APMA's
Winter/Spring 2015

LEAD REACH and CONNECT

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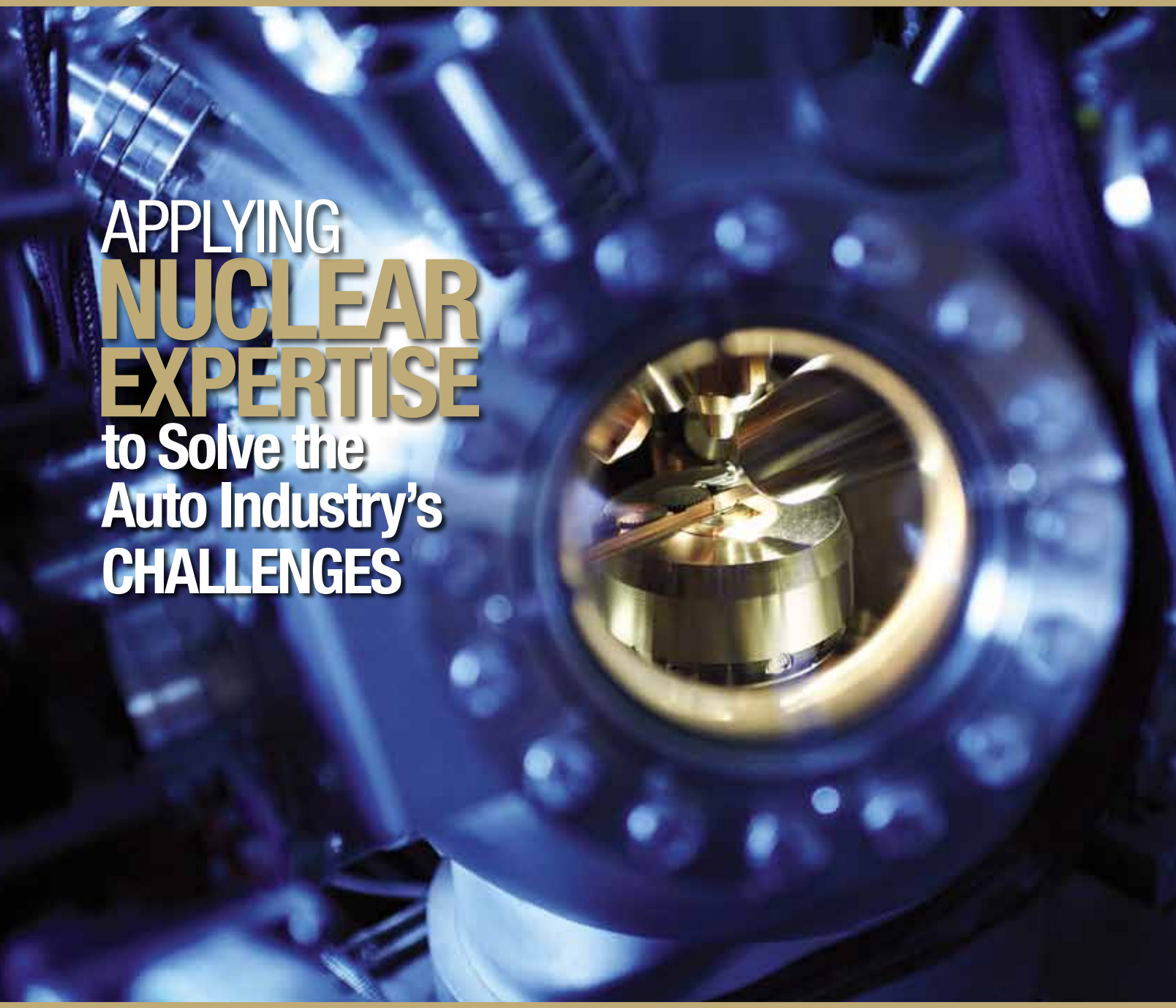

APPLYING NUCLEAR EXPERTISE to Solve the Auto Industry's CHALLENGES

DOES CANADA NEED A **COMPREHENSIVE, CONSISTENT NATIONAL** AUTOMOTIVE STRATEGY?

THE "NEW" NRC: WHAT IT MEANS TO CANADA'S AUTOMOTIVE INDUSTRY

CANADA AND THE GLOBAL AUTOMOTIVE OUTLOOK TO 2021

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Applying Nuclear Expertise to Solve the Auto Industry's Challenges

The cover of this issue of Lead, Reach and Connect features Canadian Nuclear Laboratories' (CNL) Imaging X-Ray Photoelectron Spectrometer as it probes the surface chemistry of the object's materials. Photo provided by CNL.

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From the Desk of the Chairman of the Automotive Parts Manufacturers' Association

Keith Henry
President
Windsor Mold Group

Reflecting over the last six months at APMA, I have been happy to see the fruits of our focus on the Association's core value proposition and our re-organization to best serve the current and emerging needs of our members. We set out to recalibrate our offering to members and I am confident that our restructuring has resulted in re-establishing the valued relationship we have with your companies and your employees.

In the fall we welcomed our new president, Flavio Volpe, and we bid farewell to Steve Rodgers, wishing him all the best in his retirement. Volpe brings a unique mix of government and private sector experience that we are confident will serve the industry well in a period of great activity and potential uncertainty.

Some of the program highlights we were especially proud of this past half-year were direct engagement projects and events with our members:

- The Connected Vehicle Program continues to be a successful showcase of strong Canadian automotive know-how, and in September we conducted an expansion mission to Ford Tech and Design Center in Dearborn, MI that was attended by almost 300 Ford employees.
- In October, together with the federal government and provincial government of Ontario, we conducted a prominent APMA exhibit in the Canadian Pavilion at the biennial IZB Supplier Fair in Wolfsburg, Germany.
- In December, we hosted our 19th Annual Outlook Conference and welcomed over 100 attendees as they listened to insights from a program that included Ontario Finance Minister Charles Sousa, Ford of Canada CEO Dianne Craig, and TD Bank Group Deputy Chief Economist Derek Burleton.
- In January, we entered into a strategic partnership with the Canadian Association of Moldmakers (CAMM) and welcomed their membership and team into our APMA family.

In addition to our networking program, we are focusing on strengthening our advocacy program. On the horizon there are some serious challenges for our industry in Canada. We are strong, innovative and invested in growth in Canada, but the trend for original equipment manufacturers (OEM) opportunity has not favoured this country in recent years. We are focused on doing our part to educate and reach governments and OEMs to share with them the strategic advantages of investing with the Canadian supply chain.

Throughout automotive history, the North American consumer market has been the largest and most lucrative ecosystem in global autodom. OEMs make investment location decisions and the rest follow from necessity—sometimes, OEMs make decisions that are based on the location of the latter. But it is a dance always led by the OEM.

Throughout automotive history, the North American consumer market has been the largest and most lucrative ecosystem in global autodom.

American OEMs have built capacity for over 110 years in Canada and most of this historic capacity was built in the traditional automotive manufacturing heartland around the Great Lakes and included Ontario and Quebec. In the 1980s, Japanese OEMs invested in production capacity in Ontario to feed what seemed like insatiable North American demand.

The competitive advantage of Canada had always been quality, productivity, critical massing of supply, and proximity to the premium automotive markets. But with new OEM investments in the Southeast and Mexico, and the advent of OEM-driven global quality standards, the traditional advantages have eroded both in perception and reality over time. In spite of this, however, many Canadian companies have fought for and won business from new southern customers in the regions they assemble.

Canada is a country of global traders, and over the past century we have entered into agreements that have served the benefit of Canadians as a whole. APMA has taken up the charge of articulating our position on national benefit versus specific sector dynamics and we are speaking up for a cornerstone industry that helped build Canada's industrial strength.

We are currently fighting to maintain our market share in the North American Free Trade Agreement and, in support of that effort, APMA is also seeking out closer relationships with its peer organizations and jurisdictions in Canada and abroad to understand and share best practices and efforts regarding regional strategy and global market shifts.

These are important considerations for an industry hoping for increased economic benefits from new business and renewal. The automotive sector is the most lucrative and expansive industry in the world and our competing jurisdictions will continue their pursuit of the market share we covet. I look forward to working with the Board of Directors, management, and our valued members in the continued effort to maintain our leadership position in this contest. ■

Keith Henry
President
Windsor Mold Group

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UP FRONT

From the Desk of the President of the Automotive Parts Manufacturers' Association

Flavio Volpe
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APMA is Canada's national association representing OEM producers of parts, equipment, tools, supplies and services for the worldwide automotive industry.

Let me start by personally thanking you for your company's past patronage and by introducing myself to you. In September, I took on the role of president of Automotive Parts Manufacturers' Association (APMA), Canada's national automotive parts sector's association. I am a passionate defender of the automotive sector and I am an automotive enthusiast at heart.

In a previous life, as chief of staff to the Minister of Economic Development and International Trade, I learned a great deal about APMA members' competitive excellence and spoke to that on a consistent and high level as we pursued and negotiated Original Equipment Manufacturer investments in Ontario.

Over the course of my private sector career in international and transnational development, I have noted that in an extremely competitive global market, individual companies benefit when a strong association gives voice to its competencies and needs, in times and places where they cannot be present. APMA acts as the eyes and ears for the automotive supply sector, but without committed members, it lacks a mandate. I thank you for entrusting us with these key responsibilities in the past and ask that you take another look at us today.

This will be a very important year for the automotive sector in Canada. While many reports declare that we have emerged from the most difficult times of the last decade, there is much work to be done. At the OEM investment level, Canada continues to be in a tough competition with Mexico and the United States for new mandates.

At the parts manufacturing level, Canadian suppliers continue to face the pressure to pursue mandates in other markets and are increasingly bearing the burden of product development in their business model. Our industry in this country has had a strong and proud 110 year history. This 111th year will increasingly test our ability to innovate, compete and win new business.

In this endeavour, please consider APMA as your partner in two very specific areas:

- Firstly, APMA enjoys valuable relationships with the original equipment manufacturers around the world. In addition to fostering those relationships with their Canadian operations, APMA is regularly in contact with global purchasing and design executives in the automotive capitals of North America, Europe and Asia. We work together with the Canadian Trade Commissioner Service and the Investment Divisions of the provincial governments to ensure that we are best organized to serve our customers efficiently. We organize outgoing and incoming trade missions, we conduct seminars and webinars on the subject and we connect our customers directly to their customers.
- Secondly, APMA maintains and cultivates relationships with the government ministries and departments that affect your day-to-day business. We are an active partner in investment attraction activities for Industry Canada and the Ministry of Economic Development. We conduct business on our members' behalf with the federal and provincial ministries of finance, labour, energy, environment, training colleges and universities, research and innovation and various arm's-length agencies of both levels of government. We act as the industry's voice in lobbying efforts to the above, and we have acted as your partner in your company's business interactions with them.

To meet the increasing challenges before us in 2015, APMA will launch additional targeted membership services and programs. We look forward to strengthening the ties between the association and your company as we organize new commercial and regulatory offerings that will educate, connect and advocate for you with new customers and regulatory bodies. We will need your help in identifying the issues that are most important to your daily business. To ensure that we have that insight, APMA will come to you to see what you make and how you make it, and to meet the people

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who run your business and make the decisions that determine your successes throughout the year.

Our office exists to serve our members and I invite you to re-join APMA and see how we can be of service to you at any time. Our team is committed to meeting our members and speaking with them on a daily basis. We are committed to driving up and down the same highways your parts travel on to come and meet you where you do business. Please feel free to call me and request a visit from us, we will be grateful for the opportunity to learn and to share.

I look forward to building on our past and building a fruitful relationship with you as we work toward a strong 2015. ■

Flavio Volpe
President
Automotive Parts Manufacturers' Association

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It's now easier than ever. With today's age of mobile technology and social media, there are more ways than ever before to stay connected with the people and organizations that matter to you most. Take advantage of these opportunities to stay connected with APMA and have your voice heard!

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APMA FORUMS: APMA website members can pose their pressing questions or address key issues with APMA and/or other industry colleagues. Get answers or start a discussion on any subject pertaining to the automotive manufacturing industry. This is your place to ask whatever you want to know about current industry issues, past or upcoming events, speakers, etc. (**www.apma.ca/forums**).

FACEBOOK: This is where members and non-members alike can stay tuned to APMA and what's going on in the industry. "Like" our page and get updates from APMA in your newsfeed (**www.facebook.com/APMACanada**)!

TWITTER: Another social medium for you to stay connected with APMA. Check in from home or on the go with your smartphone (**@APMACanada**)!

LINKEDIN: Social networking, the professional way. Keep connected with APMA through our LinkedIn group and get the same great updates in a more professional setting than other social mediums (search for **Automotive Parts Manufacturers' Association (APMA) – Canada**).

Join the discussion now!

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Applying Nuclear to Solve the Auto Industry's Challenges

By Clemente Angiolillo and Daniel Banks

Situated two hours northwest of the nation's capital on the scenic shores of the Ottawa River, Canadian Nuclear Laboratories (CNL), Canada's national nuclear science and technology organization, has been a key player in the global nuclear sector from its inception over 60 years ago. Through the work done at Chalk River Laboratories, CNL gave the world a uniquely Canadian reactor design known as CANDU, and put forth pioneering innovations in the area of nuclear medicine and environmental remediation technologies, just to name a few areas of expertise.

However, as several auto parts suppliers will attest, the solutions offered by nuclear technologies have application in other industries as well. Today, as the auto industry grapples with many technical challenges to meet stringent fuel efficiency targets—achieved partly by obtaining favourable strength-to-weight ratios for motor vehicles—as well as enhancing quality assurance of parts and components, researchers at CNL are bringing their unique facilities and expertise to the auto industry's doorsteps, and with remarkable results.

"On the heels of CNL's participation at the Automotive Parts Manufacturers' Association (APMA) Annual Conference & Exhibition held in Windsor, ON in early June, we were pleased to announce that we had secured a new customer named AGS Automotive Systems Inc. to perform metallographic and surface analysis of various

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Expertise

photo captions

1. *The neutron beamlines at the National Research Universal (NRU) reactor protrude out from the shielding wall around the reactor to allow materials to be analyzed non-destructively in the beams.*
2. *A visiting researcher prepares an advanced in-situ examination of an alloy's properties under various conditions of applied load on a neutron beamline.*
3. *A visiting researcher makes small adjustments to the positioning of a new alloy sample on a neutron beamline to map its properties in three dimensions.*
4. *Researcher Dr. Dimitry Sediako sets up an engine block for non-destructive examination of residual stress on a neutron beamline at the National Research Universal (NRU) reactor at Canadian Nuclear Laboratories (CNL).*

chrome plated parts," says Elliott Gillespie, CNL director of marketing and international business.

The recently appointed marketing director says the technical challenge of this commercial contract is to perform in-depth studies on the components to locate potential particulate or contaminants residing between very thin material plating layers, thus ensuring optimization of long-term corrosion resistance once the parts are placed in extreme weather conditions.

AGS Automotive is a Tier 1 automotive parts supplier (and APMA member) specializing in bumper impact assemblies with capabilities in metal stamping, chrome-plating, Class A painting and welding. The company operates 10 facilities in North America and has approximately one-third of the chrome-plated bumper business—producing mainly front and rear impact system assemblies and modules, as well as some general stampings, running boards and exterior painted trim parts such as grills—as sister company Tiercon Corp. Customers include GM, Toyota, Chrysler, Volkswagen and other major original equipment makers.

Years of automotive research

Lest one get the impression that CNL's work in the automotive parts sector is a recent business activity, think again. Years of research on technologies to make lightweight car engines reliably have been afoot at Chalk River and may soon pay off with big dividends to parts suppliers. In addition, the value of CNL's contributions to these technologies are being recognized by peer organizations and partners such as the Canadian Academy of Engineering (CAE), who recently bestowed a CNL researcher with a prestigious honour.

Dr. Dimitry Sediako, a Senior Research Officer, was inducted as a Fellow of the CAE in June 2014 in recognition of his contributions to improving manufacturing technologies in engine block casting and heat treatment, among other achievements. According to CNL customer Nemak Canada, these technologies, when implemented, will speed production times and reduce energy usage, thereby saving millions in manufacturing costs.

Some of these achievements and applications strike automotive manufacturers as novel and have potential customers wondering how exactly nuclear technologies can deliver value to the auto parts sector. Part of the formula for success is having diverse supporting facilities and the right expertise, but the other important piece is direct access to industry partners. And then there is the power of neutrons.

The power of neutrons

CNL hosts the only major neutron beam laboratory in Canada at its multipurpose National Research Universal reactor. Neutron beams, like no other tool, can be used to non-destructively probe deep inside engine blocks and determine the amount of stress in the material at any given point, which is a key factor in the reliability of the engine. Having honed this capability for decades, CNL's researchers are world leaders in using neutron beams to determine properties of metallic materials, and have examined parts for jet engines, car engines, ship hulls, pipelines, bridges, and rail tracks, in addition to parts for nuclear reactors.

John Root biography

Dr. John Root's career experience and clear communication style have been appreciated by general audiences and people who want to better understand the value of nuclear research methods for advancements in science and industry. Dr. Root received his PhD from the University of Guelph in 1986. He then joined AECL, where he developed a method to map stresses inside materials using a beam of neutrons from the NRU reactor.

This method has been copied at neutron beam laboratories around the world, and is applied to help industries improve their products, and expand their businesses. Dr. Root was appointed as Director of the Canadian Neutron Beam Centre in 2003, which operates as an international user facility, serving researchers and students from universities, industries and government labs. Unique knowledge, revealed by neutron beams, has been applied in diverse sectors such as automotive, aerospace, defence, rail, nuclear, oil and gas, and primary metal production.

John Root is the director of the Canadian Neutron Beam Centre, a key facility offered by CNL to the automotive sector.

Although not yet standardized in the automotive industry, leading companies are now beginning to make use of this high-tech tool. Dr. Sediako has built partnerships with researchers from Nemak Canada, major automotive manufacturers such as General Motors (GM) and Ford Motor Company, four universities (Ryerson University, University of British Columbia, University of Waterloo, McGill University), and Canmet Materials Laboratory, each of which contributed their own tools and expertise in metallurgy, mechanical testing and computer modelling.

In one line of research, Nemak's objective was to find the best way to build robust V-6 aluminum engine blocks. These engines have extremely low tolerance for distortion in the shape of the cylinder holes in the block. Stress relief methods are used after casting the block to increase stability, and yet each manufacturing step comes with its own costs and impacts on the materials properties. To improve over current manufacturing practices, the team needed to understand more clearly the factors contributing to stability.

Nemak and its research partners from Ryerson University accessed Chalk River's neutron beams for several studies with Dr. Sediako's assistance to acquire and interpret the neutron diffraction data. These studies included elucidating the stress distribution and microstructure in new aluminum alloys

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and in engine blocks, before and after stress relief methods such as heat treatment. Additionally, they included pioneering observations of microstructural evolution during solidification of the alloys.

The results were vital contributions to the success of the research, helping Nemak to determine that simplifying the heat treatment process is feasible without compromising reliability. Nemak is now moving forward to validate the new process by performing final tests before the engine can be used in vehicles sold to customers, such as putting a prototype engine block in a test vehicle.

Neutrons help GM

During a recent webinar organized in conjunction with APMA, CNL worked with Nemak and GM to showcase the application of nuclear technology to develop better engine components, and elaborate on the range of nuclear capabilities available to automotive companies through CNL.

Getting the Word Out: CNL – APMA Webinar, "Advancing Automotive Materials with Nuclear Technology"

This past November, CNL, in conjunction with the Automotive Parts Manufacturers' Association (APMA), organized a webinar that highlighted the experiences of Nemak Canada and General Motors using nuclear technology to develop better engine components.

In addition to their experiences described in the main text, John Root, a director representing CNL, introduced a broad range of specialized facilities and expertise available through CNL, with examples of R&D projects performed for automotive and other sectors.

"Nuclear technology enables you to perform unique testing and analysis on a broad range of materials and products. For example, neutron beams act like non-destructive 3D strain gauges that you can position anywhere inside an automotive component to determine stresses arising from actual manufacturing or service conditions," he explains.

The webinar was recorded and may be accessed by contacting CNL at **commercial@cnl.ca**.

GM uses neutron beams to accelerate the development of engine heads and blocks. These projects span three primary research areas:

- Evaluating effectiveness of heat treatment and quenching methods.
- Directly observing phase precipitation during solidification.
- Creep testing to make better predictions of reliability over the long-term.

In the first area of evaluating effectiveness of heat treatment and quenching methods, neutron experiments clearly falsified a hypothesis for GM that air quenching of cylinder heads would be a benefit over water quenching because of an overall reduction in residual stresses. The results showed significant stresses remained with air quenching deep inside the cylinder heads, at a depth of about one centimetre.

On the second research area of directly observing phase precipitation during solidification, GM uses modelling software to try to predict the properties of the components or alloys after they solidify, but sometimes the models fail to predict the actual results. Neutrons can uniquely identify phases that precipitate during solidification. In other words, they allow GM to "watch" the solidification process experimentally to better understand what is causing the discrepancies.

The third research area is concerned with "creep testing," which in essence means determining how the shape of the part may change over time and eventually fail or cause problems. The neutron beam experiments allow GM to look at how the arrangement of the atoms is changing in the material to better understand how these changes take place.

Neutrons help Ford

CNL has an ongoing research project with Ford to examine new ways of joining dissimilar materials together to be used in light-weight vehicles. For example, self-piercing riveting (SPR) is a leading alternative to traditional welding methods, and has been widely used by Audi, Mercedes, BMW, and Jaguar, as well as Ford on their aluminum cars and sports utility vehicles. SPR joints have excellent mechanical properties and high fatigue resistance. But the 3D residual stress field in a mixed metal SPR joint had not been experimentally studied before, making prediction of fatigue life of such SPR joints difficult. Ford turned to CNL's neutron beam capability because other ways of determining stresses were too difficult, considering the complex geometry and number of different materials involved. It plans to use the results from the neutron analysis to validate its existing residual stress prediction method, and document these findings to inform broader manufacturing processes.

"We know there are tremendous opportunities in the automotive and related advanced manufacturing sectors," concludes Gillespie. "These industries are capital intensive and commercially focused with resources dedicated to R&D [research and development] advancement. We are confident that in the near future CNL will be regarded as a valued supply chain partner and an active participant in their respective product development and quality assurance programs."

International discussions are also driving work in this area. The recently announced United States-Canada Clean Energy Dialogue, initiated by Prime Minister Stephen Harper and President Barack Obama, recognizes lighter-weight, sustainable materials as a key research area in the development of next-generation vehicles.

In addition to neutron beams, CNL is offering potential customers a wide range of expertise and facilities that it has been using to solve unique problems for clients outside the nuclear industry, including surface science tools and burst testing services, to name a couple examples.

About CNL

Canadian Nuclear Laboratories is a world leader in nuclear science and technology offering unique capabilities and solutions across a wide range of industries. Actively involved with industry-driven research and development in nuclear, automotive, aerospace, defence, security and life sciences, we provide solutions to keep these sectors competitive internationally.

With ongoing investments in new facilities and a focused mandate, Canadian Nuclear Laboratories is well positioned for the future. A new performance standard reinforced with a strong safety culture underscores every activity.

For more information on the complete range of services at Canadian Nuclear Laboratories, please visit **www.cnl.ca** or contact **communications@cnl.ca**. ■

Does Canada Need a Comprehensive, Consistent

By Buzz Hargrove

Canada's auto industry has certainly seen its share of tough times over the last 15 years. The industry peaked in 1999, when Canada assembled over three million vehicles, and enjoyed a trade surplus in automotive products worth $15 billion. That year we ranked as the fourth-largest auto producer in the world—an incredible industrial achievement for our small, northern economy. The influence of the Canada-U.S. Auto Pact, one of the most successful and mutually beneficial trade agreements ever signed, was a big part of that success, as were our competitive currency, our cost-saving medical coverage system, and world-beating productivity on the part of our Canadian autoworkers.

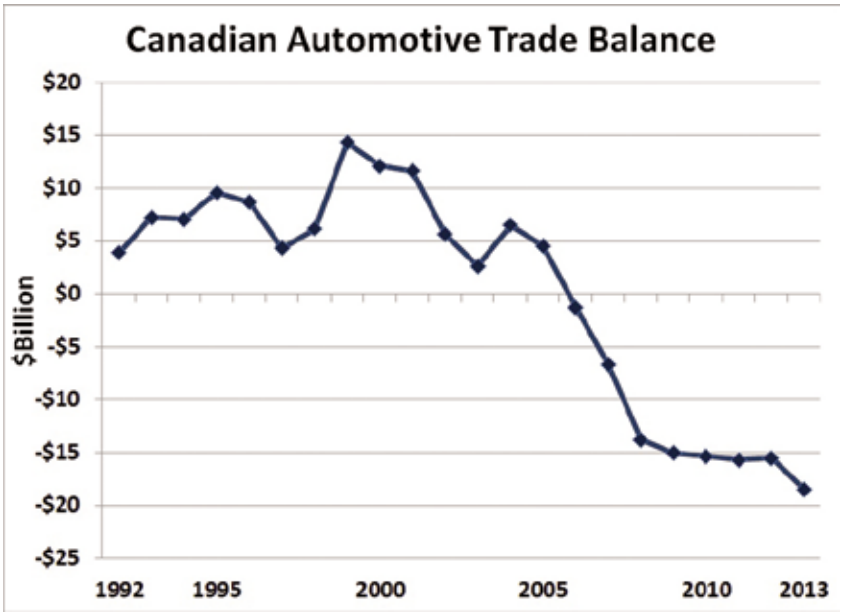
Since then, unfortunately, it has been largely downhill for this vital sector. We have lost over 50,000 good jobs in assembly in parts: about one in three. We have snatched defeat from the jaws of victory in international auto trade: our once-impressive surplus has melted down into an even larger deficit (that soared to $17 billion last year). These challenges culminated in the 2008-09 financial crisis, which was a near-death experience for our industry. Thankfully, due largely to the focused and timely efforts of the federal and Ontario governments, we survived that harrowing moment in our history and have since recovered some (but not all) of the output and jobs we lost in the subsequent recession. Now that we have stabilized our footprint, however, we must focus on the crucial longer-run necessity of winning more investment and more product mandates for the plants we managed to save.

The auto industry still makes a disproportionate contribution to Canadian GDP, productivity, and exports. It is still our second-largest export sector (behind only oil). It still supports 10 jobs in total in the broader economy (both "upstream" through the supply chain, and "downstream" through consumer industries dependent on autoworker buying power) for every job in a major assembly or powertrain facility.

But whereas we once punched far above our weight in international auto affairs, we now have a much smaller footprint than we should expect given our status as a major high-income automotive consuming nation. What went wrong? And more importantly, how can we fix it?

The stunning rise of Mexico within North America's auto industry is a particular factor behind Canada's fading glory. Since the North American Free Trade Agreement (NAFTA) in 1994, the trickle of auto investment to Mexico has gradually turned into a flood. Investment is lured by a growing supply chain, strong productivity improvements, and labour costs that are as little as

Buzz Hargrove.



National Automotive Strategy ?

one-tenth of Canada's (and which have not grown since 1994 despite Mexico's industrial development—partly because of the absence of independent unions and stable political rights). Mexico now assembles more vehicles than Canada, and the gap is widening. Every single one of the seven greenfield assembly plants announced in North America since the 2008-09 financial crisis have gone to Mexico. The southward migration of investment and jobs threatens to become an avalanche, unless Canada moves quickly to implement a well-rounded, powerful, and internally consistent national auto strategy.

Government financial supports for major new investments, of course, are vital ingredients in that strategy. They are now necessary components of any business case for capital spending in this sector—given the omnipresent subsidies and incentives routinely offered by other jurisdictions (including Mexico, incredibly, even though it already enjoys a large advantage due to suppressed labour costs). Repeated economic studies have shown that governments make a strong fiscal return from those investment incentives, especially once the indirect tax revenues resulting from assembly, parts, and downstream auto-supported jobs are taken into account.

Canada and Ontario have been at the table, too, as we have had to be. There has been no major auto assembly investment in the last quarter-century that did not benefit from government fiscal support in one form or another. Of course, government subsidies alone cannot seal a deal, unless we have strong results in quality, productivity, supply chain, and infrastructure—and on all those counts Canada ranks well. The federal and provincial governments both have a responsibility, and they both clearly have the fiscal resources, to make sure Canada is in the game.

However, investment incentives alone will not be sufficient to protect Canada's automotive footprint given the intensifying competition for investment and product mandates coming from other jurisdictions (and especially from Mexico). This is confirmed by the recent disappointing failure to land a proposed major new investment in engine production by Ford, despite concerted efforts by both levels of government and the union. So government needs to use all the other tools in its economic toolbox to ensure we capture a healthy share of future investment. More importantly, we need to ensure that our policy interventions are aligned consistently in favour of investment. At present this is not the case: often, the benefits of an investment subsidy are offset or squandered by government actions in other areas (like trade policy or exchange rates) which simultaneously weakened the case for Canadian location.

In 2012 the Canadian Auto Workers (now part of Unifor) published a 10-point proposal for a national auto strategy that would represent a more powerful and aligned plan to win future investment. Some of the measures emphasized in that strategy include:

- Getting the Canadian dollar down to levels that are consistent with industrial success: preferably to 80 cents (US), its approximate purchasing power parity level. The recent decline of the dollar is helping enormously, but we need more.
- Aligning our trade policies to reinforce the case for Canadian production, and tying trade concessions to commitments by global OEMs to Canadian investments. Recent free trade deals (like the one signed with Korea) do exactly the opposite: they open our market, no strings attached, with no pressure on Korean OEMs to produce anything here at all.
- Using the government's equity stake in major OEMs to leverage a longer-run commitment to a Canadian manufacturing footprint.
- Using other government policy levers (including vehicle procurement spending, investments in transportation infrastructure, and R&D supports) in an integrated manner, always focused laser-like on the essential priority of winning new investment commitments.

Canada faces an enormous challenge in coming years to preserve what is left of our once-world-beating automotive industry—let alone to recoup previous losses. Despite those challenges, it is not an impossible task, so long as our government recognizes its responsibility to use every policy tool it can in an integrated, consistent effort. Other high-wage economies (including Germany, Korea, Japan, and even the United States) have used government interventions to support domestic content and investment, and preserve their own domestic footprints in the face of emerging global competition. Canada can and must do the same. ■

Canada faces an enormous challenge in coming years to preserve what is left of our once-world-beating automotive industry—let alone to recoup previous losses.

Buzz Hargrove is former president of the Canadian Auto Workers union.

By Craig Ceppetelli

The "New" NRC:

What it Means to Canada's Automotive Industry

MAIN PHOTO: *An NRC technologist inspects an aluminum component following compression tests performed at NRC's aluminum research labs located in Saguenay, QC.*

INSET: *An NRC technologist works to set-up the composite fibre feeder at the Magna-NRC Composite Centre of Excellence (Concord, ON), where NRC works closely with the industry to develop advanced polymer and composite components for the automotive sector.*

Over the past two years, we have heard much talk about the restructuring of the National Research Council (NRC) of Canada, the Government of Canada's research and technology organization. The stated goal of this effort was to better align the NRC with Canadian industry needs. What does this mean for the Canadian auto industry? We sent our questions to Michel Dumoulin, NRC's General Manager of Automotive and Surface Transportation.

How does NRC's new approach help Canada's automotive parts manufacturing industry?

Although the NRC's new structure for supporting the automotive and surface transportation industries is less than two years old, NRC's involvement in automotive research goes back decades. NRC has a rich history in materials research, manufacturing

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About NRC

The National Research Council of Canada is the Government of Canada's premier research and technology organization. With 3,500 employees and research facilities in more than 20 locations across Canada, NRC covers a wide variety of disciplines. Its mission statement is to work with clients and partners to provide innovative support, strategic research, and scientific and technical services to develop and deploy solutions to meet Canada's current and future industrial and societal needs.

NRC is organized into three R&D divisions: Emerging Technologies, Life Sciences, and Engineering. Under these three R&D divisions are 12 integrated "portfolios" focusing on key industrial sectors, representing areas of strategic importance and economic value to Canada.

For more information, visit NRC's website, **www.nrc-cnrc.gc.ca/eng/index.html**.

Contact

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processes, aerodynamic testing, propulsion technologies, non-destructive testing, and computer simulation.

What is new is how we apply our expertise and capabilities to developing technology solutions that are aligned with the needs of Canada's industrial sectors. NRC is deploying technology development programs tailored to support innovation at every stage—from collaborative research, technology de-risking through pre-competitive R&D, and technical services.

NRC's efforts for the automotive and ground transportation industry are supported by a team of over 250 experienced professionals (researchers, metallurgists, physicists, chemists, software designers, programmers, and engineers) tasked with working with industry partners (such as APMA members) and assisting Canadian companies to improve their competitive position.

What areas of automotive research and technology will NRC focus on?

NRC has consulted widely and developed programs addressing the needs companies expressed, namely:

- Lowering costs: design, development and manufacturing costs;
- Fuel economy through light-weighting and innovative propulsion systems; and
- Environmental footprint, in particular GHG emissions.

NRC has also launched initiatives focused on specific technology opportunities aligned to areas of strategic importance and economic value to Canadian companies, including:

- **Light-weighting of Vehicles**: NRC aims to develop, validate, and deploy key processing, manufacturing and assembly technologies to create advanced aluminum and multi-materials components for the entire surface transportation supply chain.
- **Vehicle Propulsion**: NRC aims to develop technology which will improve the efficiency of internal combustion engines and powertrains, and enable vehicle hybridization and electrification.
- **Advanced Manufacturing and Design**: NRC is developing innovative technologies aimed at enhancing product design and reducing the costs and the time required to design, develop and manufacture products for the automotive parts industry.
- **Biomaterials**: NRC aims to develop high quality, sustainable, and cost-effective non-food biomass-based materials as well as affordable processing technologies to incorporate these materials into auto parts.

NRC works with hundreds of companies every year to develop technology solutions.

How were these priorities chosen?

These areas identified as excellent opportunities to provide a competitive edge to the Canadian automotive industry. Our initiatives were shaped in close collaboration with industry—many of whom are APMA members.

The goal of our activities is to keep offering value and increase the strength of Canadian stakeholders in the car and light truck value chain, while also developing and deploying a wide range of innovative technologies to the transportation industry for improved vehicle efficiency. We want our clients to be leaders in their respective sectors, and all of our efforts and resources are aligned to achieve this objective.

How can auto industry members work with NRC?

NRC works with hundreds of companies every year to develop technology solutions. NRC has a number of proven methods for working with our industry partners, including:

- NRC can provide innovation support, strategic research, and scientific and technical services. NRC has the infrastructure, personnel, equipment, experience, and networking capabilities required to serve industry members.
- NRC provides industry with a lower-risk way to develop innovative ideas, reduce start-up costs, and shorten time to market.
- NRC's Industrial Research Assistance Program (IRAP) can even help small and medium-sized enterprise clients by providing them with advisory services and financial support.
- Bottom line—NRC is here to support Canada's automotive parts manufacturing industry and to drive innovation in collaboration with our Canadian industrial partners and clients.

What's next?

All of the initiatives described in this article are launched and already producing results for the automotive industry. But this does not mean that NRC is not thinking of the future. We have started developing next-generation programs involving potentially game-changing technologies, such as our "Factory of the Future" initiative. I hope to tell you more about these in a future issue of APMA's *Lead, Reach and Connect.* ■

By Joseph McCabe, President, AutoForecast Solutions LLC

Canada and the Global Automotive Outlook to 2021

Most people associated with the automotive industry were uncertain that we would see a fifth straight year of increased automotive sales in North America. And yet, here we are. At the time of this writing, as we approach the end of 2014, we are also on target for one our best light vehicle production performances of nearly 17 million units; second only to the results in 2000.

Consumer sentiment is high; crude oil prices are low and continuing to drop; employment rates are improving; pent-up automotive demand is still high and driving sales; the New York Stock Exchange, along with other financial markets, are at all-time highs; and low interest financing is easily accessible.

Basically, all of the economic indicators are translating into a strong market outlook for all of the players in the North American Free Trade Agreement (NAFTA) for the foreseeable future. However, in our current ever-increasing globalized automotive industry, geographic boundary lines continue to blur, thereby promoting a highly competitive environment which could easily turn the tides of prosperity. For this reason, original equipment manufacturers (OEM), suppliers, and automotive jurisdictions must continue to defend their core operations while growing through innovation, investment, and overall global competitiveness.

We are currently forecasting global light vehicle production in 2021 to be nearly 108 million units; a 24 million unit increase over 2013. Or to be more accurate, a 27.7 per cent incremental volume gain. In the forecast window (2013 thru 2021), there are 14 countries which perform better than the global average.

These 14 countries, ranging from China through Pakistan, contribute over 18.6 million units of incremental volumes alone. And of those 14 countries, eight of them add over 250,000 (or basically a plant's worth) of volume each. In comparison, the forecast for North America in 2021 is 18.7 million units—showing that the growth in these countries alone adds another "North America" sized market to the landscape (see Figure 1).

Before we dive deeper into the country analysis, let us also consider the competition in 2021. In the globalized automotive space, OEMs are increasingly

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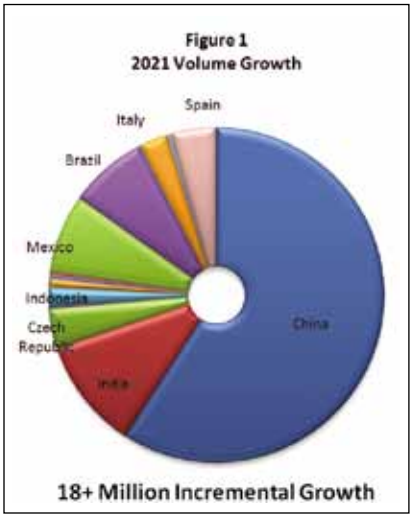


Figure 1. All images in this layout provided by Auto Forecast Solutions.

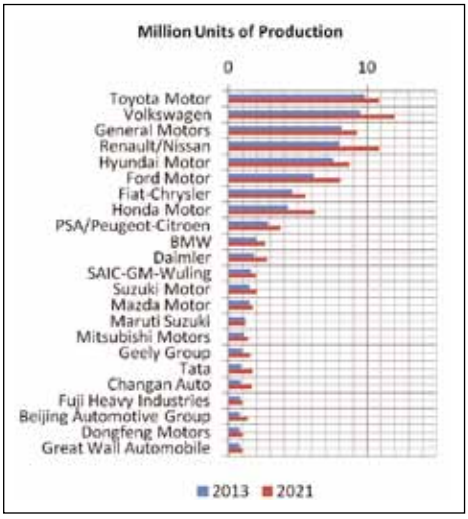


Figure 2.

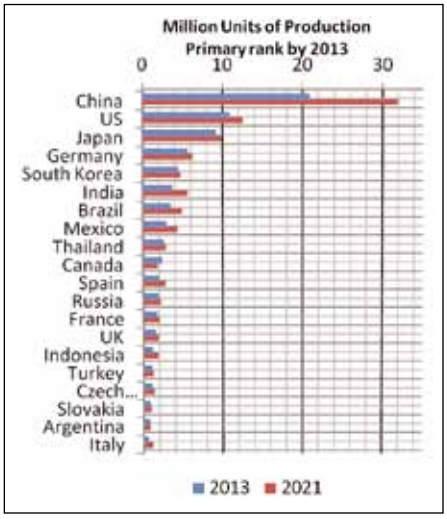


Figure 3.

leveraging joint ventures and strategic partnerships to penetrate new markets quickly.

To understand the true footprint of an automotive company is to look at the data from a brand owner perspective. For example, Buicks assembled by Shanghai General Motors (GM) in China will be counted as part of GM. By 2021, we will see Volkswagen overtake Toyota for the largest global brand owner by production. GM will lose third position to Renault/Nissan, and Honda will overtake Fiat Chrysler Automobiles (FCA) for seventh position. The position moves are a good story, but not as compelling as the new players who enter the "1 Million Unit Club" of annual production.

Four Asian brand owners, three of which are based in China, enter the arena. Great Wall Automobile, Beijing Automotive Group, Tata Motors, and Changan Auto, will all become significant competitors by 2021 (see Figure 2). And a fifth player, Dongfeng Motors, is not far behind.

Refocusing back to a country level, we find that China, the United States, and Japan maintain the top three spots in terms of production volume, respectively—with China "uncatchable"(see Figure 3). When analyzing the volume shifts, a few countries move in ranking one or two spots.

These moves are not due to a lack of investment or volume growth in each country, but rather a slower growth curve than other neighbouring ranking countries. The one exception to this rule is Canada. Canada drops from 10th position (2013) to 15th (2021) primarily due to a declining production volume base (see Figure 4).

It is evident that the global competitive landscape is and will continue to evolve. Markets once viewed as emerging, are now maturing. OEMs are constantly looking to improve their global footprint and economies of scale through platform consolidation, more frequent vehicle program refreshes, and targeting global customers with vehicle designs to satisfy consumers in multiple markets.

Developing a successful, global automotive footprint is not a one-size-fits-all solution.

A key example of this is the Jeep Renegade. FCA is leveraging their strongest North America brand equity as a launching pad into the rest of the world. Stringent fuel economy and emissions standards are compelling OEMs and suppliers to work closer with each other and think outside the box. Examples include Tesla and the aluminum-intensive Ford F-150. Countries and jurisdictions are also trying to take advantage of the global growth by providing massive incentives for foreign investment.

From another perspective, let us focus on the NAFTA region (see Figure 5).

Analysts are targeting 2014 United States light vehicle sales in the 16.4 million unit range, with some anticipating the potential to reach and exceed 17 million in 2015 (an unprecedented sixth sales year increase). Therefore, logic would dictate that a positive outlook on nearly all economic conditions and vehicle sales should translate to improvements in production volumes. Well, not so fast.

First let us look at the United States. What was once satisfied through Greenfield investments to increase production and capacity is now focused on plant improvements in efficiency, overtime, and moving to more three shift/three crew work schedules to make more efficient use of the same amount of space. States are coming to the table with incentives to promote local investment.

When looking at Michigan and the Southern United States as a group, they maintain 40 per cent of the total NAFTA production in the forecast window. Mexico is leveraging a different growth strategy. Once valued primarily for its low cost labour, Mexico will attract nearly two million units of incremental annual Greenfield production capacity by 2021. Brands such as Bayerische Motoren Werke (BMW), Audi, and Mercedes-Benz will

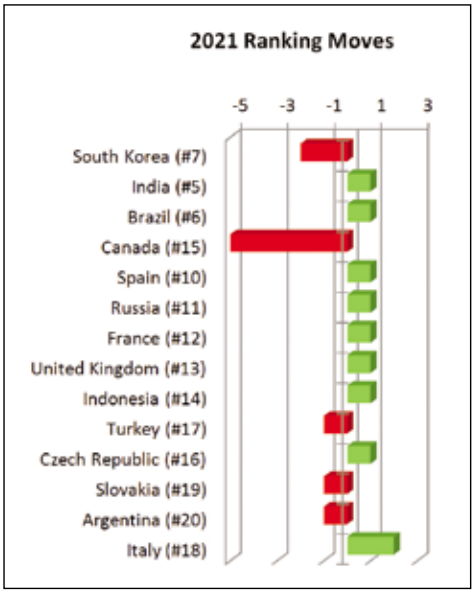
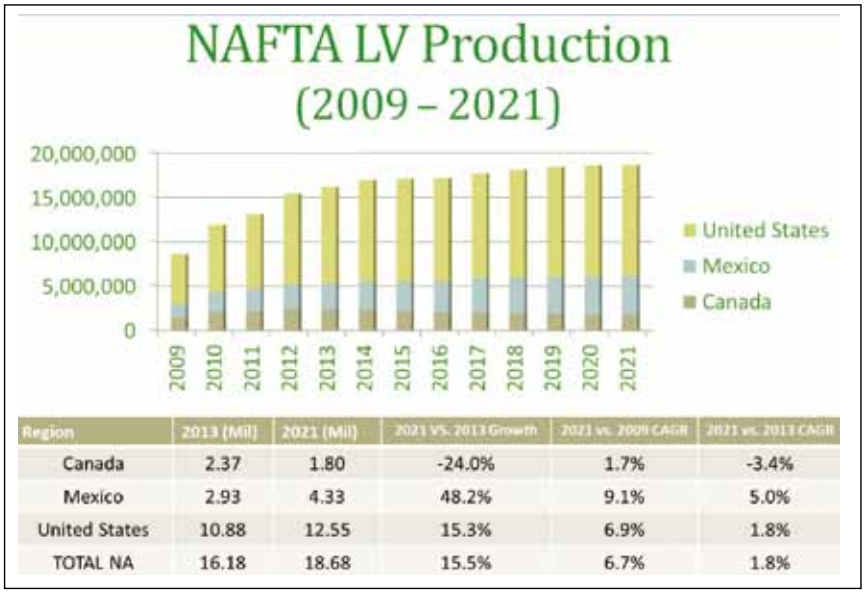


Figure 4.



Region	2013 (Mil)	2021 (Mil)	2021 VS. 2013 Growth	2021 vs. 2009 CAGR	2021 vs. 2013 CAGR
Canada	2.37	1.80	-24.0%	1.7%	-3.4%
Mexico	2.93	4.33	48.2%	9.1%	5.0%
United States	10.88	12.55	15.3%	6.9%	1.8%
TOTAL NA	16.18	18.68	15.5%	6.7%	1.8%

Figure 5.

stake a claim to the area, supporting the fact that quality is now being added as one of Mexico's key assets—closing the competitive gap with its neighbours.

Canada, of course, is a different story. In 2013, Canada maintained 15 per cent NAFTA production market share. That value projects to drop to under 10 per cent by 2021. That is not to say that investments are not being made in Canada. On the contrary, the federal and provincial governments have supported investments at Honda, Ford, and Toyota (for Lexus). But most of these investments resulted in sustaining production and employment levels—with little impact in terms of production volume increases. To compound the problem, the current exchange rate is not favourable to the Canadian dollar.

And lastly, a majority of the vehicles assembles in Canada are either a) NAFTA-centric (i.e. minivans and sports cars), or b) able to be produced elsewhere at better margins for the OEM (i.e. all of the GM catalog currently being built in Canada). Our forecast has both Oshawa 1 and 2 shutdown by 2018 and Ingersoll running only on one shift by 2017.

Canada maintains a heavy reliance on the United States for trade (over 90 per cent) and recent activities supported by new leadership at the provincial level are designed to foster more foreign relationships to lessen this exposure. Free trade agreements with South Korea, and more recently, Europe, will help promote these relationships in many sectors—but still more is needed on the automotive front. Few vehicles assembled in Canada are consumed in Europe and South Korea.

Canadian suppliers will benefit from the elimination of certain tariffs, but the OEMs will benefit less without more global vehicles to offer. Ford is making strides in this area with their investment in Oakville to produce a new global Edge. Other OEMs need to follow suit. Another issue that needs to be addressed is the elimination of the Canada "Double Standard" and improving the optics of the situations. Other NAFTA jurisdictions are praised for their high incentive programs to attract investment, while it is wrongly viewed as corporate welfare when offered by Canada.

OEMs are constantly being scrutinized for their ability to effect change, both within their organization through improving communication as well as their relationships with their supply base. This ultimately will result in product improvements, faster go-to-market strategies for innovations and methodologies to reach corporate average fuel economy requirements, and potentially reducing recalls.

This same strategy needs to be adopted by governments and automotive jurisdictions that want to compete in the global automotive industry. Instead of an OEM-supplier relationship, it is a government-OEM relationship. Fostering growth by:

- Identifying the decision makers.
- Understanding their needs.
- Developing a long-term strategy designed to benefit all parties.

All jurisdictions must understand their specific strengths and weaknesses, the gaps in their competitiveness, what assets can be leveraged, and what dramatic, long-lasting changes need to be implemented in order to develop an effective automotive strategy. Developing a successful, global automotive footprint is not a one-size-fits-all solution. ■

TO LEARN MORE ABOUT CANADA AND THE GLOBAL AUTOMOTIVE OUTLOOK THRU 2021, VISIT WWW.APMA.CA.

Leading, Reaching &

2015 APMA & Industry Events

JANUARY 13-14, 2015
Automotive News World Congress

Every January, leaders of the industry gather to discuss key issues and strategies for the coming year. The 39th annual Automotive News World Congress in Detroit, MI is the one event where delegates will hear the industry's top executives share their outlook on the state of the industry and their strategies to manage ongoing global challenges and growth opportunities.

Nearly 1,000 industry professionals attended the two-day event featuring more than 20 industry speakers and had an unparalleled opportunity to reach and hear from top level decision-makers. If you have any questions or need further information, please contact **congress@autonews.com**.

JANUARY 17-25, 2015
North American International Auto Show

The North American International Auto Show (NAIAS) 2015, took place at the COBO Center in Detroit, MI, Jan. 17-25, 2015. It is where the global automotive community comes together to catch up on the latest news and events. NAIAS 2014 featured 50 vehicle debuts with the majority being worldwide. Over 5,000 journalists attended from 60 countries. Over 30 per cent of the journalists were international, thus helping to spread automotive news made at NAIAS 2014 to the world. NAIAS is uniquely positioned to be four shows in one—a media preview, an industry preview, a charity preview and a public show with a nine-day run.

Industry professionals from around the world attended the industry's most substantive annual event. In addition to some of the automotive world's most eagerly anticipated new vehicle premieres, there was unprecedented access to more of the industry's top leaders and the latest concepts, models, and technologies. Visit **www.apma.ca/calendar** for more details.

FEBRUARY 8-13, 2015
Meeting Opportunity with Hyundai Motors and Trade Mission to South Korea

Led by the Honourable Ed Fast, Minister of International Trade, the Trade Commissioner Service is organizing a trade mission to Seoul and Busan, South Korea. This multi-sector trade mission to South Korea will highlight the breadth of business opportunities in the South Korean market and the benefits to Canadian businesses from the soon-to-be-implemented Canada-Korea Free Trade Agreement. Participants will have access to key local economic and political decision-makers and provide greater public profile to business participants, helping them build their network with the local business community and the region.

As part of the business delegation program, pre-selected automotive industry companies will have the opportunity to meet with Hyundai Motors. The deadline to submit company profiles to Hyundai has already passed.

FEBRUARY 10-12, 2015
SAE 2015 Hybrid & Electric Vehicles Technologies Symposium

The SAE 2015 Hybrid & Electric Vehicle Technologies Symposium addresses critical information on both the technical developments in electronic vehicle technologies as well as the business decisions around technology development and implementation. Additionally, it allows for attendees to meet with those industry experts and technology specialists from the entire supply chain of EV, HEV and EREV to engage in dialogue about the topics of greatest interest.

Attendees will learn about technology applications of the manufacturers' hybrid and electric vehicles, powertrain technologies and components, and about supporting technologies—such as advanced energy storage and charging systems.

This must-attend event for anyone interested or involved in the Hybrid and Electric Vehicle Technologies industry. Visit **www.apma.ca/calendar** for more details.

FEBRUARY 13-22, 2015
Canadian International AutoShow

The Canadian International Auto Show will be back at the Metro Toronto Convention Centre February 13-22, 2015. With over 1,000 new cars and light trucks displayed in a state-of-the-art facility with 650,000 square feet, the AutoShow is the ONLY place you need to be, to engage consumers and reach your potential customers.

APMA/CAMM members are being offered an exclusive opportunity to purchase tickets at nearly 50 per cent off the regular price of ($12 instead of $23). And on the morning of February 13th, Industry Members only will be able to see the entire show before it opens to the general public that afternoon. The 2015 AutoShow promises to deliver more technology, more innovative displays and exhibits, and more promotions! For more

Connecting:

information, visit **www.apma.ca/calendar** or e-mail **cias@autoshow.ca**.

FEBRUARY 23-27, 2015
Automotive Mission to Mexico & Automotive Meetings in Queretaro

You are invited to join the Canadian Delegation participating in the Automotive Meetings Queretaro 2015, the premier sourcing event for the automotive industry in Mexico. Canadian companies will have exclusive benefits that include preferential rates and site visits to important companies in Guanajuato and Aguascalientes. The Automotive Meetings offer a customized matchmaking program and access to a series of specialized conferences.

In its last edition, the Automotive Meetings attracted more than 400 companies including procurement and supply chain teams from companies such as GM, Ford, VW, BMW, Mazda, Toyota, Eaton, Autoliv, Faurecia, Nissan, Bombardier, Honda, and Volvo, among many others. Whether you are already doing business in Mexico, expanding operations to this market or looking for local partners and/or suppliers, this mission is for you. The deadline to apply for this opportunity has already passed.

FEBRUARY 26, 2015
APMA Annual Windsor Regional Conference

This APMA-run event annually takes place in Windsor, ON, in the morning of the Canada-U.S. Automotive Dinner. The purpose of this conference is to discuss relevant issues affecting the Canadian automotive supply industry, especially in the Windsor region.

The 2014 Windsor Regional Conference focused on Mexico and highlighted key opportunities Mexico had to offer and how Canadian automotive suppliers could take advantage of them. As of this writing, details

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Attendees pay close attention to speaker presentations at the APMA Windsor Regional Conference.

The trade show floor at the Society of Automotive Engineers' (SAE) World Congress.

such as venue and theme for 2015 are still being finalized. Please keep an eye on APMA's website and newsletter for new information!

FEBRUARY 26, 2015
Canada-US Automotive Dinner

OESA and APMA are pleased to announce the 27th Annual Canada-U.S. Automotive Dinner. This event takes place the evening of the APMA Windsor Regional Conference. OESA and APMA are organizing the event in cooperation with the Consul General of Canada in Detroit. This event attracts hundreds of high-level industry executives every year. This is a once-a-year opportunity for members of the Canadian and American automotive industries to meet and enjoy an informal evening of networking.

The keynote address will be given by Simon Nagata, President and CEO, Toyota Motor Engineering & Manufacturing North America, Inc. Nagata will speak to Toyota's experiences in North America and its outlook for a bright future as the company evolves its

The trade show floor at APMA's Annual Conference & Exhibition.

Many new vehicle models on display at the Canadian International AutoShow.

Joe Hinrichs, executive vice-president and president of The Americas for Ford Motor Company, delivers his keynote presentation at the Canada-U.S. Automotive Dinner.

footprint in the United States, Canada and the globe. Partnership opportunities are available, as well as individual and full-table registrations. Visit **www.apma.ca/calendar** for more information.

APRIL 21-23, 2015
2015 SAE World Congress & Exhibition

The SAE 2015 World Congress, taking place at the Cobo Center in Detroit, MI, assembles the best talent in the automotive industry; experts, management teams, engineers, and executives alike gather to collaborate and address current challenges, seek new windows for discovery and exploration, and promote the multitude of opportunities fundamental for a successful future. This year's theme, *Leading Mobility Innovation*, expresses the dawning of a new day in the automotive industry. It is a call to arms—a challenge to all engineers to create mobility for the future through innovative technologies. Become inspired; attend the SAE 2015 World Congress. Visit **www.apma.ca/calendar** for more details.

JUNE 2-4, 2015
APMA Annual Conference & Exhibition

Annually taking place at Caesars Windsor Hotel & Casino in Windsor, ON, this is Canada's biggest automotive manufacturing event of the year. The conference brings together leading Canadian, American and international automotive industry professionals to learn, share ideas and collaborate. Featuring industry leading speakers, a trade show floor, one-on-one business meetings and numerous networking opportunities, this event is a must-attend for anyone involved in or wishing to become involved in the auto industry in Canada. APMA will announce further details including theme, speakers, agenda, sponsorship opportunities and more as the event date approaches. ■

APMA is currently developing other key events on specific issues pertinent to our sector. For more information, visit **www.apma.ca/news/industryevents**.

APMA
LEAD. REACH. CONNECT.

APMA Quick Hit: Member Profile

Brakers Early Warning Systems Inc. ultimately has one goal: SAVE LIVES! Its product BRAKERS (Broadcasting to Radios Ahead Keeps Emergency Responders Safe), is designed to inform motorists that emergency vehicles are approaching from inside their car, regardless of the function of the radio.

The company is currently working with several auto makers to install the software right at the factory and would welcome more automotive companies or suppliers to do so.

Brakers Early Warning Systems Inc. is offering this software with no up-front or ongoing cost to the company or subscription to the consumer. Brakers is asking is for Automotive companies to assist in bringing the receiving software into the public domain and the company will take care of the rest.

The result of BRAKERS will be decreasing the number of accidents involving emergency vehicles and civilian vehicles, keeping motorists and first responders safer.

Meet APMA's Newest Members

Please join us in welcoming the following companies as new members of APMA. There is so much for APMA to do, from trade agreements, to leveraging new technologies, to pursuing government support programs for our industry. The only way we can have the resources to get it all done is through memberships. We salute these new members, along with all of our faithful existing members, who continue to provide us with their support.

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APMA Membership Just Got Even Better!

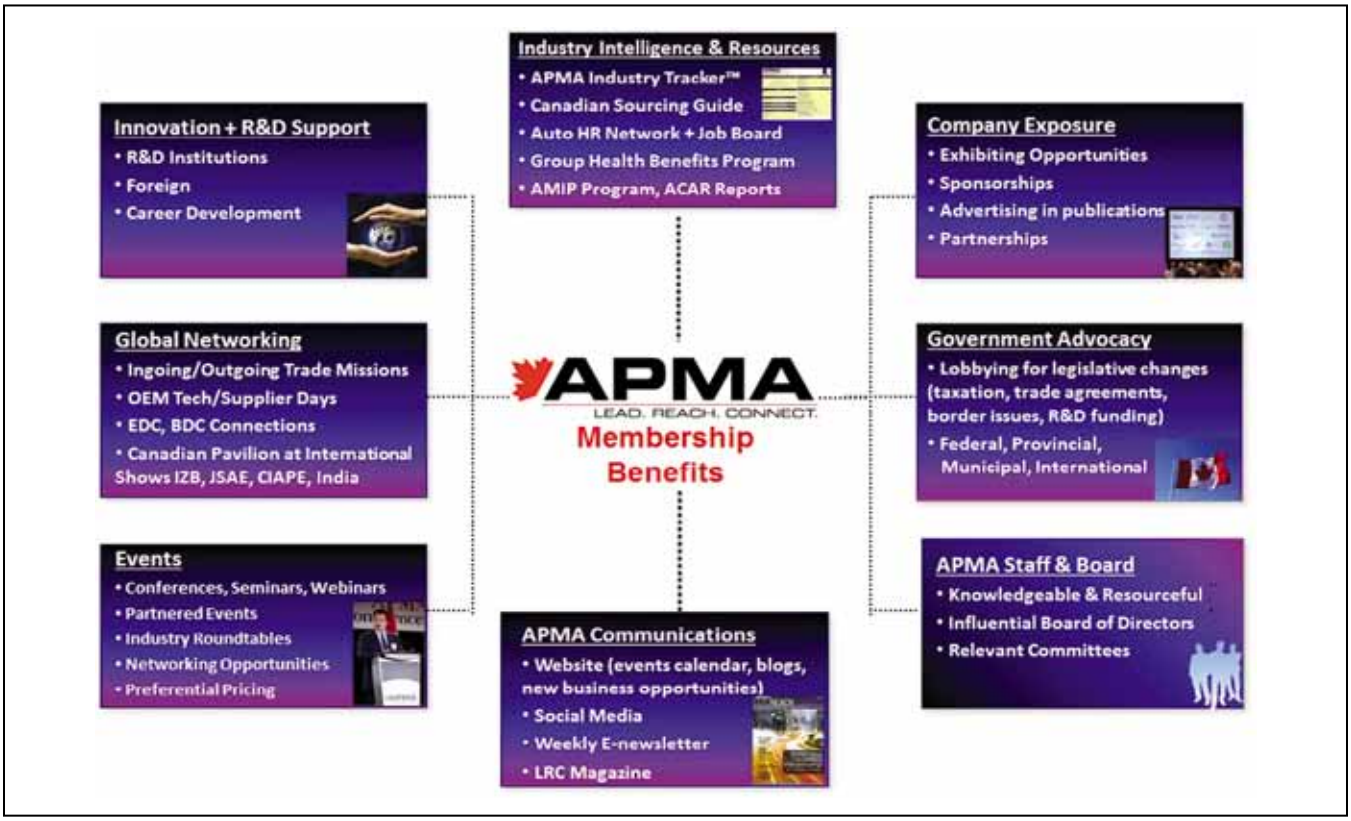
The Automotive Parts Manufacturers' Association (APMA) and the Canadian Association of Mold Makers (CAMM) are teaming up to offer members an even better membership experience!

As Canada's national association representing original equipment manufacturers (OEM) producers of parts, equipment, tools, supplies and services for the worldwide automotive industry, APMA is delighted to announce its collaboration with CAMM, an industrial organization representing the interests and serving the needs of Canadian mold makers. Through our collaboration, our associations will serve a wider range of companies in the Canadian automotive supply chain and offer further value to members of each association and to the industry as a whole.

Beginning January 1, 2015, member companies will now receive the membership benefits of both organizations!

Beginning January 1, 2015, member companies will now receive the membership benefits of both organizations! APMA and CAMM will retain their own identities including websites, events, and publications. However, both associations will collaborate on many initiatives throughout the year and members will get to enjoy the membership benefits of both associations for one annual fee!

Visit **www.apma.ca/overview/membership** for more information on how you can get involved. ■



Behind the Wheel of the 2015 Dodge SRT Hellcat

The Hellcat makes the most of its larger size, as it is one of only three muscle car coupes that offers seating for five passengers.

The pride of Chrysler's Bramalea Assembly Plant in Brampton, ON, the 2015 Dodge Challenger SRT Hellcat and its 2015 Dodge Charger SRT Hellcat twin are the most powerful regular cars ever unleashed on the buying public. Their much-hyped release late in 2014 has set the enthusiast world abuzz and has turned the performance-dollar-value equation on its ear. This edition of *Lead Reach and Connect*'s Behind the Wheel will feature the monstrous Charger and its category-busting features and improvements.

Powertrain

Let us just start with the business end. This car puts the power and train into powertrain. The 2015 Dodge Challenger SRT Hellcat comes equipped with a 6.2-litre supercharged Hemi V-8 engine that unleashes an incredible 707 horsepower and 650 pound-feet of torque. To safely maximize fuel, air, and spark under 11.6 psi of boost, Dodge dropped its compression ratio to 9.5:1 from the 10.9:1 in its 6.4-litre counterpart found in the regular 485 horespower SRT. According to the director of advanced and SRT powertrain engineering, more than 90 per cent of the engine content is new for this application.

For the first time in Challenger history, owners have the option of a robust new HP90 eight-speed automatic. Steering wheel-mounted paddle shifters activate new rev-matching technology during downshifts. Early tests have shown the Hellcat can cover zero to 60 miles per hour in 3.6 seconds in the automatic, about three-tenths quicker than the pace of the manual.

This car comes equipped with more thrust than an Indycar, more than the entire Lamborghini lineup and more than its legendary corporate sibling, Viper. Early estimates put the Hellcat's weight at around 4,500 pounds, about 188 more than a similarly equipped non-Hellcat SRT with the 6.4-litre Hemi. That power-to-weight ratio allows Dodge to claim a mind-blowing

National Hot Rod Association certified 11.0 second per quarter-mile time.

Suspension and braking

The Hellcat comes with a new adjustable ride suspension with three main settings: Track, Sport, and Street. The Track setting is used for optimized traction under road course conditions. Gas-charged adjustable shock absorbers are set to increase rebound and compression rates for maximum handling feel. This setting mitigates wheel spinning and improves handling control while helping to put power on the ground in corners.

The Sport setting is ideal for canyon driving or those windy sections of the road. It includes a firmer suspension tune with stiffer compression rates ideal for vigorous drives or even mild competition. This setting inspires driver confidence, while optimizing your vehicle for performance touring.

The Street setting is for everyday driving, offering a balance of suspension firmness and

continued on 36

ride comfort from a performance suspension. This setting is ideal for daily or inclement weather driving, featuring limited wheel spin and quiet performance. There is also a Custom setting where the driver can configure the vehicle in one of 200 possible ways.

Bringing that kinetic energy to a halt are 15.4-inch Brembo® two-piece, six-piston front brake rotors—some of the largest ever fitted into a production vehicle anywhere. These strong plates are optimized for performance, and the two-piece design aids heat dissipation to facilitate effective and efficient cooling.

Between SRT® Drive Modes and other customizable settings, the 2015 Hellcat offers more than 125 potential configurations. The different Drive Modes can control and alter horsepower, transmission, traction, and suspension settings.

Interior

The 2015 Challenger SRT Hellcat comes with an all-new interior that maximizes luxury. The interior comes with premium materials and 14 options for color and trim, including seats that come in your choice of Nappa leather with Alcantara® inserts or ultra-premium Laguna leather, a first-time offering for the Challenger. SRT® badging is subtly placed throughout the interior to remind the driver of the superior craftsmanship that went into their vehicle. For maximum comfort, heated and ventilated seats and a 360-degree heated steering wheel come standard.

The cockpit has been updated (or back-dated, rather) to offer a more retro look, but with modern instrumentation and technology. The hard black plastic surfaces of the past are gone, replaced by a modern dash and classic-styled touches and gauges. A sweeping center console has a higher edge on the passenger side, inspired by the 1971 Challenger, and the dash, instruments, and console are all accompanied by an aluminum trim.

The seven-inch Driver Information Display, with an 8.4-inch Thin Film Transistor (TFT) display screen, includes the UConnect Access system with apps and navigation features. It can call out vital information to the driver and can be completely personalized to the driver's preferences.

The Hellcat makes the most of its larger size, as it is one of only three muscle car coupes that offers seating for five passengers. And the trunk, at 16-cubic-feet, offers significant storage space that bests even some mid-size sedans.

Dodge did an excellent job of updating the Hellcat's interior for a more modern look while still maintaining the classic look and feel of Challengers of the past.

Exterior

The Dodge Challenger is well-known as one of the more powerful cars out there. It is also one of the largest, blockiest muscle cars available, giving it a considerable presence

on the road. The 2015 Dodge Challenger SRT Hellcat's basic shape remains the same, with a long nose, flat good, and thick roof pillars. The new Hellcat maintains its longstanding reputation and image while still providing some modern updates.

Despite its size, the SRT Hellcat achieves optimal aerodynamics thanks to the more than 100 hours spent in the Chrysler Technology Center wind tunnel in Auburn Hills, MI. For the fastest sedan ever, the hood design was critical to obtaining optimal aerodynamics. A pair of outer air extractors help keep temperatures down beneath the hood, improving thermal efficiency and performance. Massive air scoops feed the engine, the intercooler and the front brakes of the SRT Hellcat, helping to make it the world's fastest rear-wheel drive production car.

Similar to the 1971 Challenger, the 2015 version has a new split grille with a slimmer front opening and the typical strong, pronounced "power bulge" hood. The projector headlamps are surrounded by LED halos and LED tail lamps can be found on the rear as well. The hem of the wheel wells has also been trimmed to accommodate the 20-inch aluminum wheel and tire package, yet another way the 2015 Hellcat has been made smoother and leaner than before.

Technology

The key technology that was implemented in the 2015 Hellcat is the use of two different key fobs, each unlocking (or restricting) the Hellcat's abilities. The black key is the valet key. It restricts output, caps revs at 4,000, locks out first gear (from the optional automatic transmission), and puts the Electronic Stability Control in full-on mode. It also disables the paddle shifters, launch control, and drive-mode functions. The black key is the lesser of the two choices, limiting the engine's performance and overall vehicle capability.

Using the red key, however, unleashes the Hellcat's full capabilities without restriction. You can tell the difference when you fire up the 6.2-litre, V-8 engine, hearing its deep exhaust with a subtle whine from the supercharger. Together they produce a primal and ominous effect that is like music to the ears of Hellcat lovers. There was no internal effort to muffle the sound, as it is part of the experience.

Given that this is a 2015 vehicle, the technology does not stop there. The Hellcat comes standard with power windows with a one-touch up function, illuminated cup holders, keyless entry and start, parking sensors, an 8.4-inch color touch screen, and a one-year subscription to SiriusXM radio. Stepping up to the SRT model adds adaptive speed control with a 200-mile-per-hour speedometer (only on cars with a manual transmission), forward collision warning, rain-sensing wipers, and automatic high beams. ■

That power-to-weight ratio allows Dodge to claim a mind-blowing National Hot Rod Association certified 11.0 second per quarter-mile time.

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