



ACE Testing Brochure

Automotive Capabilities



*Driven by **Tech.*** 
*Powered by **People.***



Contact us by email at acemarketing@ontariotechu.ca to learn more!



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What is **ACE**?

ACE is a world-class research and testing facility located on the campus of Ontario Tech University in Oshawa, Ontario. ACE's facility offers unique, industrial-scale testing capabilities, supported by a team of expert engineers and technicians.

Originally designed to deliver accurate, repeatable, real-world environmental conditions that drive advancements and innovation across automotive industries; ACE has continued to evolve by expanding its capabilities to include mobility sectors, human performance testing, digital media production, as well as aerospace and defence performance testing.

At ACE, we believe innovation happens where technology meets human expertise. By blending cutting-edge tools with the skills and insight of our expert team, we create meaningful partnerships that deliver focused solutions and measurable results for all testing needs.

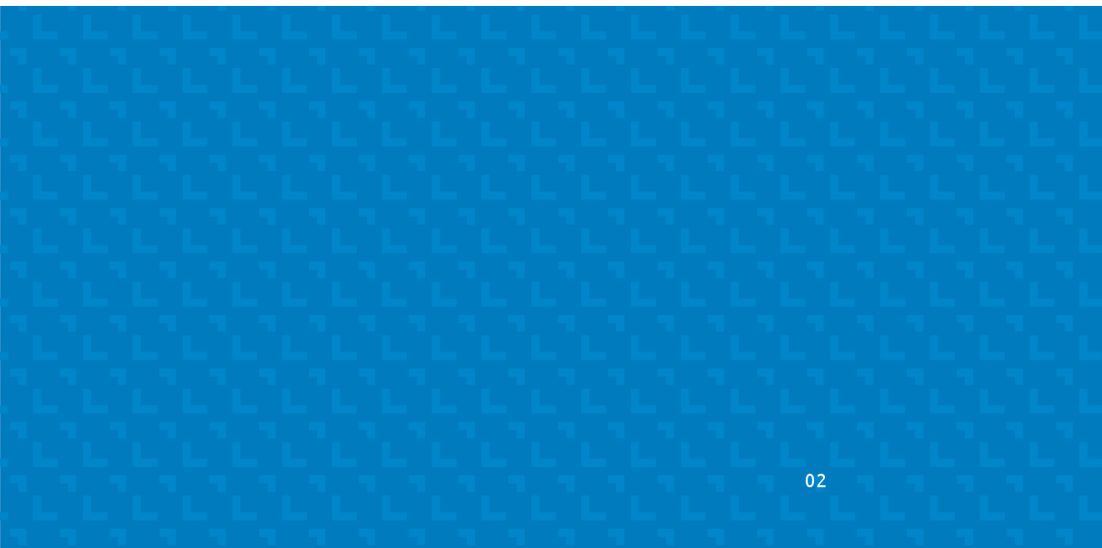
ACE's History

Established in 2011, ACE was brought to Oshawa through partnerships with General Motors of Canada, PACE partnerships, the Government of Ontario, and the Government of Canada. With a vision of housing state-of-the-art research and development tools, ACE was brought to life on Ontario Tech University's campus. At the time of ACE's inception, Ontario Tech had a cumulative of 5,000 students and the intention of growing connections across universities and building the community around us.

Since its establishment, ACE has not only surpassed its expectations of becoming the hub of the broader Automotive Innovation Network, but has also broadened its focus on market segments far outside its initial realm of possibilities.

Throughout this journey, ACE welcomed its first clients from outside the automotive sector, marking a pivotal moment in its growth and diversification. This milestone opened new horizons for ACE and its partners, expanding opportunities for testing beyond vehicles and mobility. Since then, ACE has continued to build strong partnerships with clients around the world, supporting a diverse range of environmental testing, thermal management and durability needs — from vehicles and satellites to electronics, defence systems, human performance, and architectural design. This evolution has also led ACE to host unique collaborations, including the Canadian Alpine Ski and Skeleton Teams, numerous media productions of all scales and innovative projects, ultimately showcasing the facility's versatility and world-class capabilities.

Today, ACE is home to over 25 employees, all of whom work diligently to create client comfort and satisfaction.



Thermal Management

At ACE, we simulate the world's most challenging environments to ensure your vehicle's thermal systems deliver consistent performance and passenger comfort. Whether you are testing the thermal management of high-voltage EV batteries or the cooling requirements of heavy-duty ICE engines and transmissions, our chambers allow you to collect the critical data needed to guarantee performance under any load.

Defrost & Defog

Replicate the exact humidity and temperature profiles required to validate how quickly a vehicle can clear a windshield, ensuring safety and regulatory compliance.

Chambers:

- ▶ Climatic Aerodynamic Wind Tunnel
- ▶ Small Climatic Chamber
- ▶ Large Climatic Chamber

Cold Start

With temperatures as low as -40 degrees Celsius, we provide the necessary conditions to validate cold-weather ignition for ICE engines and battery "wake-up" protocols for EVs.

Chambers:

- ▶ Climatic Aerodynamic Wind Tunnel
- ▶ Small Climatic Chamber
- ▶ Large Climatic Chamber

Integrated Powertrain Cooling

Utilizing our chassis dynamometer and solar array to simulate high-load conditions, our facility allows you to monitor how your cooling circuits handle the heat when airflow is restricted and demand is at its peak.

Chambers:

- ▶ Climatic Aerodynamic Wind Tunnel

Hot Road & Underbody Integrity

Our Hot Road system replicates the intense radiant heat rising from asphalt, providing an environment that allows you to validate:

- ▶ **Thermal Stability:** How radiant ground heat impacts EV battery temperatures and ICE transmission/exhaust systems during slow-speed crawls.
- ▶ **Hot Soak Performance:** The effects of extreme underbody heat on component durability and fuel tank pressure (Evaporative Emissions) once the vehicle has stopped.
- ▶ **System Resiliency:** Preventing "de-rating" in electric powertrains by ensuring cooling systems can overcome both ambient and ground-level heat.

Chambers:

- ▶ Climatic Aerodynamic Wind Tunnel

A/C & HVAC Performance

Conduct a detailed analysis of cabin pull-down and warm-up speeds to guarantee passenger comfort in any climate.

Chambers:

- ▶ Climatic Aerodynamic Wind Tunnel
- ▶ Small Climatic Chamber
- ▶ Large Climatic Chamber

EV Climatic Charging & Charger Performance

Reliable charging performance is the backbone of the electric vehicle experience. Using our 350 kW DC Fast Charger, we provide the infrastructure and environmental control needed to validate how your vehicle handles high-capacity power delivery in any climate. Additionally, our facility allows you to test the performance and thermal resilience of your own EV chargers, ensuring consistent power delivery when exposed to extreme environmental stress.

Chambers:

- ▶ Climatic Aerodynamic Wind Tunnel
- ▶ Small Climatic Chamber
- ▶ Large Climatic Chamber

Environmental Integrity

External conditions are unpredictable; your vehicle's response shouldn't be. By simulating extreme weather conditions such as rain, freezing rain, fog and snow, our advanced technical capabilities provide the testing environment you need to evaluate the resilience of your vehicle's critical systems.

Sensor Soiling & ADAS Reliability

As vehicles move toward higher levels of autonomy, evaluating how cameras, LiDAR, and Radar perform is more important than ever before. By subjecting these systems to road spray and various adverse weather conditions, you can measure real-time system accuracy and validate self-cleaning technologies.

Chambers:

- Climatic Aerodynamic Wind Tunnel

Fluid Management - Ingestion & Sealing

Validate that your vehicle is "weather-tight" in nature's worst conditions. Our facility allows you to:

- **Analyze Ingestion:** Ensure that air and HVAC intakes effectively separate moisture, preventing engine stalls and protecting cabin air quality.
- **Verify Sealing:** Identify leak paths in door seals, window tracks, or electrical housings before they reach production.
- **Enhanced Flow Visualization:** Leverage our dye tracing capabilities to visually track water paths in real-time. This allows for precise identification of exactly how and where fluids interact with your vehicle's surfaces and seals.

Chambers:

- Climatic Aerodynamic Wind Tunnel
- Small Climatic Chamber
- Large Climatic Chamber

Windshield Wiper Validation

Test windshield wiper performance against heavy rain and snow to ensure they can clear accumulation in the harshest storms.

Chambers:

- Climatic Aerodynamic Wind Tunnel
- Small Climatic Chamber
- Large Climatic Chamber



ACE is a welcome addition to our university as it will reinforce [the University's] recognized role as an influential leader in automotive engineering, design, testing and validation. It will also help foster greater collaboration between leading-edge industries and top researchers, and train our students for the jobs of tomorrow.

- DR. RONALD BORDESSA, 2011, PAST PRESIDENT OF ONTARIO TECH UNIVERISTY

Structural Durability & Acoustics

High-performance vehicles must be as quiet as they are resilient. We provide the specialized vibration and acoustic environments needed to identify structural weaknesses and eliminate unwanted cabin noise before your vehicle reaches the customer.

Wind Noise

Our acoustically treated wind tunnel is designed to achieve a background noise level of just 60 dBA when wind speeds are at 100 kph. This optimized infrastructure allows you to isolate aeroacoustic issues such as high-speed whistles, cabin “booming,” and seal leaks. While critical for all vehicles, this is especially vital for EVs where the absence of engine noise makes wind-induced sounds more noticeable to passengers. To further support this analysis, we also have a 108-microphone acoustic array available for performing Noise Source Identification, allowing engineers to precisely locate where noise is being generated on the vehicle.

Chambers:

- ▶ Climatic Aerodynamic Wind Tunnel

Full-Vehicle Durability

By leveraging ACE’s 4-Poster system, you can subject your vehicle to specific road profiles and high-stress scenarios. These intensive test cycles allow you to conduct chassis and suspension validation, ensuring the vehicle can withstand the rigors of its intended environment. With the unique ability to combine these tests with climatic conditions, you can evaluate how vehicles and components perform when exposed to both environmental stress and road-induced vibration at the same time.

Chambers:

- ▶ 4-Post

Component & Subsystem Durability

Validate the structural integrity of critical components and sub-assemblies before they reach the full-vehicle stage. Using ACE's MAST and 4-Poster system, you can replicate road-induced vibration and dynamic loading to evaluate component and subsystem performance under controlled conditions. In our Climatic 4-Post chamber, these vibration profiles can also be combined with temperatures ranging from -40°C to $+60^{\circ}\text{C}$, enabling evaluation of component performance under combined environmental and vibration conditions.

Chambers:

- ▶ 4-Post
- ▶ Multi-Axis Shaker Table (MAST)

Squeak & Rattle (BSR) Analysis

Isolate and eliminate "Buzz, Squeak, and Rattle" issues within our Hemi-Anechoic MAST chamber or Climatic 4-Post. By applying precise vibration profiles to full vehicles, specific components, and/or sub-assemblies, you can identify noise sources and implement solutions within a controlled, repeatable environment.

Chambers:

- ▶ 4-Post
- ▶ Multi-Axis Shaker Table (MAST)





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