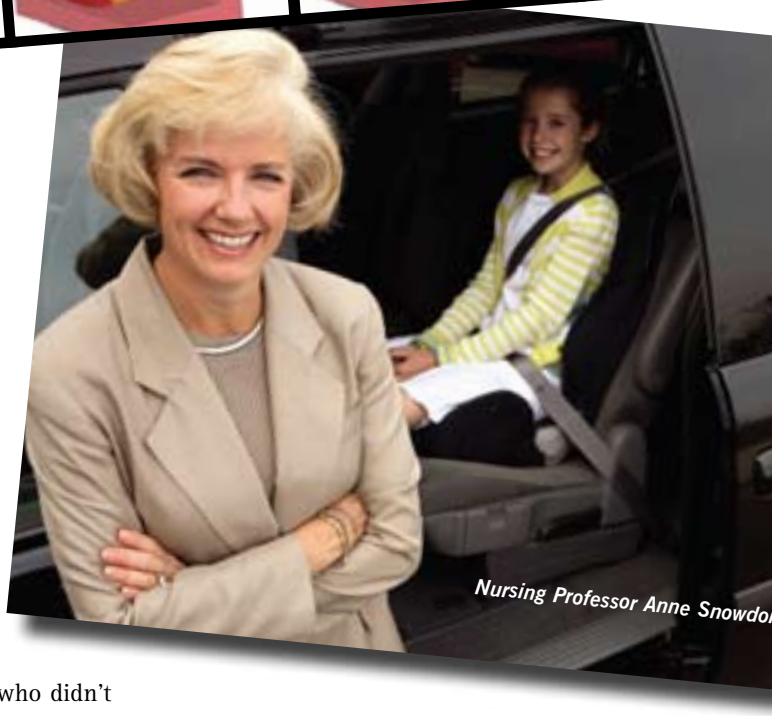
The economic cost of road crashes is also staggering. For many underdeveloped countries, it more than wipes out what is received in international aid.

Snowdon's personal commitment to child safety in vehicles began when she was a nurse in the intensive care unit of an Ottawa hospital.

"Like other nurses across Canada, I saw too many young lives end, too many crippling injuries to boys, and girls who were just babies, toddlers and impish early graders," says Snowdon. "It became my goal to learn why vehicle crashes remain the leading cause of death of young children in Canada despite advances in safety systems and safety seat legislation. Why were parents emerging from minor accidents practically unharmed to find their child in the backseat dead or paralyzed from a snapped spine?"

Every year in Canada, the equivalent of three full classrooms are wiped out from collisions on the road before these children reach Grade 5.

As a professor of nursing, Snowdon was able to begin her efforts when she received support from AUTO21™, a federal network of centres of excellence, which is hosted at the University of Windsor.



Nursing Professor Anne Snowdo

Working in Southwestern Ontario with educators, parents and children, Snowdon's team of students learned that safety seats were not being used properly and that the reasons ranged from a lack of knowledge among drivers to peer pressure among defiant youngsters who didn't want to be treated like babies.

With that knowledge, Windsor students created an education program for families including a storybook and a height chart to help parents promote safety seats to their children. (see Award, page 6) After local testing, the program spread through a network of nursing schools across Canada. The group's national activity caught the attention of Transport Canada, which was planning a national survey on child safety in vehicles and the use of safety seats.

"We agreed with Transport Canada that a more accurate way to collect data was needed, and that was when we turned to our School of Computer Science."

Computer Science students Vladislav Pavlovic and Dohan Kim and Nursing student Tina Dunlop, under direction of Computer Science Professor Bob Kent, developed the Unified Survey Management System (USMS) for conducting personal interviews using a remote electronic hand-held device such as a BlackBerry.

USMS technology was used across Canada to gather the best data ever collected anywhere on the use and knowledge of child safety seats. Teams of students surveyed 200 randomly selected sites in every Canadian province and one territory. Detailed parking lot surveys were completed with approximately 2,000 families across Canada, and some 20,000 vehicles were observed at selected intersections to complete the national survey by October 2006.

The WHO is excited about this technology. In addition to wireless data collection, USMS also will support a new computing paradigm developed by Computer Science Professor Ziad Kobti.

Dr. Kobti hopes to help find methods for promoting child vehicle safety in different cultures.

The WHO officials in Geneva believe they could also use this technology on BlackBerries following a disaster or epidemic to gather accurate, formatted information from remote locations.

Innovations spring from project to make children safe

Video Kids

A group from the Faculty of Engineering has created the first computational model of a child to simulate vehicle collisions.

Child-sized crash-test dummies do not provide much detail about stress and pressure on a real child's anatomy during a sudden stop. University of Windsor Engineering Professor Bill Altenhof and his PhD students, with support from AUTO21, found a way to learn how a child's body reacts when a car stops suddenly in a collision.

They developed sophisticated, anatomically accurate computer models that show clearly and graphically what does happen to a child in a crash.

These simulations of a child stopping suddenly have been shown to parents during education sessions on vehicle safety. Parents gasp at the visual model of a child's momentum thrusting him forward in the safety seat, their little necks and spines snapping like a whip. In outbursts they asked aloud, "why have we not been told this before?"

Engineering Professor Bill Altenhof

Dr. Altenhof is perhaps the most impressed parent of all. He has rigged his safety seats for his twin boys so they ride facing backwards, even though standards for their height allow the Altenhof boys to face forward.

There has been international interest in publications of the work in developing the computer models of young children and how these models can be used. Altenhof and his team have presented their models at conferences and have discussed developing the models further with research teams at American institutions.

Boosters that rock

Surveys of drivers with children in vehicles show that many children squirm out of their car seats as soon as the car pulls out of the driveway.

So Nursing Professor Anne Snowdon decided to expand her team's expertise with parents and drivers to include the world of children's games and marketing.

"We met with Magna International to discuss how they might use our research findings to develop a safer booster seat that children would want to sit in," she says.

The team asked children in the Early Years programs about booster seats and what design features they would like.

The children drew their ideal booster seat. Little girls drew beautiful graphic designs for their seats and added a number of accessories for comfort including reading lights and fans to keep cool. Boys wanted booster seats that resembled the cockpit of a race car or jet fighter, and drew entertainment features including a swivel arm to attach their DVD player.

That led to Snowdon's team enlisting partners from George Brown College School of Design, whose students were asked to develop prototype designs for a series of booster seats with child-appeal.

Magna used these inspirations to develop a prototype. A first, innovative booster seat product was launched nationally this fall through Canadian Tire Stores. The company has also considered donating a number of these seats to international projects.

The booster connects to UAS latches to offer greater protection for young children, particularly for side impact crashes and rollovers. And they are easier to handle for parents. The crash testing of the seat has exceeded all safety standards of any other seat on the market and sets a new standard for child safety in vehicles.

Award

The Canadian Institutes of Health Research, a federal government support agency, named Dr. John Mann, director of Engineering and Regulatory Affairs, DaimlerChrysler Canada Inc. and Dr. Anne Snowdon, University of Windsor, to receive the 2006 CIHR Partnership Award for their education program *Bobby Shooster Rides Safely in his Booster.*

This award recognizes partnerships that bring health research communities together to create innovative approaches to important research questions.

DaimlerChrysler has entered into an innovative partnership to increase knowledge of child safety in vehicles. This project, funded by AUTO21 and launched in Ontario, has led to a significant increase in parents' knowledge and is now being tested in six other Canadian provinces.

University of Windsor Archives preserves Canada's automotive legacy

At the beginning of the 20th century, a Windsor businessman named Gordon McGregor acquired the patent and rights to sell Henry Ford's new automobile in Canada and much of the British Empire

His company, Walkerville Wagon Works, became Ford Motor Company of Canada, Limited, in 1904. The rest literally is history.

The first car to be mass-produced in Canada, the Model C, rolled out of the factory on the riverfront east of the Hiram Walker Distillery in late September 1904. The company could build two cars at a time and produced 117 in its first full year of production.

The first export sales went to India. Ford Windsor engineers devised and built the first ambulance—a vehicle to remove the wounded quickly from the battlefields of the First World War. They also created a school bus for the Edmonton school board in 1918, and by 1922 they were building buses for schools across Canada and the US.

While the company's Canadian headquarters moved to Oakville 40 years ago, the early patents, drawings and records remain permanently in Windsor, under the care of the University of Windsor Archives at Leddy Library.

The Ford of Canada papers are part of a rich resource in the Archives for research into the founding and growth of Canada's automotive sector. University Archivist Brian Owens says the collection includes account balances, cheques, customs drawback claims, expense accounts, general ledgers, invoice accounts, monthly statements, notes falling due, parts ledgers, patents, payroll and customs rulings and costs. It's a valuable source of information for local, legal and business historians, as well as those with an interest in automobiles.

None is more interested than James Mays. The retired educator writes about the history and culture of cars and trucks for nearly a dozen publications across North America and Europe. He is well known to car collectors and history buffs.

"Windsor was at the centre of the automotive universe. The designs for cars created here rocked the world. That's why I decided to move to Windsor," says Mays. "Windsor is not just where Canada's automotive industry started. It's still where the action is. Nowhere in Canada would you find the knowledge and experience, and the passion for cars and trucks."

"Cars are the 20th century. Cars defined where people could live and the shape of their communities. Cars changed the society unlike any other invention that had come before," says Mays. "For example, courting couples had few places to meet, few places to go, and few opportunities for privacy before there were cars. With cars, couples could go more places and go there alone! Cars meant freedom."

Mays' books on car collecting, how to buy collector cars, the history of vehicles and the history of car companies, including Ford and the former American Motors, are based on interviews with the people who lived history.

"Nash Rambler former employees took boxes home rather than throw them out when the company was acquired," notes Mays, who located and interviewed those employees.

The Leddy Archives have accepted donations of taped interviews and many rare documents from Mays, which can be heard and viewed on request.

For more information www.uwindsor.ca/leddy and www.theoilspoteh.ca

University Archivist Brian Owens and University Librarian Gwendolyn Ebbett review documents from beginning of Canada's auto industry

Business school launches office of automotive research and training

From his fifth floor office in the Odette School of Business building, Marketing Professor A. J. Faria keeps an eye on the auto industry around the world.

Twice a year, Dr. Faria releases a report on new assembly capacity investment announcements worldwide.

The document, produced for the Automotive Parts Manufacturers' Association of Canada (APMA), gets reported by the business and automotive news media around the world, because, as Faria says, "I'm the only one in the world doing it."

Dr. Faria has been compiling the global assembler investment announcements reports since 1994. They are distributed to the 550 member firms of the APMA. The reports cover 40 major global automotive assemblers over the January to June and the July to December time periods.

"It's important for Canada's parts industry to know where they need to invest if they want to expand their business," says Faria.

"I tell them they need to be thinking far outside of North America, although there is nothing wrong with the auto industry in North America. Sales of light vehicles are up slightly this year in Canada and are up significantly in Mexico but are down slightly in the U.S. In fact, 2006 will continue a stretch going back to 1999 which represent the eight best light vehicle sales years in North American history."

North American light vehicle sales will remain near 20 million units in 2006, however another 50 million units are being built and sold outside of North America. First Automotive Works (FAW), the giant Chinese manufacturer, and Mahindra & Mahindra, the largest automaker in India, are making big investments. Faria estimates that nearly $50 billion has been invested to expand Chinese auto-making capacity over the past six years.

The worldwide investment in auto plants has meant that companies such as Linamar and Magna, the largest auto parts makers headquartered in Canada, have become real global companies with plants in many countries.

Still, the auto industry in North America remains very strong, according to Faria. While Ford is restructuring, and Chrysler and General Motors make small profits, Toyota's profits from its North American operations are in the billions. Honda, Hyundai, BMW and many others are increasing their North American sales as well.

Faria, now director of the Office of Automotive Research and Training within the Odette School of Business, has studied the industry for many years and is often called on for his point of view for TV, radio and newspaper reports and for talks to industry groups. Recent talks to parts maker groups have been on penetrating the Japanese market and the coming threats and opportunities from the growing Chinese auto industry. He also produces reports on auto market segments and trends, and conducts surveys for the parts industry on HR costs and pay scales, R&D investment, skills needs and similar issues.

The Windsor-Essex Development Commission has enlisted his assistance for their regional automotive strategy. "We are looking at what we need to do to ensure the continuing existence and growth of our parts industries and what is needed to attract more investment. There is no reason we can't have parts makers here ship east or south – Windsor and Essex is a good location for parts investment."

Raj Kumar and Mwila Clarence Mulenga: confident in heart of North America's auto industry

Windsor works to clear the air on our highways

With 12,000 trucks a day crossing the Ambassador Bridge, the Windsor area knows first-hand the issues surrounding diesel engine exhaust.

We're far from alone. The US Environmental Protection Agency counts reducing emissions from diesel engines among the most important air quality challenges facing the communities throughout North America.

Even with more stringent heavy-duty highway engine standards set to take effect over the next decade, millions of diesel engines already in use will continue to emit large amounts of nitrogen oxides and particulate matter.

The EPA says these emissions will cause thousands of instances of premature mortality, hundreds of thousands of asthma attacks, millions of lost work days, and numerous other health impacts over the next 20 years.

While most people look on the diesel parade disparagingly, there are students, professors and alumni of the University of Windsor who see great opportunity.

A cleaner-running diesel engine is the goal of Dr. Ming Zheng, Professor of Mechanical, Automotive & Materials Engineering and Canada Research Chair in Clean Diesel Engine Technologies. Under the CRC umbrella, Zheng has received about $300,000 in funding through the Canadian Foundation for Innovation and Ontario Innovation Trust, that he says "catalyzed" future research significantly. His work is also supported as part of an AUTO21™ research project.

Among his enthusiastic students are PhD candidates Raj Kumar and Mwila Clarence Mulenga.

Kumar came to Windsor by way of the University of Delhi and the University of Tennessee in Knoxville. He first worked with Dr. Zheng at Tennessee, and followed him to the University of Windsor after the professor accepted his CRC appointment.

"This exciting and challenging area of study is very satisfying," says Kumar. "People believe diesel is not clean, but we are showing that it is possible to achieve very low emissions from diesel engines."

Mulenga graduated from the University of Zambia and then earned his master's degree in Sweden. He says

attitudes about diesel are different in Europe where there are more diesel-fueled vehicles on the road.

Mulenga chose to come to Windsor for two reasons. He wanted to be in the heart of the North American auto industry, and he liked what he had heard about Canada being a more integrated and diverse society. Now, with his accomplishments in Zheng's lab, he's very pleased to have made the choice because it opens career paths in industry and academia.

"It would be difficult to find elsewhere the equipment that we use here at the University of Windsor," he said. "What we have learned in our specially-equipped lab is of interest around the world."

The lab has received about $500,000 in hardware contributions from industry, including diesel engines and engine dynamometers.

Zheng's lab is tackling cleaner diesel emissions from two sides.

The first is clean combustion, which emphasizes pre-mixing fuel and air to reduce pollutants inside the cylinder. Zheng uses a sophisticated combustion event control process that he calls "every diesel researcher's dream."

In the area of active flow controls, Zheng is working with Dean of Engineering Graham Reader on theoretical analysis, computer modeling and simulation programs.

The second angle of attack is active after-treatment with catalytic converters in the exhaust system. Computer models are also being used in this end to learn more about improving the control of nitrogen oxides and soot.

"I believe we are unique in our methodology," Zheng says.

For truck makers, the economic stakes in this research are high. New emissions regulations are coming into effect in 2007 and 2010. All diesel engine manufacturers are working to achieve acceptable levels of emissions so they can continue to produce their engines.

The University of Windsor enjoys a close relationship and daily communication with Ford Motor Company and other industrial partners.

Zheng says the university has benefited through significant research funding from DaimlerChrysler Corporation of Canada, Imperial Oil Canada and International Truck & Engine Company (ITEC), which manufactures transport trucks and also builds Ford diesel pickup engines.

In May 2005, ITEC partnered with the University of Windsor to create research and development centres for advanced truck manufacturing and for clean diesel technologies. The centres are a $270-million collaboration in manufacturing improvements and R&D from the company with support from the governments of Canada and Ontario.

ITEC's centre for diesel research is in Chicago, but the connection with Windsor could not be closer.

Windsor alumnus Phil Zoldak completed his master's degree under the supervision of Professor Andrzej Sobesiak, whose work introduced him to a spark-less combustion process called homogeneous charge compression ignition (HCCI).

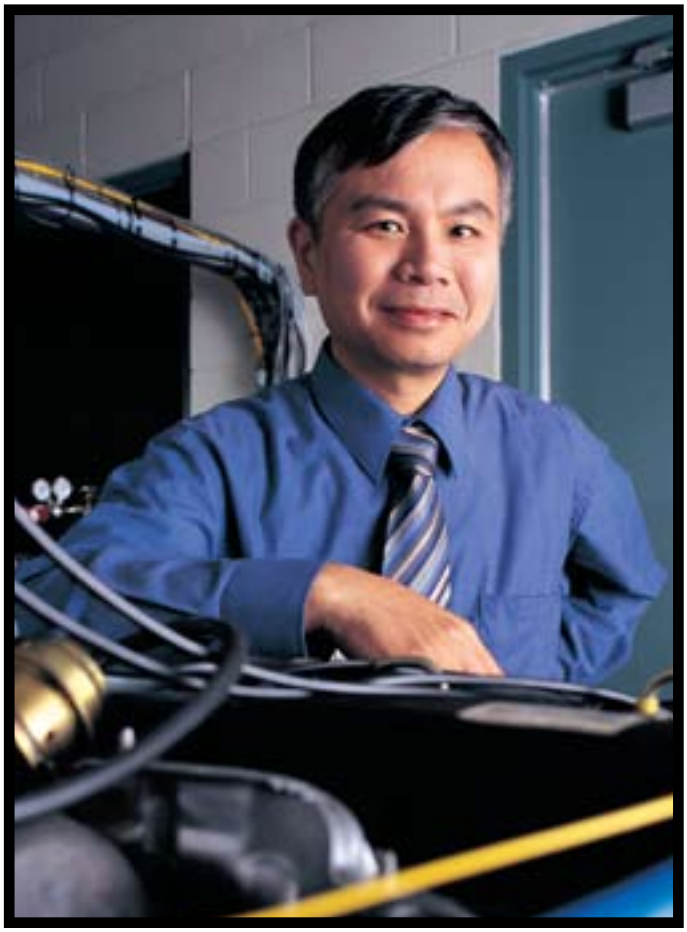
That work in this new field in combustion technology gave Zoldak a foothold in ITEC last year. In April 2006, he moved into a full-time position as a development engineer, doing mechanical development, durability and mechanical systems testing.

This work involves the system to control HCCI combustion and the engine system to go with it—engine controls, fuel scheduling and cylinder pressure.

"Fuel efficiency is the key to lower fuel costs and emissions, and the main issue in achieving that is to control combustion," he says. "This involves detectors able to measure cylinder pressure and provide feedback into the engine control unit."

Easier said than done.

Zheng's labs in Windsor are helping to validate the computer models of the ITEC systems. In addition, Zheng's team is contributing to the development of variable valve actuation and variable compression ratios, two new technologies, which, when perfected, would make efficient HCCI engine systems possible.



Dr. Ming Zheng, chair in clean diesel engine technologies

The source of innovation

Many people think of professors only as teachers, without realizing that research is a major part of their work.

Professors are passionate about the quest for knowledge ...new understanding, new ideas, creating new techniques, re-examining old beliefs in a new light. That's what drives them.

Professors may pursue an idea just to find out what will happen. It's called basic research. And while product innovations receive public attention, the source of innovations can often be traced back to a professor's curiosity and persistence.

That's what draws companies to support university research, says Professor Emeritus of Physics Mordechay Schlesinger.

Dr. Schlesinger passed retirement age a decade ago, but he continues to immerse himself in his pursuit of new knowledge as a General Motors Research Fellow.

"Automakers especially need a constant supply of real innovation to add value to their products," Schlesinger says. "Decades ago, new models rolled out each year sporting different fins and grills. But under the skin, those cars were much the same. Now it's just the opposite – a brand of car may not change in appearance every year but there are wonderful new innovations for the consumer."

Windsor Engineering Professor Peter Frise agrees. Dr. Frise serves as Scientific Director and CEO of AUTO21, Canada's Network of Centres of Excellence in the Automobile. With its headquarters at the University of Windsor, it coordinates federal support for automotive research at Canadian universities.

"It's a cyclical relationship," says Frise. "Support dollars support research to create new knowledge. R&D converts that knowledge into innovation. Manufacturing converts innovation into products. Marketing converts products into money, and some of that money goes to support more research."

The cycle today is all about durability, performance, reducing emissions, manufacturing more efficiently and managing more effectively.

Schlesinger's expertise is in thin materials, some only a few molecules thick. He has been editor of international journals on developments in thin-films and thin-film technology, and has published books on his own contributions to the field.

Currently, Schlesinger contributes to at least six projects for GM. The company prefers he keep most of them hush hush. He can talk about a couple, but just a little.

One of his current achievements has been in electrolessly depositing thin films of chrome. A thin layer of chrome on a vehicle component that would not affect its size or weight could protect the component and make it last much longer.

The other project Schlesinger can discuss involves spark plugs.

Physics Professor Emeritus and GM Research Fellow Mordechay Schlesinger

"We have discovered how to deposit a thin film of a metal that was previously thought to be not possible to deposit by electro-deposition. And, we are depositing this film onto a metal that was previously thought to not accept thin film deposition. By doing this, we will be able to have spark plugs that will be very different.

"You watch," he says with a grin. "There will be new innovations in spark plugs in about three years."

Across campus at Windsor, there are other professors and graduate students in the sciences and other fields who are making contributions to Canada's automotive sector in their own specialized fields of expertise.

Chemistry Professor Ricardo Aroca

Fuel for fuel cells

Chemistry Professor Ricardo Aroca and his graduate students are expanding the fundamental understanding of the properties of new materials that may have applications for vehicles in the future.

Around the world, scientists and engineers are striving to advance the concept of fuel cells that use hydrogen to generate electrical power. The potential of fuel cells as a clean alternative to combustion engines is tremendous, but so are the challenges that need to be overcome to make fuel cell technology practical.

Dr. Aroca is investigating properties of materials that may offer the option of storing and retrieving hydrogen from within the material itself. Pure hydrogen is explosive. Refillable materials that can absorb hydrogen like a sponge offer potential for improving safety in fuel cell technology.

Aroca's lab has also published a number of articles about materials used in energy storage systems such as lithium batteries. Efficiency gains for energy storage are important for new hybrid vehicles. It may be even more important for alternative vehicles and hybrids in the future.

Organic coatings

Most chemistry professors create new molecules and test them for their properties. Most specialize in certain elements or certain kinds of molecules. Professor Holger Eichorn has two such projects on the go. He has support from Exxon to test certain kinds of molecules in lubricants. He also has support from the Emerging Materials Knowledge Network and the Ontario Centre of Excellence for Materials Manufacturing to explore ideas for organic coatings for steel.

Organic coatings would be better for the environment than heavy metal coatings. He works with a partner at McMaster University on this work. Their ideas are inspired by polyanimine, the only organic coating currently used. They are trying to learn more about why polyanimine works and how it can be improved.

Aerodynamics

Plans are firming up to build a wind tunnel at the University of Windsor.

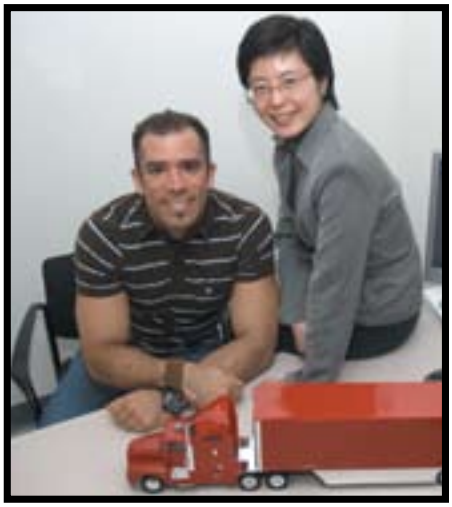
Engineering Professors Shaohong Cheng and Rupp Carriveau have $250,000 from the Canada Foundation for Innovation to build the tunnel that will be 25 metres long and nearly two metres high.

Dr. Cheng's research is in structural dynamics and aerodynamics. She says the tunnel could be used for testing scaled models of vehicles as well as other types of structures.

"Aerodynamic design can improve fuel efficiency, but also impact on stability and vehicle safety, which is a big issue as vehicles become lighter," says Cheng. "Drivers are familiar with passenger cars affected by turbulence from passing trucks. The aerodynamic interference between different vehicles sharing the road can be investigated in this wind tunnel."

She envisions the tunnel being used as well for testing wind-resistant designs of bridge and building structures, which is also an area of her expertise.

Cheng and Dr. Carriveau are also involved with public education and demonstration projects for the Green Corridor environmental organization. They are exploring wind and water-current turbines that could provide power to light landmark posts on the international gateway or even the sign on the Ambassador Bridge.



Engineering Professors Rupp Carriveau and Shaohong Cheng

Law Professor Maureen Irish

Regional vs World Economies

The rise and fall of the US-Canada Auto Pact of 1965 to 2001 presents an excellent example for policymakers to understand how international trade rules can override government efforts to support a regional economy, says a University of Windsor law professor.

Dr. Maureen Irish collected and edited essays from 16 specialists for the book, *The Auto Pact: Investment, Labour and the WTO,* which provides insight for professionals in every area of international trade.

The book uses the Canadian auto industry centred in Windsor, directly across the river from Detroit and the heart of the industry in the U.S., as an intensely concentrated sample of the triple nexus of investment, labour and trade, which lies at the core of economic development worldwide.

"Issues that are of profound significance for the future of international trade are brought into sharp focus by the history of the Auto Pact and its demise," says Irish.

In addition to the vulnerabilities of a local community, issues considered include labour rights, export subsidy and implications for investment strategies and foreign investment. A challenge for the World Trade Organization is whether trade remedies may be used to enforce the standards set out by the International Labour Organization.

The Auto Pact: Investment, Labour and the WTO was produced with the support of the Canadian-American Research Centre for Law and Policy at the Faculty of Law, University of Windsor.

To drive or not to drive

Like budding automotive engineers, PhD student Myra Ruggles, in the Sociology and Social Justice program, has come to the University of Windsor because Windsor is the centre of the auto industry in Canada.

However, Ruggles ponders what city living would be like if our communities were not designed for cars. Her work explores whether cars and roads are actually barriers to better communication in our society.

Ruggles is an organizer of Windsor's annual Alternative Transportation Festival. "It's a time to stop and appreciate what we are doing to our communities and think about how things could be different," she says. "Ironically, when we asked to close Wyandotte Street, they said: 'but traffic will not be able to get through'."

"Well, that's the point," she says. "We are so stuck on our automobility. It restrains us from thinking of any other way."

Thin but durable

Materials Engineering Professor Afsaneh Edrisy is one investigator who doesn't try to dig below the surface. What she wants to know is how a surface reacts in terms of wear and friction.

Dr. Edrisy creates and studies alloys and coatings, including thermal spray coatings that work like cast iron liners in engine cylinders, but at a tiny fraction of the weight. She also studies and provides advice on casting new materials like aluminum alloys for engine blocks and how to improve those materials.

For the aerospace industry, Edrisy has developed a mechanism to test the friction and wear of titanium alloys in vacuum conditions.

An import part of her work is her understanding of the microstructural properties of the materials she investigates. She emphasizes understanding the behaviours of atomic structures to her students, and the course on the properties of engineering materials is a popular option with students in every engineering program at Windsor.

Dr. Edrisy earned her PhD at the University of Windsor in 2004 and recently joined the ranks of the engineering faculty. Most recently, she has moved into a new field of study, nanoscale crystalline films.

The hope is that these films could offer opportunities for creating wear resistance and strength.

Social unionism in tough times

Sociology and Anthropology Professor Stephanie Ross came to the automotive capital of Canada because of her interest is in the labour force that makes the vehicles.

Dr. Ross studies social unionism – the idea that the union has a responsibility to labour as a whole, not just its own members' bread and butter issues.

"The CAW has been the leader in social unionism," says Ross. "They have pushed the country's social agenda. For instance, the CAW may be in a position to ensure their rank and file has good daycare facilities for their children, but they use their strength in numbers to push for a national daycare system for workers everywhere.

"I will be watching to see if the CAW will be able to continue to do that in these difficult times."

Sociology and Anthropology Professor Stephanie Ross

Mechanical Engineering PhD candidate Helen Ule with mannequin equipped to record sound as humans hear it

Sound advice

Automotive parts manufacturers want good vibrations from Engineering Professor Colin Novak, a specialist in sound and vibration who often provides psycho-acoustic consultations.

"Luxury car owners particularly are looking for quiet vehicles. We cannot always eliminate a sound through absorption, but sometimes we can make it sound better," he said. "For instance, a local firm makes the motor for the adjustable lumbar support in the Lexus. We can't make the sound of the motor disappear, but we can make it a sound more pleasing to the human ear."

Part of Novak's special equipment for psycho-acoustics is a pair of microphones enclosed inside the head of an insulated torso that picks up sound through the ears. The microphones in the mannikin pick up sound in a manner similar to how a human would interpret the same sound.

Novak is able to capture the acoustic signal digitally and analyze it with software specifically designed to predict a human's perception of how good or unpleasant the sound would be interpreted by our brain. "This is very important in the development of a product because consumers will feel that it is of high quality if the sound is pleasing to them."

Active Safety Systems

How long will it be until we have cars and trucks that practically drive themselves? It could be sooner than you might think, according to Electrical and Computer Engineering Professor Sazzadur Chowdhury.

Dr. Chowdhury points out that the technology is already part way there with fault-tolerant "drive-by-wire" systems. This group of electrical systems is replacing conventional mechanical components for throttle, steering, acceleration, braking, etc.

Coupled with a microsystems-based collision avoidance system, which Chowdhury is developing, vehicles could start thinking for themselves.

A collision avoidance system would monitor the driver's actions and use sensors to monitor a safety zone, like a shell around the vehicle. Chowdhury has contributed to an improved design methodology for microelectromechanical radar units so small that they could fit into the logo on the front and rear of the vehicle.

High-speed microprocessors would analyze data from the sensors to determine when a vehicle is safe or not.

If a driver needed to take action to improve the vehicle's safety situation, the system could inform the driver.

Or, if split-second action were necessary, the system could override the driver's controls and act autonomously to try to avoid or reduce collision damage.

Microscale acoustical sensors could also monitor any unusual vibration in any part of the vehicle and alert the driver.

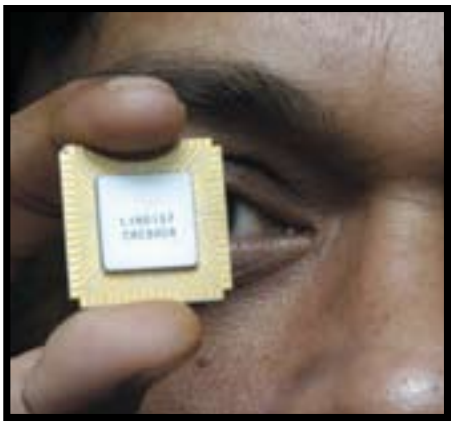
To describe how a vehicle with this system might be able to function, Chowdhury recalls the Night Rider TV program of the early 1980s. To understand the technology that Chowdhury has envisioned to make it functional is not so easy.

Integration of a fault-tolerant, microsystems-based collision avoidance system with the existing systems in a vehicle is the most formidable challenge.

Chowdhury has no doubt that meeting that challenge will be possible.

"With all the large trucks on our highways and the tragic accidents we learn about, we need a system to make these vehicles, pedestrians, and properties safer. This system would reduce the stress of driving long distances," he says.

"With advancements in global positioning systems coupled with collision avoidance technology and intelligent transportation systems a truck driver may someday work like a railroad engineer".



Electrical and Computer Engineering Professor Sazzadur Chowdhury: huge possibilities in micro technologies

Power to stand still

Truckers on long hauls let their engines idle for hours at rest stops. They need the engines running to power their heater or air conditioner, their microwave oven and the entertainment system in the cabin. A University of Windsor engineering professor is working on a way to let those truckers shut down their huge engines and still enjoy the comforts of home.

Dr. Narayan Kar is cross-appointed in the Electrical and the Mechanical Engineering programs. He specializes in electrical motors and drive systems, and is preparing to teach a new course on hybrid electric vehicles.

Surveys conducted by his students suggest truckers may spend 20 to 40 per cent of their time with their engines idling.

"Traditionally, the industry has paid little attention to the fuel costs and the emissions released into the environment by idling trucks," says Kar. "But fuel costs are rising as are demands for reducing pollution. I believe truckers and manufacturers have become much more interested in reducing fuel consumption."

Kar is developing an efficient auxiliary power generation unit with a power output not much greater than a lawn mower to provide the same power when idling as a transport truck's mighty 400 hp diesel engine.

This auxiliary power unit would be able to provide variable electric power to the cabin, which a trucker might need when the rig is pulled off the road.

The system is being designed to regulate the output voltage of the auxiliary power unit under variable load conditions to improve its performance. This auxiliary power generation unit would reduce the fuel consumption, cut the costs, enhance engine life and reduce pollution.

Biomechanics on the line

Automotive designers are not just making cars healthier and safer for the people who drive them. With more knowledge about the effects of movements required to assemble the vehicles, they can be designed to be healthier and safer for the workers who put them together.

Kinesiology Professor David Andrews and colleagues have developed a way to measure the cumulative effects of certain repetitive movements required of assembly workers. "We hoped that this information can be used to reduce and prevent future injuries, particularly to the low back and shoulders," he says.

Dr. Andrews says cumulative loading can cause fatigue of tissues, reducing their tolerance or ability to withstand continuous or heavy loads.

Using video records of assembly workers doing their jobs, Dr. Andrews and biomechanics and ergonomics students in the Kinesiology program are able to analyze repetitive postures and calculate the accumulative forces on the lower back or the shoulders.

"Improvements in how work is designed and organized can also reduce compensation costs and inefficiency," says Andrews.

The information that has been collected in industry to date by the researchers that Andrews works with is being compiled, with the ultimate goal of using it to predict what circumstances are more likely to cause injury or pain than others. Knowing the relationship between cumulative tissue loading and injury or pain could lead to guidelines for assembly systems designers.

"Guidelines should be useful for everyone active at work and at home," he says.

"We are also translating the lessons with automotive assembly work to agricultural work, nursing and other types of activity that require repetitive physical activity."

Andrews studies are supported with funding from AUTO21.

Kinesiology Professor David Andrews: a healthier and safer workplace

Women alumni add new talent and imagination to auto sector

Ann Marie Zugaj

The web of tire marks on the large parking lot behind the Roush Industries in Dearborn, Michigan, might raise concerns at some other companies. At Roush, it reflects the enthusiasm for performance cars that attracts the talented young engineers who work there.

The Roush Industries offer comprehensive vehicle development services that can take a concept from sketchpad to showroom, and also has divisions for auto racing and performance packages for street vehicles.

The graduates of the University of Windsor who have landed jobs with Roush are all smiles when they talk about their work.

"With a typical employer, we could spend years working in a narrow specialty. But here, we are involved in a variety of jobs from designing parts to calibrating engines and transmissions," says graduate Ann Marie Zugaj, BASc '03.

"After only a few months, you think back and realize all the amazing experience you can add to your resumé – heads, pistons, crankshaft, exhaust, supercharger, induction systems," says Zugaj. "And at Roush, you work with people who have great levels of expertise in management, manufacturing and plant design, but you aren't confined to a computer in the office. You can walk out to back shop with freedom to pick up tools and work with mechanics on the actual product."

Windsor alumni such as Zugaj are now making their marks throughout the automotive sector.

Susan Docherty, BA '83, BComm '86, is Western Regional General Manager for General Motors, based in California. She began her GM career in 1986 at GM of Canada where she held a number of positions in Sales, Service and Marketing. In 1994 she transferred to the U.S. and held a brief assignment in business planning supporting GM's North American Strategy Board. The following year, she became manager of international marketing and communications for GM Europe in Switzerland and director of Marketing/ Advertising for Cadillac/ Chevrolet in Germany in 1996. Docherty returned to the U.S. in 1999 as Cadillac's marketing director for the Escalade family of vehicles. She was named general manager of Hummer in 2004. She also holds a master's degree in management as a distinguished Sloan Fellow from Stanford University.

Susan Docherty

Paula Rocheleau BASc ’86, MBA ‘92 is a product engineer for DaimlerChrysler in Auburn Hills, Michigan.

Also with DaimlerChrysler in Auburn Hills is Lori Pinter Bsc ’82, MBA ’84, is senior manager, internal communications and strategies.

In Canada, Lori Shalhoub BA, LLB ‘86 is director of external affairs and public policy for DaimlerChrysler Canada.

Cherrie-Lyn Ver Woert BHK ’97, MHK ’03 is an ergonomics engineer with Ford Motor Company in Dearborn, Michigan.

One of the best known women graduates from Windsor to make it to the top in the automotive industry is Dr. Cynthia Trudell, who earned her PhD at Windsor in Chemistry. She was the first woman to head an automotive company when she was named President of Saturn Corporation of General Motors in 1998. Ms. Trudell was honoured in the fall of 2006 with the Alumni Award of Merit from the University of Windsor Alumni Association.

Dr. Cynthia Trudell

Women from Windsor are also taking on important positions in the major automotive suppliers.

Lia Zannier is a process engineering leader at the Schaeffler Group’s automotive ball bearing manufacturing facility in Stratford. Schaeffler is headquartered in Germany and regularly employs Windsor co-op students and graduates, including placements in Europe. Company operations are located worldwide, including Brazil, India and South Carolina.

Zannier earned her bachelor degree in Industrial and Manufacturing Systems Engineering in 1999 and a Master of Applied Science degree in 2003. She has been with Schaeffler for two years. Her role is to optimize the manufacturing process, ensuring productivity, quality, safety and ergonomic impacts on the workforce.

Leaders in industry

Windsor grads include:

Thomas LaSorda, BA, BComm ’77, the CEO of the Chrysler Group for DaimlerChrysler Inc. rose through ranks with General Motors before joining the Chrysler Group in 2000.

Greig Mordue, BComm ’85, who is in charge of corporate planning at Toyota Motor Manufacturing Canada. He has been with Toyota since 1992 and was responsible for coordinating the original business plan for new assembly plant in Woodstock, as well as the site selection, land acquisition and negotiating the government involvement.

Sergio Marchionne, BComm ’79, MBA ’85, was named CEO of the giant Italian automaker Fiat SpA in 2004. He began his career in Canada and served with companies in North America and Europe.

Frank Ewasyshyn, BASc ’74, is executive vice-president of manufacturing for DaimlerChrysler, overseeing 30 facilities world-wide. Ewasyshyn has spent his career developing advanced technologies and supports a scholarship in electrical engineering at Windsor.

Glen Byczynski, BASc ’94, MASc ’98, is manager of the Nemak Engineering Centre and has held process development and management responsibilities at Ford Motor Company and Nemak Inc. He was among the first graduates to study with Dr. Jerry Sokolowski, chair in light metals casting.

John Mann, BASc ’76, is director of engineering for DaimlerChrysler Canada and heads the University of Windsor/DaimlerChrysler Canada Automotive Research and Development Centre.

Andriano Vido, MASc ’80, director of manufacturing operations for Ford Motor Company, worked with Chrysler and was Windsor plant manager for DaimlerChrysler before joining Ford in 2000.

The alternate route

Ethan Barbour was drawn to the world of research when he graduated from Windsor’s Bachelor of Applied Science program in Mechanical Engineering. So, while most of his classmates accepted jobs, Barbour cast his resumé to graduate schools, including some of the biggest-name American schools.

One of the prestigious schools that agreed to consider Barbour’s application was Stanford University in Palo Alto, California.

“The visit clinched the decision,” he recalls. “I met with Dr. Ron Hanson who has a large research group and amazing facilities. We clicked, and I have done my Master’s and PhD here in Dr. Hanson’s program.”

The young man from Essex County had studied fuels and combustion at Windsor with Alternate Fuels Chair Andrzej Sobiesiak. In his senior year here, his team of students converted a GM pick-up to run on ethanol and dubbed it “the Corn-Dog.”

Barbour has not decided whether to work in the private sector or academia. Remembering Barbour’s enthusiasm and leadership, Dr. Sobiesiak expects his former student to join the legion of Windsor grads who have taken leading positions in the auto sector.

For details on Ethan Barbour's work at Stanford University, go to http://hanson.stanford.edu/people

Chairs advance strategic research

Windsor's two most recently appointed Canada Research Chairs work in very different fields.

Dr. Daniel Green

Dr. Daniel Green advances the development and optimization of sheet metal forming and tube hydroforming processes for automotive manufacturing companies such as Dofasco, Variform and Valiant Machine & Tool. This helps those industries stay on the leading edge of technology and keep jobs in South-Western Ontario.

Dr. Green's work enables Canadian manufacturers to use lighter components in their vehicles and contribute towards reducing greenhouse gas emissions. Valiant and other companies support his research.

A professor in Mechanical, Automotive and Materials Engineering, Green carries out research at the University of Windsor and teaches at the campus of the University's partner, Georgian College in Barrie.

Dr. Jonathan Wu, on the other hand, is working on a photographic sensing system that could be used in vehicles anywhere in the world. The goal is for the system to pick up signs that a driver is becoming fatigued and warn the driver that it may be time to stop and rest.

A professor in Computer and Electrical Engineering, Wu holds the chair in automotive sensors and sensing systems. He develops sensor technology for automotive and intelligent transportation applications. Imaging technologies in the automotive industry are integral to future active safety systems, potentially eliminating collisions and revolutionizing safety standards.

Dr. Jonathon Wu and PhD candidate Leila Sabeti

The other Canada Research Chair holders include Dr. Hoda ElMaraghy, chair in manufacturing systems. She is a globally recognized expert on robotics and intelligent manufacturing systems and professor in Industrial and Manufacturing Systems Engineering.

The work of Dr. Ming Zheng, chair in clean diesel engine technologies is featured in this publication. (page 10)

The University of Windsor also boasts five Industrial Research Chairs. Their research is supported by both government and industry.

Dr. Ahmet Alpas holds the Natural Sciences and Engineering Research Council (NSERC)/General Motors chair in the tribology of lightweight materials. His group is learning how to reduce friction in engines and other parts of cars or trucks to improve fuel efficiency and durability.

Dr. Roman Maev, a professor of Physics, holds the NSERC/DaimlerChrysler Canada chair in applied solid state physics and material characterization. His developments in acoustic imaging technology offer major savings to manufacturers in quality assurance.

Dr. Andrzej Sobiesiak, who held the NSERC/DaimlerChrysler Canada chair in alternate fuels, is an expert in combustion and retrofitting engines for fuels such as propane, natural gas and methanol.

Dr. Jerry Sokolowski, a professor in Mechanical, Automotive and Materials Engineering, was the first to hold a chair position at the University of Windsor. Sokolowski was appointed in 1993 as the NSERC/Ford-Nemak chair in light metals casting technology, a position he held until 2003.

Sokolowski's research group contributed to the success of Ford and Nemak aluminium casting and manufacturing operations in Windsor, which have led to investment in the region of hundreds of millions of dollars. He now leads the Light Metals Casting Technology Research Group, which develops new technology platforms for the light metals casting industry.

Dr. Peter Frise is executive director of Automotive Research and Studies at the University of Windsor, and scientific director and CEO of AUTO21, the federal Network of Centres of Excellence in the Automobile of the 21st Century. Recently he was appointed to the National Research Council of Canada. Frise has been a professor in mechanical design, as well as the DaimlerChrysler Canada/NSERC Senior Industrial Research Chair in Mechanical Design.

Dr. Peter Frise

Partnering with industry supports Canada's automotive sector

More than a decade ago, Ron Ianni and Yves Landry, the presidents of the University of Windsor and Chrysler Canada, together set out a new vision for Canada's Automotive Capital as a global knowledge centre for automotive innovation.

Ianni and Landry saw the auto sector was becoming a highly competitive global marketplace where success and growth would be tied to innovation.

The University of Windsor took up this challenge with new emphasis on programs with engineering and technology specialties, and a fresh emphasis on the automotive sector in teaching and research across the campus. Distinctive professorships called Research Chairs were established to lead clusters of research specialists with links to industry partners and collaborators.

Current University of Windsor President Ross Paul galvanized the university's focus on automotive teaching, research and partnerships by setting out automotive as a pinnacle area in the University of Windsor Strategic Plan.

Integral to the automotive pinnacle are Research and Development partnerships. Today, three industry R & D centres are at the core of the development of the Windsor region as a knowledge centre for automotive innovation.

The University of Windsor/DaimlerChrysler Canada Automotive Research and Development Centre (ARDC) has won prestigious national awards as a benchmark in Canada for innovation and for the synergies between education and industry, and has been visited by two Prime Ministers since opening in 1996.

DaimlerChrysler Canada has invested more than $600 million in the ARDC to advance innovations in vehicle durability, alternate fuels, emissions, fuel economy, automotive lighting, steering columns, engineering design, automotive recycling, coatings, corrosion and vehicle safety. Its 200 research specialists work with University of Windsor students in every project area, so when those students graduate they have unique knowledge and experience. A number have become permanent employees at ARDC after graduating.

"DaimlerChrysler Canada's three-way partnership with government and education builds our company, strengthens the economy and provides a strategic environment for learning and growth unrivalled by any other in Canada," says John Mann, Director of Engineering and Regulatory Affairs.

University of Windsor/DaimlerChrysler Canada Automotive Research and Development Centre

Another industrial partnership in R&D is the International Truck and Engine Corporation Centre for Innovation (ITEC). Created in 2005, it is part of a $270-million collaboration between International Truck and Engine, the University of Windsor and the governments of Canada and Ontario, which includes an engine R&D effort, a truck manufacturing R&D effort, training and improvements to the Chatham assembly plant.

The centre on Deziel Drive advances R&D for advanced truck manufacturing processes and clean diesel technologies, says General Manager Jim Nooks.

Industrial and Manufacturing Engineering Professor Leo Oriet and more than 10 University of Windsor students on co-op placements have worked with the ITEC team to develop new processes for manufacturing and introducing new products into assembly plants in the United States, Canada and Mexico.

Dr. Nooks says plans at the ITEC Centre for Innovation include the development of a virtual manufacturing tool. This tool will enable the company to create an entire manufacturing process from concept through design to launch in a virtual environment that will eliminate the high cost of building prototype systems.

Other plans are for developing new systems for fastening truck parts and for improvements in ergonomics in the manufacturing process.

Nooks says the goal is to create an integrated school for manufacturing excellence where a student would be able to earn a Master's degree through the Centre for Innovation.

The third example of industry – education partnership in innovation is in the new Windsor firm, Tessonics Inc. Tessonics was created by automotive executives and colleagues in the laboratory of University of Windsor Physics Professor Roman Maev.

Tessonics uses high-resolution ultrasonic imaging inspection technologies that were developed by Dr. Maev and his colleagues. This technology translates ultrasonic echoes into computer images.

Tessonics has created more than 100 portable devices for various quality assurance applications for DaimlerChrysler. The technology has also been integrated into spot welding systems to tell operators instantly whether welds are proper or faulty.

"A range of applications are emerging for portable and adaptive ultrasonic imaging technology," says Dr. Maev. Tessonics has assistance from Odette School of Business students as it begins marketing from its base in Windsor to other potential clients across North America and into South America, Europe and Asia.

"This is what we mean by knowledge capital," says President Paul. "Unique, high value products and services are needed by automakers and suppliers all other the world. Innovators are the new growth industry in the auto sector. Our university and its partners are positioning Windsor to grow from our manufacturing foundations into one of the leading centres in the world for automotive innovation."

International Truck and Engine Centre for Innovation

Tessonics Inc. founder and innovator, Dr. Roman Maev

First it was Chicago, decorating cow sculptures to festoon its public spaces. Next, Toronto joined the fun with Moose in the City.

When the Windsor Endowment for the Arts (WEA) and counterparts in Detroit chimed in, they created a celebration of Motown by marrying cars and music.

CarTunes on Parade, the international art project highlighting the region's automotive heritage, saw nearly 100 moulded cars souped up with musical designs and placed around Windsor and Detroit.

After display in public spaces, many of the sculptures were sold by the artists, providing direct support for continued arts activity.

Excitement around the CarTunes project prompted WEA to create an education kit that was used by local teachers to educate schoolkids on local heritage.

Edward Bernard, president of Bernard Mould and Comprehensive Plastic Technologies, was product designer, coordinator, artist and logistics advisor to CarTunes on Parade.

CarTunes on Parade project installed
Education Professor Wayne Tousignant's Cat Scratch Fever on the roof of the welcome building in Dieppe Park.

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401 SUNSET AVENUE
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