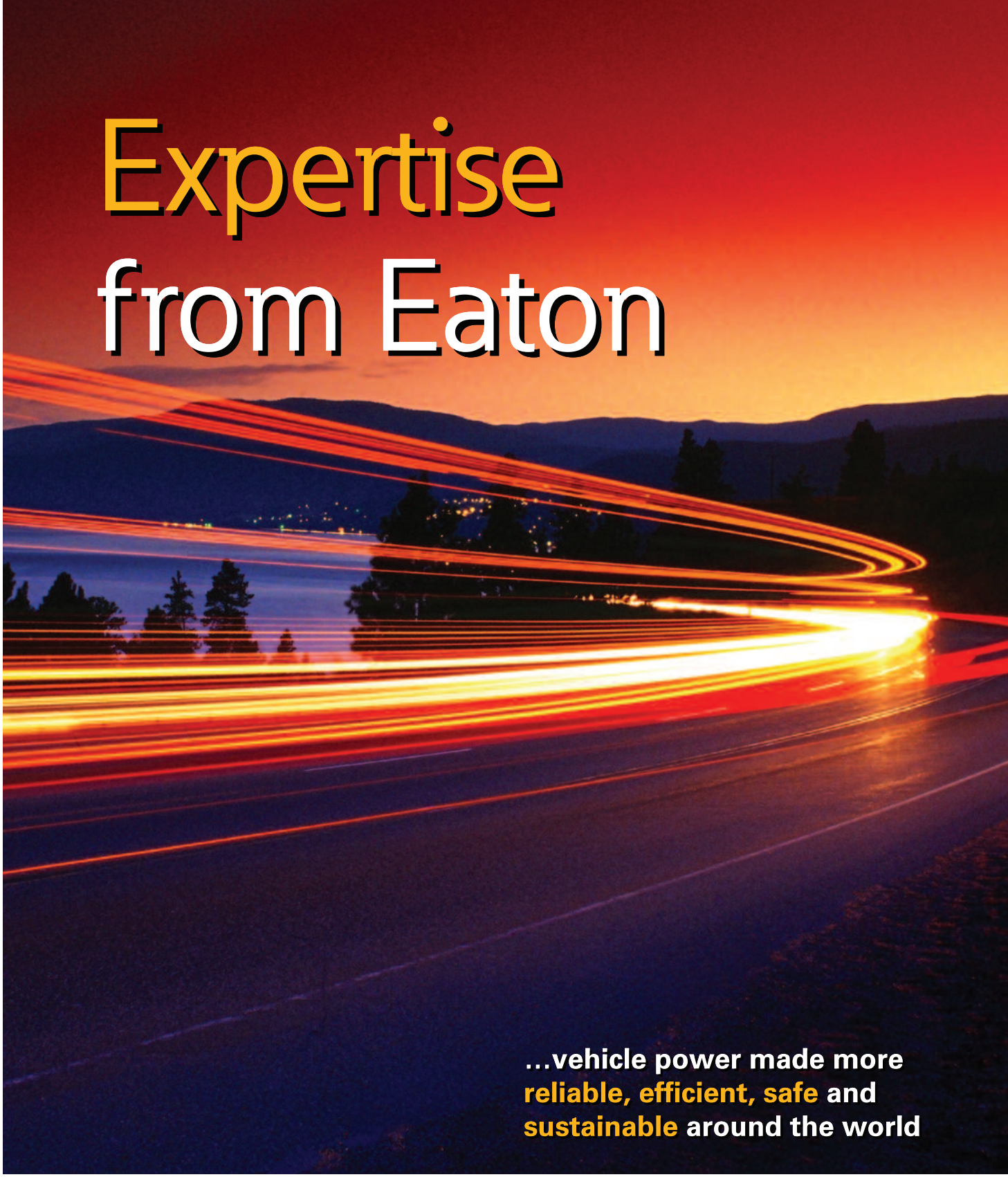
Automotive World
MEGATRENDS
MAGAZINE
Q1 2014

EXCLUSIVE INTERVIEW

Google Automotive discusses a new brand perspective

WITH INSIGHTS FROM CLEARWATER CORPORATE FINANCE, THATCHAM AND INFOR



As a leading power management company, Eaton is uniquely positioned to answer the demand for cleaner, more fuel efficient vehicles. Our supercharger and valvetrain technologies are engineered to improve fuel economy and performance. With integrated solutions from the engine through the drivetrain, Eaton helps make vehicle power more **reliable**, **efficient**, **safe** and **sustainable**.

EATON
Powering Business Worldwide

www.Eaton.com

Superchargers • Valvetrain • Torque Control • Fuel Emissions & Powertrain Controls • Fluid Conveyance & Plastics • Light-duty Transmission

Editor's welcome

Welcome to Megatrends Q1 2014

As discussed in the last issue of Megatrends, 2013 was the year of the millennial: this generation garnered a lot of buzz, with OEMs worrying that the disaffected youth no longer want to buy what they are selling. But 2014, it seems, is the year of solutions, offering a new perspective on this and the many other matters that have been plaguing the automotive industry.

Motorsport has been grabbing headlines for months, as new developments across racing series trickle down to the manufacturing and design of mainstream road cars. But while this is proving to work out well for R&D, OEMs are still pushing to reinvigorate interest in racing in the first place. On page 29, Darren Cox, Global Motorsport Director at Nissan, discusses how the company has been working with Sony Computer Entertainment Europe and Polyphony Digital Inc to recruit the latest generation of race car drivers via their video gaming skills. The GT Academy has been finding players of Gran Turismo for six years, with success at Le Mans and other races substantially increasing youth interest in motorsport.

Google, meanwhile, has taken to new social media channels, to show the automotive industry how to connect with consumers today via its online offerings. On page 63, Meredith Guerriero explains the work of Google Automotive and what it hopes to achieve working with OEMs.

Despite this renewed optimism, it cannot be ignored that the last twelve months have been a time of worrying change for Australian plants. Ford, Holden and Toyota have all announced plans to end manufacturing in the country - but there is a small silver lining, or so thinks Tony Lemmo, Chief Executive of Autoteam Australia Consulting. On page 18, Lemmo talks to Megan Lampinen about what can go right in the year ahead - and beyond - after so much has appeared to go wrong of late.

Clearwater Corporate Finance's Constantine Biller also reflects this confidence on page 32, stating that the automotive industry will help bring growth back to the global economy. "The automotive industry "is in an extremely positive position" he writes, "with emerging economies offering a unique opportunity to investors, and traditional powerhouse markets like the UK and US recovering well from the recession".

When discussing megatrends, it is near impossible to overlook the developments in alternative powertrain technologies. Although fuel cell vehicles will most likely be the next big thing to arrive, a completely carbon free ideal is still the goal for some OEMs. So, from page 54, we ask just how eco-friendly automotive production can be, and what exactly should be powering alternative powertrains.

We hope you enjoy this issue of *Megatrends* magazine and, as always, we welcome your thoughts and suggestions; email us at *megatrends@automotiveworld.com*.

Ruth Dawson

Ruth Dawson
Publications Editor,
Automotive World

Automotive World
MEGATRENDS

Automotive World Megatrends magazine

ISSN: 2053 776X

Publisher:
AW Megatrends Ltd
1-3 Washington Buildings
Stanwell Road, Penarth CF64 2AD, UK

www.awmegatrends.com
T: +44 (0) 2920 709 302
megatrends@automotiveworld.com

Registered number: 800516
VAT number: GB 171 5423 23

Chief Executive:
Gareth Davies

Editor:
Martin Kahl

Publications Editor:
Ruth Dawson

Production & Design:
Michael Franklin

Business Editor:
Megan Lampinen

Analyst:
David Isaiah

Staff writers:
Rachel Boagey
Rachael Hogg

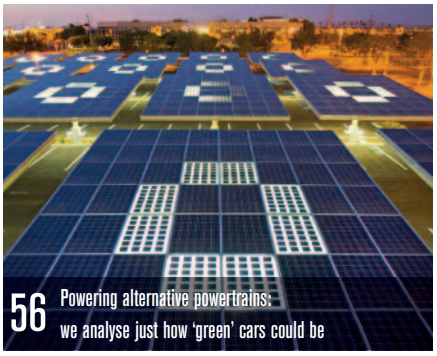
Commercial Manager:
Gavin Dobson

Events Manager:
Amanda James

Contents

> ON THE COVER

Away from driverless cars and the newly-formed Open Automotive Alliance, Google has been working with OEMs to take advantage of the digital world. Ruth Dawson talks to Meredith Guerriero, Global Head of Automotive, about collaborating with the industry



> ALSO IN THIS ISSUE

CONTRIBUTORS

Constantine Biller
Partner, Clearwater Corporate Finance

Constantine is Clearwater Corporate Finance's chemicals and industrials specialist. He has particular expertise in aerospace and defence, automotive, building materials, capital equipment, chemicals, consulting engineering, industrial services, manufacturing, motion and flow control products, oil and gas, and precision engineering.

He previously worked in the industrials team at Livingstone Partners, an investment banking firm in London, and has also worked with the Director General for Science and Technology at the UK Department of Trade and Industry.

Matthew Avery
Research Director, Thatcham

Matthew's role involves liaising with OEMs, legislators and Global NCAP initiatives on crash testing, with a view to encouraging safer designs and more cost effective repairs.

Matthew has led much of the research work into whiplash testing. He co-authored the International Insurance seat assessment procedure, now used as the basis for the Euro NCAP whiplash test, and also advises on whiplash issues within the European legislative framework. Matthew also chairs various working groups within the crash test community.

Martin Hayes
Executive Chairman, Automotive PR

Martin has more than 40 years' experience of motor industry communications - first working as a truck and bus journalist, then as head of public affairs for Leyland Truck and Bus, Midland Bank International and DAF Trucks, followed by seven years in independent PR consultancy before he founded Automotive PR in 2000.

APR now lists 18 international affiliates in all major motor industry markets. Thanks to this globalisation programme, Martin has gained considerable experience of the motor industry in China.

Ivaylo Dimov
Consultant, DNV GL

Ivaylo works within the Business Assurance sector of the newly formed DNV GL. With a particular interest in the automotive sector, he specialises in strategy development, the sustainability business case, and environmental data analysis.

On page 59, Ivaylo uses the 2013 Tomorrow's Value Rating to assess just how sustainable the automotive industry is. As the world's population continues to expand, the market must adapt to new mobility models and, Ivaylo writes, consider the possibility of innovating through collaboration.

Manmeet Malhi
Senior Project Manager, EOS Intelligence

EOS Intelligence is a professional services firm that delivers business research and analysis solutions targeted at corporate, consulting and investment organisations. Manmeet follows the emerging markets automotive sector closely, and works with established companies in the USA and Europe to support their emerging market-focused growth and optimisation strategies.

A regular *Megatrends* contributor, for Q1, Manmeet has investigated how major OEMs are making eco-friendly cars even greener by implementing new manufacturing strategies.

John Flavin
Executive Vice President, Global Manufacturing, Infor

John Flavin brings more than 25 years of experience in the application software market to his role as Executive Vice President, Global Manufacturing, where he currently leads a team focused on growing Infor's business.

Flavin has had several senior management roles at Infor, including leading the company's professional services organisation, customer care, and development teams.

Prior to joining Infor, Flavin was CEO of software development company Future Three.

For him, Bright Science means developing best in class heat performance.

DSM, the inventor of Diablo technology, offers you a complete portfolio of high-performance plastics for every component in air induction systems, including ducts, resonators and end caps. If you are looking for solutions to replace metal or rubber, know that our portfolio provides suitable materials for virtually every temperature range. Our Stanyl® polyamide 46, Stanyl Diablo and Akulon Diablo thermoplastics offer the ideal solution thanks to their ability to operate at up to 230°C.

Visit our website to learn more about our solutions in air-management:
WWW.DSM.COM/AIR-MANAGEMENT

HEALTH · NUTRITION · MATERIALS

DSM
BRIGHT SCIENCE. BRIGHTER LIVING.

Flying high

The Indian automotive market isn't usually regarded as being at the forefront of connectivity innovation, so many were surprised that Renault decided to launch its latest hi-tech concept, KWID, at the Delhi Auto Show in February.

"Designed by an international team for international markets", the choice to launch in India was taken to confirm Renault's commitment to new markets. All well and good, but to get to the real interesting part of the French OEM's concept, one must look beyond press release talk of robust design and playful interiors - in fact, one must disregard this vehicle altogether and look to the skies.

Sitting atop the KWID is a small drone, the first of its kind in the automotive industry. The Flying Companion can be used manually or follow a pre-determined route to scout traffic, take photographs and detect obstacles on the road ahead.

A novel idea indeed, and one certainly suited to the tech-junkie millennial market this concept is aimed at. But many already have expressed concern over just how safe this safety extra would actually be: piloted via integrated dashboard tablet, if the drone was ever to become a reality, it would take some hefty persuasion to convince distracted driving regulators.

However, the KWID could have some potential as a fleet delivery vehicle. In late 2013, Amazon announced that it was testing the drones for use as delivery vehicles, and this development by Renault could certainly prove of use to the Internet giant's logistics plans. After locating the vehicle in one central point on a block, or in a town or village, a driver could send multiple drones out to addresses, saving both time and fuel.

WE MADE SMART CARS

EVEN SMARTER

BY COMBINING REAL-TIME TRAFFIC DATA WITH HISTORIC DRIVING PATTERNS TO IMPROVE FUEL EFFICIENCY.

WHAT'S AHEAD?

That question is on the minds of everyone who works at Infosys. From breakthrough strategies to flawless execution, our mission is to design the right innovations for each unique business challenge and deliver tomorrow's enterprise today. That's our promise.

Infosys® | Building Tomorrow's Enterprise

Fifteen minutes with...

Hugues Van-Honacker, European Commission

***Ruth Dawson** talks transport initiatives with DG Move's policy officer*

What areas are under the remit of the Directorate-General for Mobility and Transport (DG Move)?

DG Move is trying to address policies across the whole mode of transport, one of which is automotive. We are dealing in policy, so we have two kinds of things in clean transport: one is to make policies - we already have some directives to promote clean vehicle procurement and now we are tackling infrastructure. We also have demonstration projects in clean vehicle technologies such as CNG and LNG, and electromobility.

How is the EU's clean fuel strategy, launched in early 2013, progressing?

The strategy addresses all modes of transport to try to define how to replace oil in the long term. We came up with three conclusions that we need, basically, a mix of different fuels for different modes of transport because no single solution is available for all modes. We need to continue technology development to improve energy efficiency, and also find a cheaper alternative fuel, and improve batteries and range.

We also need an alternative fuel infrastructure with common standards in Europe so we came up with the proposal directive to mandate member states to deploy a minimum number of infrastructures in CNG, hydrogen, LNG and electric, to allow EU mobility and to avoid fragmentation of investment in the industry.

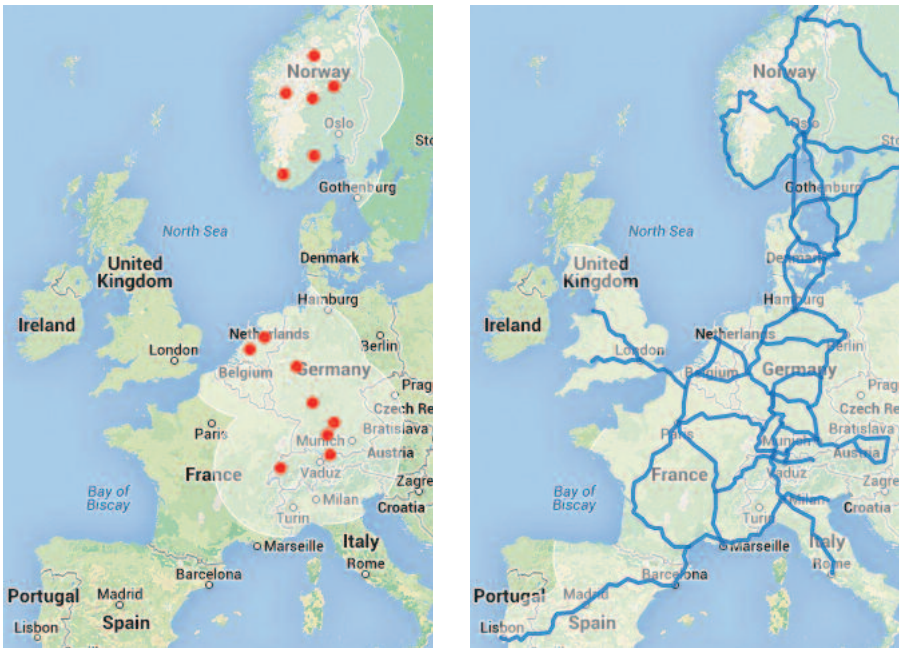
How do OEM plans, such as Tesla's supercharger network, fit into the deployment of infrastructure?

Infrastructure is one part of the chicken and egg problem; we cannot have a market of alternative fuel if you have no infrastructure, and infrastructure deployment is not done because there are not enough alternative fuel vehicles. Infrastructure is necessary but the automotive industry should make an effort to sell and develop alternative fuel vehicles at an affordable price and with high performance.

Tesla is a good concept but it's expensive. People want to develop their own infrastructure and this should be addressed. We still don't know how, but I personally believe that they should have the same standards at all OEMs. If you say this is a niche market - because it is a niche market, it's about 80,000 to 100,000 cars - and they invest in their own private infrastructure, this is something that we should address in the future. We don't close the door but if the market for Tesla is getting high volume, we should try to have a common standard for every approach in Europe.

Last year, Wolfgang Bernhard voiced the opinion that emissions standards should be more open to cover potential savings across the whole vehicle, not just the engine. Do you think legislators should consider implementing this idea in future policies?

We should decouple activities on the automotive industry - regulation and the energy part. The Commission is involved through the JRC [Joint Research Centre] with CONCAWE [Conservation of Clean Air and Water in Europe] and EUCAR [European Council for Automotive R&D],



Tesla supercharger network in Europe today (left) and planned locations by winter 2014 (right)

to come up with a referenced study in Europe on Well-to-Wheel, addressing different alternative fuels. This is something that is needed for policymakers to understand all cycles of life of the alternative fuel, from production to use in the car.

But I think we should decouple because we have an energy policy and a climate policy to make more renewable deployment in member states and the EU asked them to have targets. For example, Belgium is 13% renewable electricity, so what we try to tackle now is really that the vehicles themselves are clean in terms of pollution, in terms of CO2. Even a CNG car will reduce the CO2 level by 30%; the idea is that at the end we can replace CNG with renewable CNG, because somehow the molecule is the same.

We also know that an electric vehicle is clean, it will not produce any pollutant, and if you take into account the mix of electricity production in Europe, we have a 30% reduction of CO2. Sure, in some countries we have a mass usage of coal, for example, for electricity, so the local perception of EVs may be negative. But there are other policies saying that this country which uses mainly coal should make more renewable electricity. I think if we address this topic too early, saying that there is no need to have electric vehicles in countries where electricity is produced with coal, they will not try to promote electric vehicles and then the market will be reduced; the cost of the vehicle will be high. And when this country has more clean energy, the transport will not follow.

ACEA's former Secretary General Ivan Hodac questioned in November why Europe has the toughest CO2 requirements. He stated that the European rules are "not comparable to anywhere else in the world", that "the Americas, the Chinese, the Koreans and the Japanese have a requirement in the industry in their countries but not when they export to Europe". Do you think this is a fair comment?

My personal opinion is that, first, CO2 regulation may help industry, may force industry to invest in research to have cleaner technology and to have alternative fuel vehicles, and then they will be competitive all over the world. CO2 regulation will trigger technology development and new technology will be needed to maintain competitiveness.

CO2 regulations also address multiplication factors to promote new technology, so in my opinion, dealing with electro mobility in DG Transport, I see a good opportunity to sell more electric vehicles if you have these multiplication factors in Europe. This is useful to trigger the market. We shouldn't influence the market too much, but trigger the market when we have barriers like costs because oil will be predominant in the future. Oil is a perfect fuel in terms of performance and in terms of costs, but it affects the environment and, unfortunately, we are not producing much oil in Europe so we are really dependent on other regions.

How can the industry inform customers of the advantages of alternative powertrain technology? Is it up to the manufacturers to push dealers to educate at the point of sale, or should policymakers be responsible?

I think there are two sides to it. As policymakers, having addressed customer information in the direct proposal, we've found that customers are not familiar with alternative fuels. They are familiar with normal gasoline and diesel, so when they go to the pump they understand what kind of fuel they need. But as we extend to more biofuel blends or CNG or hydrogen in the future, we need to make sure that customers are confident buying these technologies.

The other side is the dealership. Clearly, the customer is not used to buying an alternative fuel vehicle so when he wants to buy a vehicle he goes to the dealership. If no one explains the advantage, in terms of cost and in terms of environment or even performance, the customer loses out. It's the role of the car manufacturer - well, it depends if it is an independent dealership or not - to also educate the seller, they are the contact people who can explain, answer questions and spend time on this.

Driving innovation in today's vehicles

ArcelorMittal is the only automotive steel producer with a worldwide presence, delivering a large scale of quality products, solutions and services to automakers globally. We provide industry first innovations for some of the Insurance Institute for Highway Safety's Top Safety Pick Plus vehicles. From hydroformed tubes in critical roof rail and b-pillar safety structures found in the 2014 Ford Fusion to the hot stamped laser welded door ring in the 2014 Acura MDX, our award winning innovations are the result of collaboration throughout the supply chain.

Innovative steel solutions from ArcelorMittal are a low cost and environmentally responsible weight reduction solution that help automakers safely achieve 54.5 mpg.

www.arcelormittal.com/automotive

@ArcelorMittalUS

S-in motion

View from the top: Megatrends India 2014

David Isaiah *evaluates the state of the commercial vehicle market in India*

The Indian commercial vehicle market is currently going through one of its worst slowdowns, with sales of trucks and buses on the decline for 23 consecutive months now. Even for a segment that is normally considered fairly cyclical, this decline is seen as something more: a crisis.

The fourth annual *Automotive World Megatrends India* conference brought together stakeholders from the country's CV industry to discuss the trends that are set to shape the Indian market over the next few years. A panel discussion proved to be one of the highlights of the conference, featuring leaders from Daimler India Commercial Vehicles, AMW, Tata Motors and Scania.

According to Marc Llistosella, Managing Director and Chief Executive Officer of DICV, the Indian CV industry should not be regarded as a one-way street, driven by global manufacturers coming to the country, with the domestic industry following suit. The Indian industry will change in its own time, but that is not to say the global industry will remain unaffected by it.

According to Llistosella, the industry is facing what he calls a "pre-judge": "When we bring our trucks to Indonesia, Tanzania, Kenya or Sri Lanka, we face a lot of pre-biased judgments. There the judgment is clear - it's an Indian truck, and that means it is not a judgment that is neutral; it is already negative. I think this will change, the supplier base will be more global."

In the near future, Asian low-cost trucks will increasingly come from India - not just from China. This, Llistosella says, is because the quality is better in India, and the trucks are much more competitive. Furthermore, he thinks that Indian trucks compete with foreign ones in terms of cost of ownership, fuel efficiency, load patterns and price. India will be used increasingly as a hub, not just as a market to go to. Llistosella went on to state that in the area of frugal engineering, India is the best and has enormous potential.

"The short-term downturn is very unpleasant; it will take some more months. Then we will see trucks that will be more costly, because there will be more safety standards in them. We will see higher horsepower - it's a myth to say that a higher horsepower engine consumes more fuel. No, it's the opposite," Llistosella said at the conference.

"We will see an increase in torque, we will no longer see under-engineered, under-powered trucks climbing ruthlessly high hills and being a public obstacle. We will see less and less of this. We will see the full potential of the market here coming in the next five years. And these factors will have an impact on the global truck industry as well."

Half a million

Tata Motors, meanwhile, feels that the Indian CV market will get to the half-a-million-unit mark very soon. Ravi Pisharody, President of the Commercial Vehicles business unit, based his optimism on various factors that make India a good growth country, including the size of the population itself, disposable income and an increase in urban lifestyles.

"One trend I think the industry may not like but will have to go through, is that it will have to migrate to a higher cost platform…I think today the industry is far too conscious on the price of the vehicle; that will have to change. The cost of the product itself will become smaller and smaller, compared with the other costs of owning the vehicle," Pisharody said.

The increase in price will primarily come from various emissions norms and safety regulations that are now coming into force, which will also increase safety features, such as ABS, and efficiency in trucks. Further legislation is expected too, Pisharody observed, such as Bharat Stage IV.

According to Pisharody, today's market is such that the transporter is actually selling their transportation at the prices of two years ago. "When we talk about the industry not being in good shape, it's actually everybody - OEMs, vendors, dealers, including transporters. At some point when the demand starts picking up, I think the freight industry will have to pass on these increases. Otherwise it cannot survive," he says.

"Along with other trends of growth, I think the industry will migrate to a higher cost freight model, otherwise there's not enough money to go around for the transporters to invest into products."

China comparison

A. Ramasubramanian, President of heavy truck manufacturer AMW Motors, believes that the Indian heavy duty market should be in the range of 400,000 to 450,000 units in ten years' time. He acknowledged that most comparisons will go to China, and feels that overall, India will be one-third of everything in China, be it the number of trucks produced, steel production, or infrastructure.

India will have to build infrastructure and, more importantly, start using said infrastructure better. In this regard, Ramasubramanian believes that potential implementation of the Goods and Services Tax (GST) in India will play a significant role, and if enacted, increase the fluidity of transportation, he says.

"I think there is an uncanny reality which people have to grab, that any Indian entrepreneur goes for the lowest cost and highest profitability. Today they are using old and dilapidated trucks, and essentially trying to be able to earn more. I do believe that if you look at areas like mining, where people migrated to better trucks, it happened because it is more profitable. No longer was cost an issue," Ramasubramanian commented.

According to him, if capitalism is to stay, and the west has grown, it is essentially because profitability has been a motive. This, he says, will be the driving force towards enhancement of trucks in general. An upturn, he feels, is inevitable: "I think the size of trucks is to grow. It's going to be tractor trailers, going to be more powerful vehicles, more expensive, there will be a higher cost platform consequent to which efficiencies and effectiveness becomes far more important than just fuel efficiency."

While AMW may be looking at the big picture, Scania is focused on the road ahead. Anders Grundström, Managing Director of Scania Commercial Vehicles India, believes that the volumes transported by road in India will essentially double between now and 2020. The OEM feels that India can be a 400,000 to 500,000-unit market on heavy CVs alone.

"We all see the trend going forward with the hub-and-spoke system in the class A, B and C cities in India, and this will drive the change towards heavy and light CVs. This is what we have seen in Europe and that is what we have seen in the US previously," said Anders Grundström.

"What that will push also, I feel, with companies like Marks & Spencer, Walmart, Ikea, H&M coming into India, is that they have established logistical chains with 20- and 40-foot containers translating into pallet loading. In a hub and spoke system, this will drive the change from multi-axle hand loaded vehicles in India, to truck and trailer."

Is manufacturing flexibility the Indian slowdown solution?

David Isaiah

In the past few months, the Indian passenger car market has had little to celebrate apart from a marginal rise in exports. Although the year-on-year rate of sales decline has been lower than the country's commercial vehicle segment, that is a fairly shallow positive note. The industry is under significant pressure.

Last month, new car sales in India fell by 7.6% to 160,289 units. The industry will watch the next few months carefully, hoping that the many of the new models launched at this year's Auto Expo in New Delhi will help stimulate sales - against the rising tide of high interest rates, increasing fuel costs and the slowdown in the country's economy.

The country is due for union elections in the middle of this year. However, it is not certain that a new government can do much to improve the situation. The possibility of a change in government could improve consumer confidence, but no revival in the country's new car market is expected before the second half of this year.

"We are in the midst of doing nothing; we got an excise duty reduction a few days ago, and on top of this, we are waiting for elections with no idea as to whether we will have a stable government, or not," said Tom Chackalackal, Ford India's Executive Director of Manufacturing.

The situation continues to be complicated by the price of fuel over the last three years, and to add to industry confusion, there has been much fluctuation between gasoline and diesel. "What normally happens is, we end up with huge inventory and then we start correcting. Now, Ford is always monitoring and trying to build what the customer needs and ensure inventory matches demand. We have moved out from a possible 'push' situation to a 'pull' situation," Chackalackal said, referring to flexibility in manufacturing.

> "Globally, Ford is now trying to get everything to a common design bill of process so that every plant manufacturing cars is common: common standards, facilities, equipment, and equal amount of flexibility"
>
> *- Tom Chackalackal, Executive Director of Manufacturing, Ford India*

Ford dealerships in India

Ford is linked to every dealer who places an order by the 'order-to-delivery' system: the dealer placing the order starts the cycle, and while it can be a pretty long, drawn out process, with a cycle of nearly 90 days, this is a period of stability for all concerned. Ford says it has learned from mistakes in the past and, as a result, the OEM is now trying to keep the system as stable as possible for the supply base, so that they do not go into a churn.

How Ford does this is through its production system, which Chackalackal calls "an umbrella of operating systems" that govern Ford today. This list of operating systems includes safety, quality, delivery, cost, people, maintenance and environment.

"Globally, Ford is now trying to get everything to a common design bill of process so that every plant manufacturing cars is common: common standards, facilities, equipment, and equal amount of flexibility. Part of it is the standardisation and the ability to use this capacity globally," Chackalackal told delegates at Automotive World Megatrends India 2014.

New car exports from India have grown marginally, and this is exactly how Ford India has managed to use capacity during the last eight or nine months while the domestic market has been on a decline. During the slowdown, the OEM has been shipping more cars to markets like Mexico or South Africa, in order to keep its plant near Chennai busy. This in turn has enabled its supply chain to keep up.

But challenges still exist. According to Chackalackal, one is the need for coated steel - a requirement when exporting to countries where there is heavy incidence of corrosion, and a 12 year warranty requirement. In the domestic market, on the other hand, cost is the key criteria.

On the matter of challenges, Chackalackal cited the example of the port.

"In Chennai, the port could be shut down. One needs an alternate supply chain to keep the lines running, owing to export commitments and volume pressure. Supply chain is another area you could look at what are the alternates, what is the flexibility. With regard to the port situation, we have signed an MoU with Ennore, so we now have the flexibility of using either Chennai port or Ennore for exports," he said.

"The automotive industry is a high investment industry, intense, with a long gestation period, with frequent model changes. Flexibility is critical to ensure that the manufacturing process can adapt to what the customer needs." This, he feels, will help safeguard against the sort of economic uncertainty faced by the Indian passenger car industry.

Ford plans to export the Chennai-built EcoSport to over 50 countries

Automotive World MEGATRENDS

Automotive World Megatrends Europe 2014

10th-11th September 2014
Brussels, Belgium

http://megatrendseurope.automotiveworld.com

Automotive World Megatrends Manufacturing India Summit 2014

2nd-3rd December 2014
Chennai, India

http://manufacturingindia.automotiveworld.com

Automotive World Megatrends Manufacturing USA Summit 2014

23rd-24th September 2014
Dearborn, MI, USA

http://manufacturingusa.automotiveworld.com

Automotive World Megatrends India 2015

24th-25th February 2015
Chennai, India

http://megatrendsindia.automotiveworld.com

Our goal is to inform and connect OEMs, suppliers, government and other key stakeholders whose knowledge, ideas, products and services will shape the global automotive industry of the future.

For more details please visit www.awmegatrends.com

Automotive World Megatrends Ltd (AWMegatrends.com) is the events division of Automotive World Ltd (AutomotiveWorld.com), the provider of premium information services for auto industry stakeholders worldwide. The company was established in 2013 following the acquisition by Automotive World of Next10 Automotive, a provider of online auto industry conferences.

Australia: what went wrong, and right, in 2013

Tony Lemmo, Chief Executive of Autoteam Australia Consulting, speaks to ***Megan Lampinen*** *about some of the factors at work behind the scenes*

Australia's automotive industry grabbed the headlines for much of 2013, with news of upcoming plant closures for both Ford and Holden, job cuts across the board, the withdrawal of the Opel brand and urgently sought labour concessions. Lost to many, however, was the fact that sales were booming. In fact, the country ended 2013 with a new record number of vehicle sales.

Full year sales of new vehicles in Australia rose from 1,112,032 units in 2012 - a record itself at the time - to 1,136,227 units last year. "A number of things were instrumental in the achievement of this new record volume," notes Tony Lemmo, Chief Executive Officer of Autoteam Australia Consulting. "A stable Australian economy with modest growth rate, stable unemployment rate and record number of people employed. There was also a record low official interest rate for the majority of the year."

The country's low tariff regime and lack of import quotes were also of benefit: imported passenger cars are charged at just a 5% rate, and vehicles from the US and Thailand are exempt thanks to free trade agreements. In addition, tariffs are not applied at all to SUVs, light commercial vehicles and heavy trucks. "The 5% on the affected passenger cars equates to about 3% at retail. In the near future, Australia is looking to extend countries with which it has a free trade agreement," Lemmo explains.

Lemmo believes the most important factor when it comes to purchase decisions among Australian consumers is cost, and observes that the "market is very price sensitive"; the strong Australian dollar compared to its trading partners has resulted in competitive pricing.

There has been an "aggressive push by manufacturers and dealers to achieve what could be regarded as unrealistic full year sales targets. As such, manufacturers and dealers have been offering large incentives to attract retail customers. These incentives range from deferred payment plans to cash back to a low or nil interest rate. These actions have made vehicle prices very attractive. In fact the 'real' price of an average vehicle in Australia is at about the same level as it was in 1990," Lemmo states.

Meanwhile, OEMS are fighting for sales in what Lemmo describes as "one of the most competitive automotive industries in the world, with 68 different brands competing for volume in a market of just over one million units." Some manufacturers are "putting pressure on dealers to pre-record vehicles in order to achieve overseas sales targets. While the number of units in this category is not known it is certainly in the tens of thousands," he adds.

Manufacturing challenges

General Motors has repeatedly blamed the strength of the Australian dollar for the high manufacturing costs in the country, claiming that currency factors alone have pushed the cost of making things in Australia to 65% higher than just a decade earlier.

Lemmo agrees that local production is costly: "In terms of a manufacturing location, because of all the compliance and workplace issues in place, Australia would have to be one of the most, if not the most, expensive manufacturing locations in the world."

There is also the issue of model choice. "Apart from the manufacturing costs, Ford and Holden are building vehicles that consumers do not wish to purchase. In the passenger industry, 70% of all sales are light/small vehicles. The locally manufactured Falcon and Commodore are large segment vehicles which account for just 9.3%. This compares to 35% of the passenger market just 10 years back."

Sales of such locally built large models have plunged. For instance, Falcon and Commodore sales - along with their commercial derivatives - stood at 197,196 units in 2003. As of last year this figure fell to just 48,996 units. "Consumers have been deserting these brands in large numbers over recent years," Lemmo states. "Consumers no longer require a large vehicle as average family numbers have come down, and with low air fares at present the number of consumers who travel long distances has reduced."

Overall, locally built vehicles accounted for a mere 10.4% of total industry volumes last year. Ford's locally built vehicles accounted for a hefty 76% of its Australian sales in 2003; this dropped to just 34% last year. For Holden, locally-built vehicles made up 64% of its Australian sales in 2003. Last year, they

December 2013: Total vehicle industry

	December					December Year-to-date				
	Year		Difference		% Share	Year		Difference		% Share
	2012	2013	Volume	%		2012	2013	Volume	%	
Passenger Car	50,496	47,686	-2,810	-5.6	49.3	575,427	566,454	-8,973	-1.6	49.8
SUV	25,670	28,543	2,873	11.2	29.5	307,253	333,511	26,258	8.5	29.4
Light Commercial Vehicle	16,439	17,809	1,370	8.3	18.4	197,704	204,566	6,862	3.5	18.0
Heavy Truck	2,822	2,718	-104	-3.7	2.8	31,648	31,696	48	0.2	2.8
Total	**95,427**	**96,756**	**1,329**	**1.4**	**100.0**	**1,112,032**	**1,136,277**	**24,195**	**2.2**	**100.0**

made up 53%. Excluding the Cruze, locally made Holden vehicles accounted for just 31% of the brand's sales in its home market.

"In prior years, Falcon and Commodore were primarily sold with large factory incentives to fleets, rental companies and governments. These historical buyers have, to a large extent, also deserted these products in favour of smaller, more fuel efficient vehicles with better resale value and green credentials," Lemmo explains.

Overall, buyers in Australia are not concerned with purchasing locally-made models. "The Australian consumer either does not know, or does not care, where their vehicles are manufactured. Consumer loyalty does not exist in most cases and it is just what represents the best value. Australian-built vehicles are of outstanding quality, as are most of the vehicles imported, and as such consumers do not have a preference for locally manufactured vehicles," Lemmo says.

Last OEM standing

Whilst Ford and Holden were both preparing to wind down production, Toyota warned that their departure only put it under greater pressure - despite leading the market in terms of unit sales for 11 consecutive years, and the fact that its Corolla was the top selling car in the country last year. By December 2013, the Japanese OEM's year-to-date sales were down 12.7%, falling by 5.4%.

The OEM had said, before announcing that it would leave the country by 2017, that changes to its manufacturing operations were essential if it was to remain viable. It had attempted to introduce changes to the current workplace agreement covering its Elizabeth plant in Adelaide, but workers objected.

Like GM, Toyota has said that the decision to end production was based on several factors, including "the unfavourable Australian dollar that makes exports unviable, high costs of manufacturing and low economies of scale for our vehicle production and local supplier base." It also highlighted the upcoming FTAs Australia was poised to finalise, which would have further increased competitiveness in an already heated market.

Government support

At present, Australia's government provides the local automotive manufacturing industry with about AUS$500m (US$447m) in funding each year. Last September, however, Prime Minister Tony Abbott warned of possible changes: "There will continue to be a high level of assistance to the motor industry, but we expect the motor industry, in return for that high level of assistance, to provide us with a reasonable indication of how it is going to increase volumes, particularly export volumes. I accept that government has a role in bringing this about but I also think the industry has a role in bringing this about."

The future of government funding is yet to be decided, but it will partly be based on a December 2013 report by the Australian Productivity Commission. The document examines the global context and trends in automotive manufacturing, and the factors affecting the competitiveness of the local automotive manufacturing industry. The Commission also released a position paper on 31 January 2014, considering potential options for government assistance to the automotive industry.

"Over many years, the Australian government has provided large incentives - into the billions of dollars - to Ford, Holden and Toyota, to encourage them to remain in Australia. The present government, while still providing incentives, is not inclined to provide the level of financial support the manufacturers are requesting," warns Lemmo.

Prior to Toyota's announcement, Autoteam Australia Consulting forecast a modest rise in full-year volumes for 2014 to 1,140,000 units. "The Australian economy is sound, interest rates are forecast to remain low, unemployment level is also forecast to remain low and housing prices are on the up. We may see a slight weakening of the Australian dollar versus our trading partners but not significant enough to impact vehicle pricing," Lemmo said at the time. Toyota's announcement, however, means that around 2,500 plant workers will now lose their jobs

However, there are positive indications from key trading partners, as Lemmo adds: "The global economy is also forecast to grow and one of our major trading partners, China, should see growth of about 8%. A good sign for the Australian economy."

Interview: Karen Newman

Americas Automotive and Aerospace Industry Leader, IBM Global Business Services

Big Data is a key industry buzzword at the moment, and for good reason. Many companies, IBM included, see massive potential across numerous segments, providing they can harness the data and use it effectively.

Karen Newman runs IBM's automotive and aerospace consulting systems integration and managed service business for the Americas. This unit carries out consulting work for OEMs, suppliers, heavy duty truck companies and aerospace companies, looking at everything from improving finances to optimising the supply chain.

"In the supply chain there are tons of opportunities to leverage Big Data to improve your supply chain. We are helping a couple clients look at their supply chain and the manufacturing processes. They collect tons of data off their manufacturing floor but they don't really leverage a lot of that data to get predictive and know when equipment is going to fail before it's going to fail and get out in front of some of those failures," Newman said.

Beyond manufacturing, Big Data is also fuelling the rise in connected cars, a segment in which IBM is also heavily involved. It has worked with NXP Semiconductors and the Dutch city of Eindhoven on a smarter traffic pilot project. This trial involved wireless relay of vehicle performance indicators from about 200 vehicles to a data centre. The data was then used to predict road condition trends.

Last year, IBM announced a deal with German supplier Continental to develop connected and automated driving technology. The partners aim to develop a highly scalable cloud platform that will enable automotive manufacturers to deliver a range of new mobile in-car services and allow software updates and vehicle control device functionality to be delivered over the Internet.

"Continental was looking for a partner that could help them in the connected space: the customer who wants a seamless lifestyle, from the cell phone outside the vehicle, to inside the vehicle, to wanting OEMs to know more about them personally as an individual. We help them understand the demographic of the household, where the individual customer is at. We call it 'marketing to a customer of one'," Newman explained.

Newman emphasised in particular IBM's place in this developing connectivity market. "We're not really in the telematics business. We don't do the head unit, we don't do the connectivity between satellites and head units. What we do is have a great practice and insight around Big Data, and integration of that data into the enterprise, so you can take real action on it, apply analytics to it, create the 360-degree profile of your customers and then leveraging that to market to them in new ways...Continental saw IBM as someone they wanted to partner with going forward."

Numerous other automotive partnerships are also on the go, though as Newman points out, IBM is often behind the scenes. It is working on behalf of satellite radio specialist SiriusXM on a telematics partnership with Nissan, and has previously worked with the likes of Hughes Telematics, whose products feature in models from Mercedes-Benz, Volkswagen and others. "We have a pretty strong history in this space but we're not always out in the press," she explained.

As the industry develops, Newman sees considerable potential in the connectivity sphere: "We're very interested in connectivity. It's a really important space to IBM. The mega amounts of data coming out, turning data into predictive analytics to shape your business - these are important trends for us."

However, challenges remain when it comes to tapping the full potential of Big Data. To begin with, some drivers remain uncomfortable with the idea of sharing personal information that would come from connected cars. Newman admits this area needs to be addressed and it all boils down to the individual's personal choice: "People are going to chose to opt in or opt out of those things. It's important for companies to understand that. I think there's a little fear and uncertainty out there over how that data will get used and what that might mean. Companies have to be really patient and gentle with some of those ideas. I don't think they're necessarily bad ideas. You just have to allow the individual to be able to opt in and opt out."

IBM will be facing these and other challenges as it pursues the potential of Big Data and ensures its own place in the increasingly connected automotive sector.

Words: Megan Lampinen

when cars talk

Cars are rolling gold mines of information, gathering data about the driver, the driving environment and of course—the car itself—as well as any devices connected to it. Automotive companies can use this data to provide a safer driving experience, improve customer service and enhance vehicle quality.

And the benefits associated with real-time analysis of data collected from vehicles extend beyond just the automotive industry. Insurance companies can more accurately assess risky driver behavior, enhance the claims process and identify fraudulent claims. Fleet operators can use vehicle data to improve the efficiency and safety of their operators, and retailers can improve the timeliness and accuracy of product promotions.

With IBM Watson Foundations Big Data & Analytics technology, automakers can now analyze huge volumes of vehicle data at speeds that allow cars to "talk" to each other through the cloud. This vehicle-to-vehicle communication makes it possible for drivers to receive real-time alerts about nearby hazardous road conditions or looming equipment failures. Watson Foundations can also provide a more enriched driving experience through application or entertainment offerings customized just for them, and delivered through their vehicle's infotainment system or a connected device.

To learn more, visit **ibm.com/software/data/bigdata/industry-auto.html**

Bsquare Connected Automotive IVI Solutions

Partner with Bsquare to innovate and deliver state-of-the-art IVI systems that delight motorists

Bsquare Connected Automotive IVI Solutions speed time to market and delight motorists while reducing project risk and cost. Bsquare drives results in all aspects of IVI development with the expertise to lead innovative product development, design dynamic IVI systems, and deliver high quality products to market on time and on budget. The result: IVI systems that meet automotive quality, reliability and durability standards while at the same time delighting motorists around the world.

Benefits

Speed time to market
Bsquare draws from its wealth of embedded development and IVI experience to bring systems to market quickly.

Reduce project risk and cost
Bsquare Connected IVI Solutions teams provide extensive Quality Management support and testing capabilities. This, when paired with our deep systems integration capabilities, reduces overall project risk and cost.

Delight motorists
Bsquare delivers innovative, dynamic IVI systems that tie seamlessly with motorists' personal handheld devices, information from the cloud, and key internal vehicle systems to create an experience that delights motorists.

Bsquare can take your IVI system through every stage of the product lifecycle.

Phase 0 Requirements | Phase 1 Design | Phase 2 Development | Phase 3 Prototyping | Phase 4 Integration | Phase 5 Testing | Phase 6 Production | Phase 7 Maintenance | Phase 8 End of life

Learn more:
Bsquare Connected Automotive IVI Solutions
Visit: www.bsquare.com/solutions/automotive
Call: +1.425.519.5900 or 1.888.820.4500
Email: sales@bsquare.com

BSQUARE
FORGING SMART CONNECTIONS

Growing old gracefully

Nobody likes to think about how old they are getting, but it has, particularly in recent months, become key to the developing automotive market

Ruth Dawson

The world's ageing population has been the subject of many a pitch and presentation these last few years - but what does it really mean for the automotive industry? Yes, as a person ages, their preferences change, health deteriorates, and contempt for high speeds appears to very rapidly decline, but focusing on the fast-growing older demographic has had some other surprising consequences too.

Although most will assume that taking into account older generations would mainly affect areas like interior car design or infotainment, the ageing population is affecting matters across the board for OEMs - and not just in the automotive sector.

Norgren, a motion and fluid control technology supplier to the commercial vehicle industry, has taken the rather unusual tack of developing its current business strategy around four 'mega-themes', including the hobbies and habits of older generations.

"We're seeing quite a lot of interest in city buses and in tour coaches for recreational use," Mark Sealy, Engineering Director commented. "The design of those vehicles is changing: they're going to low floor; the air conditioning systems, the entertainment systems all continue to be more sophisticated because that sector is quite demanding in their creature comforts."

It is not solely selling 'creature comforts' that will satisfy the automotive market, however: the sales opportunity that senior citizens represent is something many OEMs are keen to tap through new technologies. In Japan - a country well known for the high level of cultural respect afforded to elders - the demand for self-driving cars has been particularly notable. Indeed, *Bloomberg* has even suggested that the driverless car market could counteract falling sales numbers from younger generations, thanks to the new opportunity that the growing ageing population presents.

Building new technology to encourage this new demographic to purchase vehicles is clearly the best way to encourage sales - but older drivers need to be made aware of it too. A 2013 survey conducted by the American Automobile Association (AAA) found that only one in ten senior drivers with health issues was driving a vehicle with features like keyless entry or larger dashboard controls.

"Although older Americans are healthier now more than ever before, the ageing process can diminish a person's vision or limit range of motion that could impact their driving," said Jake Nelson, AAA Director of Traffic Safety Advocacy and Research.

However, when it comes to developing a car for senior citizens, "There really is no such thing as a best make or model for an older driver. This is because it is more about the features and less about the car itself," Nelson said.

Certainly health matters may facilitate the sale of driver assistance systems but when it comes to other in-car tech and infotainment features, is age really that much of an issue? Sheryl Connelly, Global Consumer Trends and Futuring Manager at Ford, thinks that it is more about attitude than age: "The car and how we value it is really evolving between generations," she commented.

"One feature we don't spend enough time talking about is the 'do not disturb' button that comes with the system. There are those people who say 'my car is a sanctuary, it's a place where I decompress from the day'. In that regard, it's not driven necessarily by age. I can't say the 'do not disturb' button works more for an older person than a younger person, it's very context driven."

> "*Bloomberg* has even suggested that the driverless car market could counteract falling sales numbers from younger generations, thanks to the new opportunity that the growing ageing population presents"

Emissions: the supplier's perspective

Commercial vehicle emissions legislation has been increasingly tightened over a relatively short period of time and Mark Sealy, Global Technical Director of the Commercial Vehicle Sector at Norgren thinks that it has gone far enough. However, that is not say that optimisation could not still be improved.

*Here, Sealy talks to **Rachael Hogg** about the future of fluid control technologies, and how he expects the CV market to look in 2020*

What will be the main focus of the industry going forward?

The emission stuff has happened very quickly in relative terms, and the solutions are not optimised, so I think we are going to see quite a lot of activity to now simplify, optimise, reduce cost and improve the actual on-road performance of systems. Euro VI is done but the engineering hasn't finished yet.

The new agenda is all around CO2 legislation, which is being drafted. The single biggest area to go at to reduce the CO2 footprint is the engine and its efficiency. Recovering waste heat, which isn't currently done in any significant way, and dedicated heat-harvesting equipment are the next significant developments, certainly for a fluid control supplier like Norgren.

What are the benefits of electric inlet throttles for Euro VI on trucks, and why was it important for Norgren to introduce them?

Historically, while petrol engines have used throttles, diesel engines have not. However, it has become a requirement with the very last stages of emissions control because you need control of the mass flow of air through the engine to make the emissions equipment work. It's a new application and, being on a truck, needs to be very robust.

There were some other requirements that were quite unique to the truck sector, such as the valves having to do 20 million cycles. They have to work at very high vibration levels, wake up before the engine is started and continue to work after the engine is closed down. We jumped in and won programmes with MAN and Scania.

What work is Norgren doing on advancing aerodynamics?

We have a suspension system for lowering the nose of the vehicle at speed and we have a tyre management system that can inflate and deflate tyres on the move, which is part of the rolling resistance agenda. We are keen to get involved in things like active aerodynamics, but haven't been asked yet. Static equipment that will be implemented first, and there's really nothing for us there.

Has the CV market gone as far as it can in terms of reducing emissions?

It's almost 100 times better than it was ten years ago and is much better than passenger car, marine and aeroplane emissions. I would say trucks have done more than anyone else and have gone as far as is practical. So no, enough is enough, let us try to get some CO2 reduction.

The only other thing that might happen is further hybrid developments. Certainly inner city emissions will remain a target. There are some quite serious initiatives now to electrify trucks with overhead pantographs. So, electrifying city vehicles and some main highway routes could be the only sensible way to further reduce emissions.

Do you think the CV industry will change much in the future?

Urbanisation is continuing to happen, with more megacities and concentrated inner city deliveries. I think that will lead to more automated city logistics; more electric and hybrids, and, possibly, larger inner city delivery vehicles will be allowed.

What challenges will the fluid control industry face in the next ten years?

Natural gas is a very significant challenge. It could be that a third of the world's trucks are actually converted to gas in 15 years, so that's a huge undertaking.

Heat recovery as a general theme is something which is going to be taken seriously now because you can effect a 5% fuel saving and there's nothing else that can make that sort of step.

We're still seeing restructuring of the big players. The Volkswagen Group has acquired a controlling interest in Scania and we see Volvo acquiring Asian interests and becoming the world's largest vehicle maker. So for some of the smaller players, it's going to become increasingly difficult.

I think some safety legislation could become quite onerous around driver fatigue, for example. In North America, the driver base is just disappearing and the skill levels of drivers are also poor, so that needs addressing.

There's also a fear that half the trucks in the world will be made in Asia. They're becoming more and more sophisticated, and some Asian suppliers will become quite a threat to established players in the US and Europe.

What is the benefit of using natural gas in the CV sector?

Cost. It also has inherently cleaner emissions, so you can reduce equipment on the vehicle.

...and the negatives?

As it's an infrastructural challenge, the vehicle range can become limited and there are some new maintenance and safety issues. But the general availability of the fuel and the fact that it burns more cleanly are very persuasive.

Could you explain your vision for an air/gas hybrid CV?

In general, the use of liquefying air as a method of storage is becoming accepted. There are conditions that make it economically viable, but if those conditions are right, it's an effective alternative to hydroelectric, batteries or other powertrains.

The next step could see an air/gas combination engine become an ideal, and thermally neutral, power source on a vehicle. While there are a few hurdles to overcome, Ricardo has confirmed the science works, and it has some extraordinary advantages.

In my job, I probably have some hare-brained idea for a new type of engine presented to me every year, and nine out of ten of them are rubbish. This is the first one in a decade which has actually stood up. The only killer I can see is whether the liquid nitrogen or liquid air infrastructure would remain economically available. However, assuming we do want to continue to liquefy air in the future, then there's no reason why the science wouldn't work.

Have you put a timeframe on that?

A seven year horizon has been set, and it probably will take that long for the industry to move and develop.

What do you think the CV industry will look like in 2020?

More gas, heat recovery, bigger trucks, and integrated systems on the vehicle. We'll see the engine, emissions and heat recovery equipment becoming much more deeply integrated. We'll see the chassis, tyres, gearbox, and engine being matched real time. We'll see telemetry systems in the vehicle connected to the powertrain, competition from Asia, and further hybridisation in cities.

I don't think we'll see much further activity in basic soot and NOX reduction, and I don't think we'll see significant changes in the basic configuration of diesel use. There will be a general migration towards automated and semi-automated transmissions, and we'll see more rolling resistance and air resistance technologies, aerodynamics and smart tyres.

Interview:

Dr John Warner, Director of Sales and Marketing, Magna Steyr Battery Systems

Despite the excitement that surrounded the first wave of battery electric vehicles (BEVs), sales have fallen short of expectations. A new round of product launches, led by the BMW i3, Volkswagen Golf EV and Ford Focus EV, looks set to bring this alternative powertrain car back into buyers' considerations - but the industry has still been left to wonder why BEVs have so far been less than stellar.

Dr John Warner, Director of Sales and Marketing at Magna Steyr Battery Systems, attributes BEV performance to "early excitement" that failed to translate into realistic timing. Much of that enthusiasm came from outside the automotive industry: "Those of us who have been in the automotive market know that new vehicle development is a four to five year programme. Even modifying an existing vehicle can be a two to three year programme. To take something and say you're going to fully electrify it in two years is a major task."

The Battery Systems group is the most recent addition to the portfolio of Magna Steyr, the wholly-owned subsidiary of Magna International. Alongside Battery Systems, the company operates engineering services, vehicle contract manufacturing, fuel systems and roof systems.

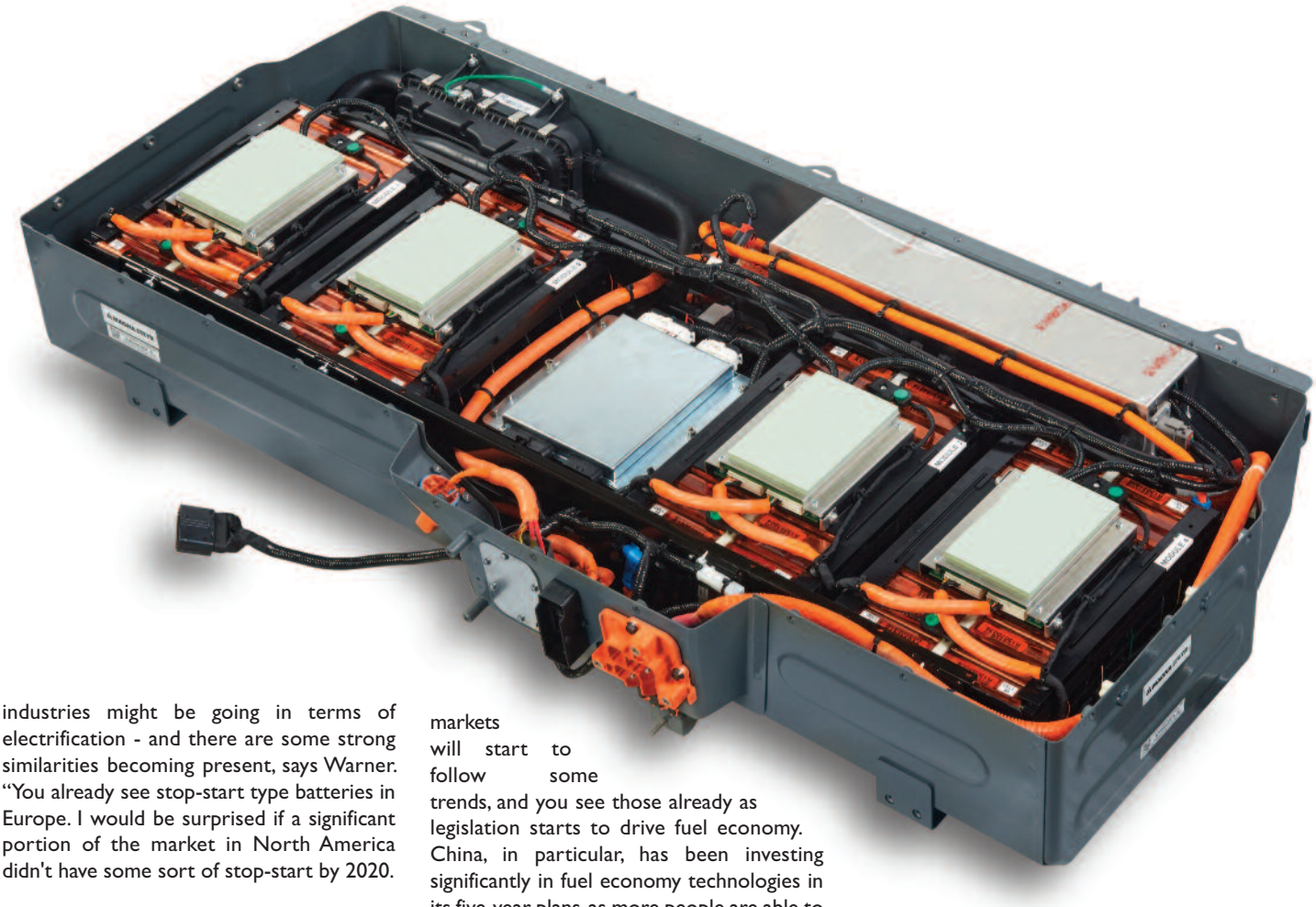
"Most of the architectures were really vehicle architectures that were designed for internal combustion engines," explains Warner. "For everything else, vehicle manufacturers were trying to fit a battery into something that was not designed for that. One future trend I see is vehicle architectures designed for batteries."

This raises the question of whether OEMs should design BEVs from scratch, or if vehicles should be developed to take numerous powertrains. Warner provides the view of a battery supplier: "The optimum solution would be to build a ground-up solution, but costs mean that's not always feasible. As the architectures evolve and OEMs realise they need to put in batteries, they will start redesigning to optimise where to put the battery."

Battery Systems is not a battery manufacturer. Instead, it works as a system integrator with cell manufacturers like Hitachi, Samsung and Toshiba to build, design, engineer and test a range of batteries, including 12-48 volt lithium-ion stop-start batteries, hybrid, plug-in hybrid and full EV batteries.

Working with both US and European OEMs on contract engineering and production programmes puts the Battery Systems group in a very knowledgeable position when it comes to understanding where the regional

Words: Martin Kahl



industries might be going in terms of electrification - and there are some strong similarities becoming present, says Warner. "You already see stop-start type batteries in Europe. I would be surprised if a significant portion of the market in North America didn't have some sort of stop-start by 2020.

"48 volt in the near term and 12 volts are going to be significant drivers in Europe and North America, because of CO2 and US fuel economy requirements. In many cases, it's the lowest cost solution to meet those targets."

Over 50% of the European market currently uses lead-acid stop-start systems, says Warner, who believes that the transition to lithium-ion based systems will soon begin. Li-ion systems offer not only weight savings but also the possibility of building in regenerative or recuperative braking.

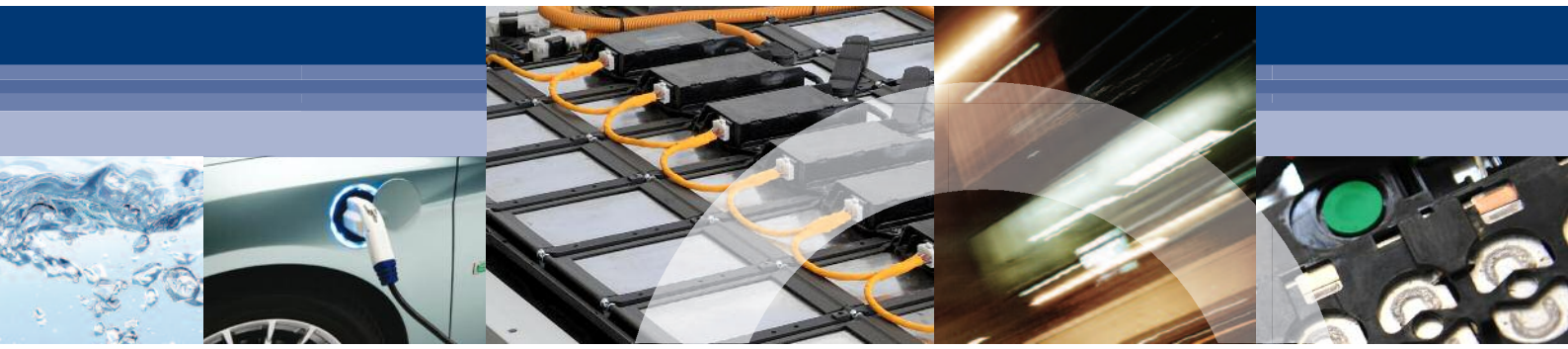
A rise in the use of batteries in vehicles is on the horizon, not only to store energy for driving, but also to support increased electrification of vehicle components, such as electric power steering, fuel pumps and HVAC systems. "As more of the ancillary systems become electrified, it's going to draw more and more demand on the engines," Warner explains, "so the best way to manage it is to put in a small battery. This in turn takes loads off the engine, allowing it to operate at its most efficient level; you can downsize engines and optimise them - that saves fuel. If you start taking all those ancillary loads off the engine, it's going to drive better fuel economy and CO2 emissions."

Outside Europe and North America, Magna Steyr Battery Systems is exploring expansion into Asia - particularly China. "The Asian markets will start to follow some trends, and you see those already as legislation starts to drive fuel economy. China, in particular, has been investing significantly in fuel economy technologies in its five-year plans, as more people are able to afford cars. Now it is trying to figure out how to manage the pollution issues that it has struggled with. Electrification is a great way to do that."

When it comes to trends driving the industry, Warner believes the combination of CO2 reduction and fuel economy is the biggest one to watch. "That's driving most of our customer requests," he explains. "On top of that is the electrification of the vehicle's ancillary systems. The best way to improve CO2 is to make the engine more efficient, and the best way to do that is to remove unnecessary loads. And electrifying the system enables the vehicle to become a communication portal. As you increase electrification, the needs for battery power increase."

Longer term, autonomous cars will drive full electrification. In the near and mid-term, however, Warner sees the greatest potential in plug-in hybrid technology. "Pure BEVs are still a viable solution, but they're a viable solution for a very small percentage of the market. Plug-ins are going to be the unsung heroes of probably the next ten years."

MAGNA STEYR



Over 100 years of experience in vehicle production and a broad range of services make **MAGNA STEYR** *the worldwide leading brand-independent engineering and manufacturing partner* for OEMs.

Our extensive range of services covers five product groups:

- **Engineering Services: From systems and modules to complete vehicle engineering**
- **Vehicle Contract Manufacturing: Flexible solutions from niche to volume production**
- **Fuel Systems: Innovative fuel systems**
- **Battery Systems: Li-Ion battery systems for vehicle applications**
- **Roof Systems: Entire range of roof systems**

The product group Battery Systems develops and produces high- and low-voltage battery systems for hybrid and electric vehicles, as well as 12 V batteries for starting applications and on board power support. In this field we focus on passenger cars and heavy duty vehicles. This Magna Steyr product group is represented globally with locations in Austria and the USA.

www.magnasteyr.com

Motorsport: a changing philosophy

Darren Cox, Nissan's Global Motorsport Director, talks motorsport and the mass market with ***Megan Lampinen***

Motorsport developments are increasingly grabbing headlines at mainstream OEMs, emphasising the changes taking place in the industry as a whole. A range of technology, covering not only powertrain developments but also electronics and lightweighting, has steadily migrated from racetrack to road car, following a trend that looks set to continue.

"The philosophy in motorsport has changed over the past five years," Darren Cox, Global Motorsport Director at Nissan, explains.

"The business mantra is 'We don't do motorsport for motorsport's sake'. In the past, car brands have competed in championships to win them and prove they have better technology...Our view is that the world has changed and we need to be doing things differently everywhere."

The changes in the racing scene have so far centered on a shift of impetus away from pure technological development to include, and in some cases even focus on, other opportunities: "Motorsport isn't engineering led; motorsport is actually marketing and brand-led. It's all about telling stories in a high-profile environment about the way the Nissan brand is changing, and trying to get that message across to consumers."

"Many of our new motorsport activities are aimed squarely at informing the general public that new technologies are coming, and doing what the motor industry used to do - proving out technologies in motorsport and transferring them to road cars. That link has been lost over the past 10-15 years when a lot of manufacturers went racing for racing's sake."

Side mirrors, or the lack of, is a prime example: Nissan's ZEOD RC has been developed without side mirrors. Its launch will mark the first race car since before WWII to run without them. "Get rid of wing mirrors and you reduce drag on the car, reduce CO2 emission, increase efficiency," Cox sums up. As a replacement for the external hardware, Nissan is looking to boost software inside the vehicle, notably using its Safety Shield system, which consists of cameras, screens and radar to provide the same information about the immediate environment as wing mirrors. The move to dropping wing mirrors in favour of Safety Shield is just one of several design changes "that could potentially come into road cars," Cox adds.

ZEOD RC

The Zero Emission On Demand Racecar (ZEOD RC) is a clear herald of what awaits the EV passenger car segment, described by Cox as "a ground-up design of a car that will prove electric technology". Claimed to be the fastest electric racing car, with speeds topping 300km/h, the model was the basis for

the road-going BladeGlider EV concept shown at the Tokyo Motor Show.

The ZEOD RC will get its first taste of the racetrack at Le Mans this year, taking on some more traditionally powered rivals. Every hour, the ZEOD RC will perform a single lap, operating exclusively on electric power. As Cox points out, Le Mans is a long circuit at 8.5 miles, and the ZEOD RC will be running at speeds in excess of 180mph during that lap. Nissan's lap-time prediction data says that the car should be faster than a Ferrari.

"That's an example of us showing the general public and industry that EVs can be sexy, cool. This links directly into our road car push, but also of course in the traditional way that motorsport used to - it helps our engineers understand electric power and the challenges that happen a lot quicker than when we're looking at road cars. The challenge [for motorsport] is immense. We're going to be purely electric for four minutes."

Notably, the ZEOD RC is not destined for Formula E, the upcoming championship involving only electric powered vehicles. Instead, the Le Mans race will it taking on diesel, hybrid and gasoline-powered vehicles/

Cox sees Formula E as "a very interesting championship", however, and one that will pose significant challenges for EVs.

"Formula E could go one of two ways," Cox says. It could either be an absolutely massive success, thanks to its location, staged in the middle of towns as opposed to an isolated race track. However, the cost of putting on such an event is daunting. "The reason it might not succeed is the cost .If they can get that working they will be a massive success."

Looking ahead to further developments in motorsport, Cox sees an increasing divergence between entertainment and technology. "Despite its claims, F1 is in the entertainment business and the relevance to road cars is almost zero. Whereas, if you take the new rules at Le Mans, these are very relevant to road cars. That's a very different model, that's manufacture-based. I see an even further split between entertainment and innovation, and technologies between different championships," he states.

From virtual to reality

Nissan is also focusing its efforts on addressing its motorsport audience, primarily the loss of younger followers. "A worrying trend is the lack of engagement of current motorsport with the younger generation," says Cox. This is a significant matter which has been in echoed in the passenger car industry, where a lack of interest in driving and car ownership by millennial buyers has been seen, as improved mobility alternatives vie for their attention.

"For motorsport the challenge is getting young people engaged as spectators, administrators, volunteers, engineers," Cox adds. To address this, Nissan has been linking gaming to motorsport through the GT Academy. This "takes players from the PlayStation game *Gran Turismo*, and we see if we can turn them into race car drivers," explains Cox. "The main push is this idea of virtual to reality...about democratising performance in motorsport."

The academy takes individuals who excel at racing video games, and trains them to become professional racing drivers. The first GT Academy was held in 2008. The success of the programme has been considerable, and many participants have gone on to racing victory. "The people who win this competition quit their jobs, quit school, move

away, and become professional race car drivers," the GT Academy website boasts.

Cox is similarly enthusiastic about the success of the programme: "We've proved that it works. We're in our sixth year and our first winner has been on the podium on Le Mans twice. Last year we had across the globe 41 podiums from guys that have come through this programme."

Success on the racetrack breeds enthusiasm, and that is exactly what Nissan is after. "This really fires a new generation of engineers, drivers and fans, because we're doing it in the world that these guys are in. At our GT Academy we have had four million people enter the competition so far, over five years. That's a huge number of people trying to be a racing driver. Where today, for most racing drivers you have to be the son of an oligarch or [associated with] a big conglomerate."

Looking ahead, Cox believes a major focus for motorsport, and Nissan in particular, will be entry into new markets. "People have been talking about getting motorsport into new markets for many years. There have been a number of attempts to establish in China, India, re-establish in some South American countries, the Middle East. That will continue to be a trend," he states.

Again, this is where the likes of GT Academy come in, and Nissan intends to use it to establish a culture of motorsport where there has not been one before. "It's very difficult if you are a lower-middle class Indian or in the UAE to go go-carting. This is where everyone in the UK or Western Europe starts racing. However, they do have PlayStations. Why not start their racing career on PlayStations? We've proved it has worked. We're looking at expanding globally. The Academy is currently is in Europe, Russia, the US, Middle East and South Africa, and will soon expand into some new markets that haven't got a culture of motorsport. We hope to build that culture online rather than physically first."

The automotive economy

***Constantine Biller** explains the role of the automotive industry in bringing growth back to the global economy in 2014 and beyond*

The recent announcement from Volkswagen, outlining its plans to invest US$7bn in the North American car industry over the next five years, epitomises the strength of the global automotive market. Despite economic uncertainty during the last few years, the industry has continued to expand.

With a number of car manufacturers reporting record sales, the automotive industry is among the best performing sectors worldwide and, with further investment, can play an integral part in bringing growth back to the world's economy.

On present estimates, the global automotive industry is worth US$800bn a year. Analysts forecast that the world market for cars and other light vehicles will expand from the current rate of 80 million units a year to well over 100 million by 2020, reflecting the enormous growth potential of emerging economies; according to the World Bank, just 18 people in every 1,000 own a car in India, in China the figure is 58. Yet in Europe that figure is more than 500.

Against this backdrop, it is little wonder that automotive companies, particularly OEMs, continue to pour investment into these newer markets. Volkswagen's North American investment comes after plans to double its existing car production in China, pledging a further €10bn (US$1.37bn) investment in Chinese plants. Though the German company failed in its aim to overtake Toyota as the biggest car manufacturer by volume last year, expanding into these markets is critical. Whether it is the Far East, sub-Saharan Africa, the Middle East or South America, OEMs are engaged in a frantic scramble to capitalise on the growth of emerging economies.

In contrast, the more established markets have struggled, with Europe showing particularly poor growth levels. Annual car sales in Western Europe have fallen by almost a quarter since 2007, and are expected to continue to fall until 2019. The worst affected market was Spain, where the number of new cars sold last year was a meager 700,000 - the lowest level for almost 25 years.

These figures continue to dampen global automotive market statistics, with projected growth varying between 2-4% from now until 2018.

Potential in the east

The growth of the Chinese market represents a once in a lifetime opportunity: customers in China today buy more than 20 million new vehicles a year, making it the world's largest automotive market. Over the next six years, a

market the size of Europe will be formed in inland China, with consumption forecast to top 30 million vehicles before 2018.

The latest figures from the China Association of Automobile Manufacturers (CAAM) show that the delivery of cars, multi-purpose vehicles and SUVs was 16% higher in Q1 2013 compared to the same period in 2012. Total vehicle sales, including trucks and buses, rose 13% to 7.3 million units.

The affordability and practicality of saloon cars have made them the overwhelming favourite when it comes to global car sales. However, what is most striking is that Chinese consumers are not merely buying ordinary saloon cars. Recent statistics rate China as the world's second largest market for premium cars, with many believing it could surpass the US by 2016. This is aided by the expectation that, by 2020, China will have 23 million affluent households with a disposable income of at least Yuan 450,000 (US$72,000) a year.

With projections suggesting that the Chinese market will grow to 29 million in 2018, and account for almost 50% of total industry growth globally, there is little wonder that investors are flocking to the far east.

Island boom

The gloom experienced across the European car market has not been replicated in Great Britain - in fact, British sales and production are now the highest they have been for six years, and the industry is continuing to register strong month-on-month growth.

Though high profile success stories like Jaguar Land Rover - which saw a 19% rise in sales, to 425,000 units - stole the headlines in 2013, there has been a plethora of growing businesses operating in the UK market of late. Output has been boosted by £10bn (US$1.67bn) with planned investments from the likes of Toyota, Honda, Nissan, BMW and General Motors, whilst BMW has announced investment in jobs and growth in its British bases, with £750m (US$1.2bn) set aside for the next generation Mini.

UK automotive component manufacturers are becoming increasingly attractive acquisition targets for overseas buyers. Britain has always had a strong reputation for vehicle engineering, particularly in engine development and associated technologies. With the success of JLR indicating it is no longer a niche car manufacturer, UK suppliers to the company are now becoming even more interesting. The development of JLR's presence in China, India and South America means that its supply chain needs to follow in these countries, making the suppliers highly attractive acquisition targets for overseas investors aiming to build relationships with the OEM.

An estimated 80% of UK cars are being exported, and this clear global appeal of British vehicles is helping the industry overcome weak demand elsewhere in Europe. Cheap finance deals and strong competition are also boosting sales, while targeting the US and China has proven a winner. However, those two countries contribute to less than 20% of the UK's exports, leaving a substantial opportunity to tap into growing markets and optimise growth.

Boosted by a 22% increase in domestic sales of British-built cars, recent reports have suggested that the UK is currently on target to break the two million mark in car sales this year, representing a 3% increase from 2012. With UK car manufacturers thriving both at home and abroad, the market attracted over £2.5bn (US$4.16bn) of investment last year. Further success stories are expected as Britain continues to buck the European trend.

The world market

Despite global growth of the automotive industry - and high profile cases like Fiat's recently completed US$4.35bn acquisition of Chrysler - deal volumes have slumped in recent years, with 2012 yielding 33% fewer agreements than the previous year, putting them at a level lower than during the recession of 2008.

The cause of this is quite simple: the lingering economic situation in Europe, historically the most active region for mergers and acquisition activity, took its toll on the global automotive deals market. However, the recent improvement in the macroeconomic environment has seen a wave of pent-up demand, resulting in increased deal volume and value. Statistics for the first half of 2013 indicate a growth of 24% in deal value compared to the same period in 2012.

M&A activity in the automotive supply chain is set for further growth in 2014. This is in part due to pressure from OEMs that want their suppliers to build scale through acquisitions. As OEMs have assembly plants in different parts of the world, automotive component manufacturers will naturally want to develop relationships with them, especially as production and sale volumes increase in markets such as China and India, as well as the MINT countries of Mexico, Indonesia, Nigeria and Turkey.

With emerging markets holding enormous potential for future growth, a glut of deals are also expected in countries like Thailand, South Korea and Saudi Arabia over the coming years. The European market may have slowed, but it is by no means dead - and as the economy continues to recover, investment in the automotive industry should also be on the increase.

It is clear how the automotive industry can directly impact the economy as a whole. On a national level, the US is a prime example. Estimates suggest that up to a quarter of the 500,000 manufacturing jobs created in the US since 2010 are directly attributable to the recovery of the motor industry. Car sales are currently showing double-digit growth, which is helping drive the US economy out of recession.

This can also happen globally. The automotive industry is in an extremely positive position, with emerging economies offering a unique opportunity to investors, and traditional powerhouse markets like the UK and US recovering well from the recession. If investors take advantage of the growth potential of emerging markets, the American and European markets can and will return to past glories, and China may very well solidify its place at the top.

With greater investment, the automotive industry can help the global economy out of its recent hardship, and can reap the rewards when it recovers.

Constantine Biller is a Partner at Clearwater Corporate Finance.

The Detroit 3 versus Europe and Asia: the race for North America

Douglas R. Gilman *recaps the biggest trends of the 2014 Detroit Auto Show*

At this year's North American International Auto Show (NAIAS), guests were not disappointed with the multitude of announcements and vehicle reveals. The Detroit Three needed to defend their home turf with the growing presence of foreign OEMS - six of the top ten selling vehicles in the US are built by foreign OEMs - and defend it they did.

Welcome to the 'D'

While news was plentiful, it was Ford and Chrysler that stole the show, with potential segment changing vehicles. Ford kicked off the NAIAS with an all-new F-150: the United States' best-selling vehicle for over 30 years has had a 700lbs (314kg) reduction in overall vehicle weight. The OEM achieved this by implementing a military grade aluminum alloy body, partnered with an all-new high strength steel frame.

The Ford marketing team has used a trifold approach to the new F-150, calling it tougher, with its new frame; smarter; and more capable, with its incredible weight reduction. The 'smarter' description stems from 11 class-exclusive features; changes include new LED headlights, an all-new eight inch productivity screen, and new apps geared specifically to the F-150. The facelift, both interior and exterior, gives little doubt that the F-150 will continue its dominance in the North American light vehicle sales market. Ford has also included a 2.7 litre, 4 cylinder turbo engine in this vehicle - something consumers have never seen on a full-size truck before.

For Chrysler, the 2014 NAIAS had been a long time coming. But the show saw the debut of the all-new 2015 model of the Chrysler 200, a vehicle which has suffered with underperformance of late. The expected late spring release of the 200 will feature an optional 3.6-litre V6 Penastar, or the standard 2.4-litre I4 Tigershark engine. Chrysler fully expects the 2015 version of the 200 to regain lost market share in the competitive mid-size segment - whether or not that will happen, however, is another matter.

The power of German engineering

Mercedes-Benz made a splash with four new vehicles, the most of any new domestic OEM: the concept S-Coupe, the S600, the GLA45 AMG, and, most importantly, the new C-Class. Similar to its under US$30,000 cousin, the CLA, Mercedes-Benz anticipates the new C-Class to set the industry standard for mid-size luxury vehicles.

The ancillary vehicles Mercedes also debuted were more in the premium sector - even for the luxury segment. However, for driving enthusiasts the GLA45 AMG goes from 0-60 in 4.8 seconds. Furthermore, the S600 is powered by a 6.0-litre V12 engine, ensuring the S600 is no slouch for the performance driver.

Mercedes was not the only European OEM making headlines: Volkswagen continued with their goal of introducing the most fuel-efficient vehicles to their already mpg-saving lineup. Last year, Volkswagen unveiled the CrossBlue featuring a plug-in hybrid diesel powertrain and has now unveiled the BlueMotion Passat concept. The technology behind BlueMotion features cylinder deactivation, improving the car's fuel economy while avoiding hybridisation.

Alongside the Passat BlueMotion was the 2015 Golf R, a performance version of one of the world's bestselling vehicles, equipped

with a 2.0-litre turbocharged I4, paired with either a six-speed manual or Volkswagen's newer six-speed dual clutch gearbox, taking the driver from 0 to 60 in 4.9 seconds. The Golf's introduction into the North American market works to further Volkswagen's goal of being the number one OEM in the world.

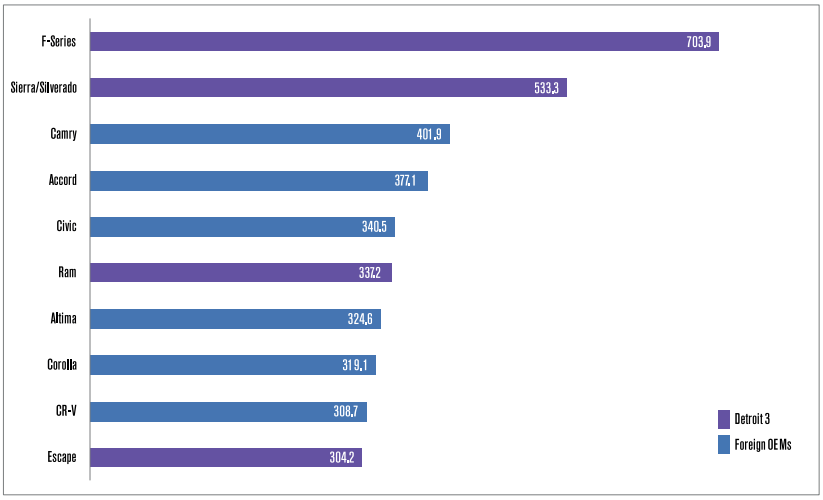
New market players

When comparing Asian companies Toyota, Nissan, Honda, Hyundai and Kia, and their respective luxury brands, it was the South Korean brands that turned most heads at the NAIAS. Hyundai, for example, unveiled their all-new 2015 Genesis. With the previous generation Genesis earning North American Car of the Year honours in 2009, the next-gen 2015 model has some big shoes to fill. The sleek redesign really emphasises Hyundai's push to make an impression on the luxury vehicle market, while maintaining their competitive price point: the starting Manufacturer's Suggested Retail Price (MSRP) of the 2015 Genesis will be less than US$40k.

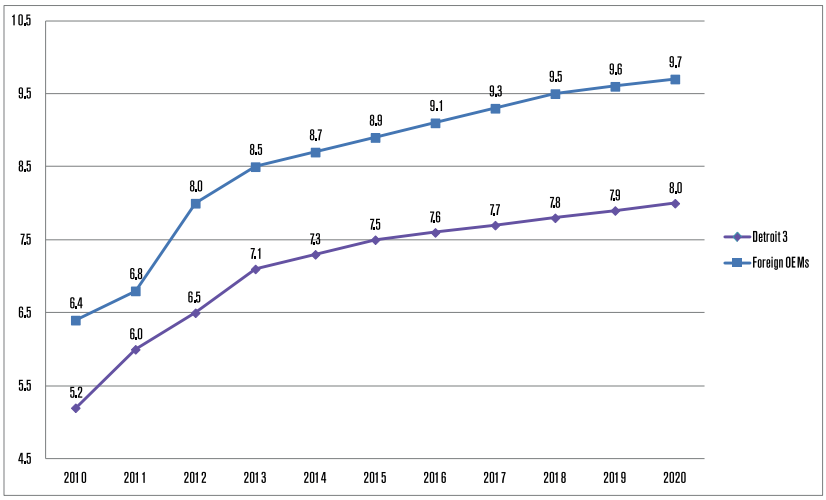
Honda, similar to its competitor Volkswagen, introduced a geared hatchback to the US, the 2015 Fit. The affordable and more spacious compact hatch has never fared well in the States, but Honda hopes to remedy that.

Both Kia and Nissan, meanwhile, brought slick sporty concepts and hinted at what's in store for the future at both manufacturers. Nissan's attractively-named Resonance may be a sneak peak of the next-gen Maxima. For Kia's GT4 Stinger, while production is not in the foreseeable future, the vehicle could be the company's first sports car and, with its

US: Top 10 Vehicles Sold
~2013 (thousands)



US Sales: Detroit 3 vs. Foreign OEMs
2010 - 2020 (millions)



sharp edges and futuristic grille, the Stinger would certainly garner a few looks.

The implications

For all other OEMs who geared up for one of the most important shows in the automotive calendar, their lack of mention does not mean that their announcements were inconsequential - quite the contrary.

Ford's new aluminum F-150 should do nothing but remain 'Built Ford Tough'. The Dearborn-based OEM has a stranglehold on the truck market. In addition, with the housing market on the rise, truck sales, as they have done historically, will follow. Ford have made all the right choices to cement their position as the country's leading pick-up manufacturer. Despite the other Detroit two doing everything they can to keep up - including GM recently unveiling their small pick-ups - the segment is trending negatively.

Chrysler's introduction of the all-new 200 could create a shake-up in the already competitive mid-size segment. While the new flagship sedan will not generate an earth shattering impact, the much improved 200 should steal some market share. Last year, the mid-size segment was a true battlefield. It's hard to deny the redesigned Fusion made the most progress, expecting to increase its sales by over 100,000 units from 2012 to 2014. The all-new 200 will not produce numbers quite that impressive, however, but the upgraded vehicle should see some marginal improvement in market share. Similar to Jeep's Cherokee, the new 200 will have a class leading ZF 9-speed transmission. Additionally, it features Chrysler's unique all-wheel drive disconnect system, keeping fuel economy up and skidding down. Looking at the big picture, it will be incredibly difficult to catch the Accord and Camry. In 2013, both vehicles were more than 50,000 units ahead of the next closest competitor. The brand loyalty seen in both Camry and Accord drivers will more than likely hold steady for the foreseeable future.

With sales in North America reaching new highs year after year, luxury manufacturers are trying to keep pace with the growing demand for premium vehicles. In 2012, the main luxury players - Acura, Audi, BMW, Cadillac, Infiniti, Lexus, Lincoln, and Mercedes - made up roughly 10% of total US sales. For German OEMs that figure is cut in half. While the market is small, it is the only market for some, thus making it incredibly important. Between the German luxury OEMs, Mercedes dominates the mid-size segment with its C-Class. Mercedes' new mid-size sedan will remain the best-selling vehicle in the segment and, truthfully, the only real competition will be the Lexus E-Series. While both the 2014 Car of the Year Cadillac CTS and the newly designed Lincoln MKS look great, neither are close to C-Class sales figures.

Volkswagen has always been an industry innovator when it comes to powertrain options: they truly are the standard for diesel offerings. Volkswagen claims to be the first OEM to introduce deactivation on a four cylinder engine, a feature which can be a double-edged sword. However, Volkswagen's continued success with powertrain options has propelled it to being the automotive leader it is today. New innovations like the cylinder deactivation or the dual-clutch gearbox will only keep Volkswagen among the fuel efficiency leaders.

With respect to Japanese OEMs, they may have attracted some press or revealed a slick new vehicle, but when it comes to meaningful releases the conversation was short. Production and sales at Toyota and Honda lead the way, followed closely by Nissan and Hyundai-Kia. And this pecking order will certainly not be affected by any announcements made at the motor show: Toyota will continue to remain the top Japanese OEM, and Honda will continue to try and overtake it, while implementing the overarching Asia-Pacific theme of building-selling, for example, by bringing Fit production to its Mexican plant.

However, this is a big risk, as hatchbacks have never been popular in the US, so one can only consider that exports of the Fit to South America, where it is already built, or keeping it local in Mexico is in Honda's ultimate plan. Volkswagen is taking that same risk with its globally successful Golf. The capacity constrained Hyundai-Kia, the steadfast Honda, the reinvented Nissan, and the leader Toyota will all continue to increase production in North America, expanding vehicle offerings and, in some cases, making North America their largest market, an unheard of claim ten years ago.

Douglas R. Gilman is Industry Analyst, Automotive & Transportation, at Frost & Sullivan.

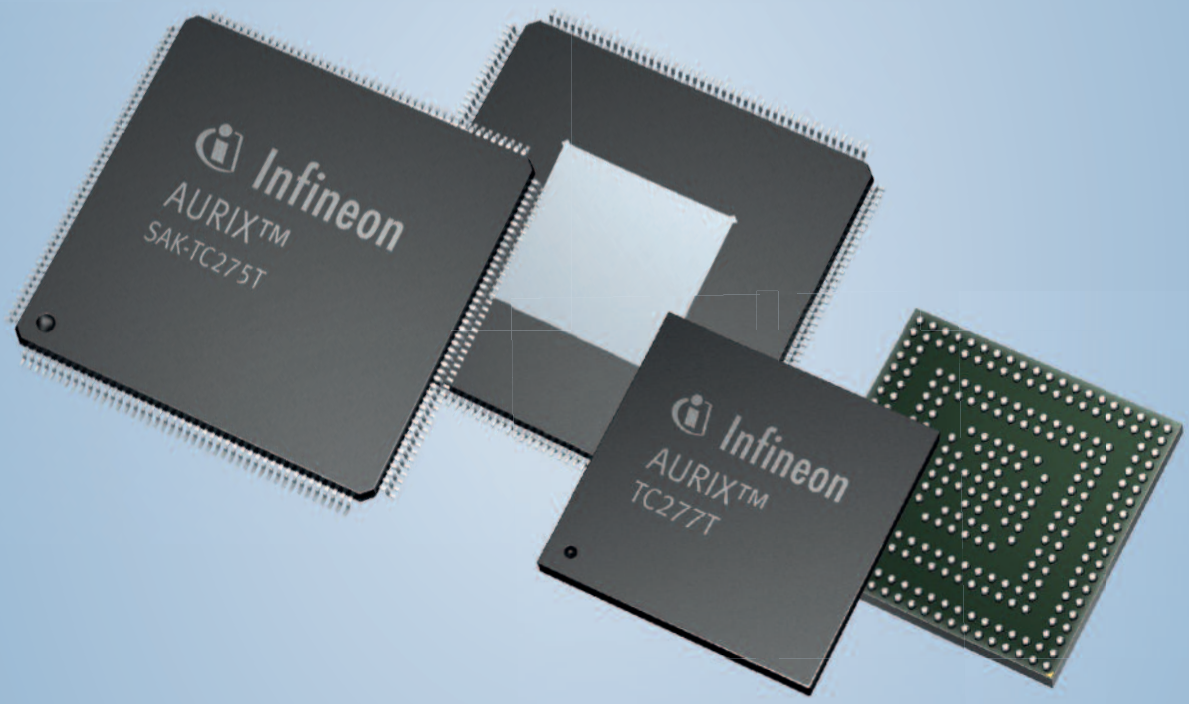
Top 10 NAIAS announcements by style, performance and impact

1. Ford F-150	6. Volkswagen BlueMotion Passat
2. Chrysler 200	7. Nissan Resonance
3. Mercedes-Benz C-Class	8. Volkswagen Golf R
4. Hyundai Genesis	9. Lexus RC F
5. Honda Fit	10. Kia GT4 Stinger

With electronics, we're going places you've never been.

Johnson Controls, a leading supplier of electronics, offers full in-vehicle infotainment, connectivity and driver information solutions. By bringing together adaptive cloud and vehicle-based information sources with highly intuitive user interaction, we're achieving new levels in driver satisfaction without sacrificing safety. To learn more about our electronics capabilities visit us at johnsoncontrols.com.

Johnson Controls



AURIX™ – Safety Joins Performance

Automotive Multicore 32-bit Microcontroller

Now you can get your automotive applications under control with just one microcontroller platform – using the AURIX™ 32-bit multicore microcontroller, you will be able to control powertrain and safety applications with one single platform.

Using AURIX™ will require less effort to achieve the ASIL-D standard than with a classical Lockstep architecture. Customers can now cut down their microcontroller safety development by 30%. On the same token, up to 100% performance surplus allows more functionality and sufficient resource buffer for future requirements, keeping the power consumption on single core microcontroller level. While protecting IP, theft and fraud AURIX™ provides an already built-in Hardware Security Module.

With its special feature set AURIX™ is the perfect match for powertrain applications (including hybrid and electrical vehicles) as well as safety applications (such as steering, braking, airbag and advanced driver assistant systems).

www.infineon.com/aurix

Safety first

*While driver distraction is still one of the biggest concerns, OEMs are now making corporate decisions on the safety of their vehicles and relying on brand power. But how can an industry accused of "basically cutting costs and maximising profits" continue to work this way? **Rachael Hogg** talks to Michiel van Ratingen, Secretary General of Euro NCAP about future safety, global standards and autonomous driving*

What does Euro NCAP have planned for 2014?

While the body is not proceeding to ESC [electronic stability control] performance tests, as this is now part of EU regulation, Euro NCAP plans to update its pedestrian bumper test, using a more humanlike test impactor, known as the Flexible Pedestrian Legform Impactor. Crash avoidance systems will be included in the star rating and autonomous emergency braking tests will begin. Vehicles will also get points for lane departure warning and lane keep assist; if an OEM brings suitable data for the tested model, they will be awarded one point.

Do you think OEMs are being flexible enough to meet market requirements?

Some OEMs look at market requirements and develop the minimal safety standard they can get away with. This often leads to a vehicle with the same name being sold in different regions, with significant differences in safety performance. If you look at Latin NCAP's list of cars tested recently and compare it with Euro NCAP, there are cars that are apparently the same. However, the results show significant score differences because the OEM has removed parts they don't need in, for example, Latin America to optimise profits.

Our viewpoint is that a manufacturer should develop a car, making it as safe as possible so it should do well in every NCAP in the world. But they don't and instead develop cars specifically for certain regions. This is a real problem for the NCAPs, because the results will be different even if the car is identical by name.

Are there any plans to establish harmonised rules between different NCAP markets?

Yes and no. One reason why the NCAPs are slightly different is because we all have ties with our regulations, and it's important we keep those. Particularly with crash avoidance, there is hardly any legislation that specifies advanced braking systems, so there are opportunities here for NCAPs to align in what they do.

NCAPs are structured differently. US NCAP changes, for example, have to go through a regulatory process where a cost-benefit analysis needs to be made in terms of economic and road safety benefits. This makes it quite inflexible for standardising procedures. We in Europe have a very loose tie with regulation and could harmonise on test parameters more easily, without having a regulatory consequence.

"Our viewpoint is that a manufacturer should develop a car, making it as safe as possible so it should do well in every NCAP in the world"

"Certainly for premium car manufacturers, brand power is still very important. But safety and brands are not mutually exclusive...[they] should go hand in hand"

Do you believe OEMs are taking more of a corporate route when it comes to safety decisions now than ever before?

That has always been the case. However, taking the i3, BMW is a famous OEM that has invested a lot in safety. It's an innovative car, and going for five stars was possibly a step too far. However, four stars is perfectly okay, especially if you look at how Euro NCAP has developed over the last couple of years.

More concerning is that an OEM achieving a four star rating can start to remove some equipment without consequence. BMW has done this, which is poor judgement. The last ten vehicles have seatbelt reminders in the rear, but in the i3, BMW removed them. It's basically cutting costs and maximising profits. I would say if you really believe in safety and safety technologies having a benefit in the real world, as an OEM you should not be doing that.

Which do you think is more important to consumers: a high Euro NCAP score or brand power?

Honestly, I think brand power is still the most important. We try to associate safety with a brand so they almost can't develop a vehicle less than four or five stars. What is really challenging is that new budget brands, like Dacia, really don't want to associate themselves with safety, then try to get away with lesser safety for a lower price. Renault, which makes the Dacia, have been giving us five stars since 1999, so it's our job to make sure consumers still want the safety they're used to.

Certainly for premium car manufacturers, brand power is still very important. But they're not mutually exclusive. For us, brand power and Euro NCAP rating should go hand in hand.

Do you expect more OEMs to include advanced safety systems into their vehicles in the immediate future?

We started this year with autonomous emergency braking and lane departure warning systems and we discussed the development of these tests with OEMs and suppliers. We have seen a huge uptake and suppliers have said it's been a revolution over the last two years with autonomous emergency braking, which is now on most vehicle development plans. It will at least be included as optional, which means OEMs have to design the car with the technology on board, almost for all segments of cars. I'm very positive we will see a lot of cars with a camera as standard, as it is nowadays in a mobile phone.

How important do you think these systems are?

We have made them a requirement for five stars, possibly for four stars in the future. For some advanced systems, we are still deciding what to think, but even for low speed city brake systems, we have very convincing evidence that the number of, let's say whiplash claims, is significantly reduced if your car is equipped. If you go to the higher speed systems, these help in situations where people are inattentive, using their phone or not paying attention, and run into an accident with serious consequences.

How far do you think eCall will go in improving safety?

For the more developed markets like the UK, Sweden, The Netherlands, Germany, I don't think eCall will add a lot. Our systems of emergency post crash support have already been well developed over the last 15 years. We have very quick response times.

eCall will be more beneficial in parts of Europe where there is no such system and certainly in rural areas, where drivers are by themselves at night and an accident happens.

Do you think more needs to be done to prevent accidents rather than managing them afterwards?

One of the reasons we don't include eCall in Euro NCAP is that we certainly believe avoidance is a much more cost-effective way of dealing with the continued attempt towards achieving zero fatalities and serious injuries. Avoidance technology is getting constantly better.

Politicians now speak about autonomous driving being the next thing. The driver assistance systems we're currently talking about will be key for the rollout of autonomous vehicles. Automated vehicles can only work if they are self monitoring, can look at the surroundings, communicate with other vehicles and sense the situation.

As vehicles become more hi-tech, will this be safer for drivers and pedestrians, or more distracting?

With the first phase, there is potential risk for distraction. It's already on the political agenda in Europe and the US that, if cars are designed with more and more features, and they are not developed with safety in mind, distraction will be an issue. However, as the car moves towards taking over driving tasks - which isn't far away - the risk of drivers being distracted won't matter as much. HMI will become increasingly important and Euro NCAP will work on that with the industry in the coming years.

Do you think brought in technology is the main cause of driver distraction?

There are many forms of driver distraction, but the most overwhelming case is texting in vehicles. Distraction is never good, but it's not as clear cut as texting cases. It's much harder to say how many crashes have been caused by looking at a navigation system.

What do you think will be the main focus for Euro NCAP in the next ten years?

The majority of attention will go into further development and promotion of advanced avoidance technologies. There will be a parallel path of moving towards semi-automated driving cars, and then to highly automated cars, before fully automated cars. That will need to be supported by robust driver assistance systems, and we feel Euro NCAP can do a lot. We need to sort out the technical performance, and ensure OEMs are promoting the technology and making it available to the lower, cheaper segments.

LET'S GO DRIVING IN THE CLOUD

CSC

TO CHOOSE THE RIGHT PATH TO THE FUTURE, YOU'VE GOT TO KNOW YOUR CUSTOMER — and know how to use technology to deepen that relationship. CSC helps the world's leading automotive firms rapidly analyze data and drive automotive sales, aftersales and services — in the cloud. Find out how you can engage customers and take your relationship to a higher level.

LEARN MORE AT:
csc.com/drivinginthecloud

VISIT OUR SESSION AT:
Automotive World Megatrends USA 2014
1:30 p.m., Stream 3 "*Capturing Wallet Share of Millennials — Knitting Together All the Devices*"
David Woodhead, CRM and Digital Transformation Practice Partner, CSC

The mobile office

Autonomous cars have long been a futuristic ideal, the subject of many a fantasy film set in a time when drivers can simply sit back, relax and travel the open road. But the last year has changed all that: self-driving vehicles are now set to hit the market by 2020, leaving the question open of just how driverless a driverless car can be.

*Here, **Rachel Boagey** investigates the impact of self-driving vehicles on everyday life, and asks whether automated vehicles could become the home of a new mobile office*

For years, the automotive industry has struggled to keep up with consumer demand for technologies that are readily available in smartphones and other handheld gadgets. But now, as connectivity becomes more accessible and business models change, it seems that the humble car is quickly becoming a must-have mobile office.

So, is the prospect of a car as a mobile workplace realistic - or even possible?

As automation develops and in-car systems take greater responsibility for the safe control of vehicles, there will inevitably be increasing opportunities for drivers to engage in other activities, such as using a tablet computer, making phone calls, and getting work done, rather than just sitting in traffic or concentrating on monotonous motorway driving.

Jen-Hsun Huang, President and Chief Executive Officer at chip-maker NVIDIA, thinks the car as an office away from the office is a perfectly viable option: "The car is the ultimate mobile computer. With onboard supercomputing chips, futuristic cars of our dreams will no longer be science fiction."

However, despite the leaps and bounds made in autonomous vehicle development of late, allowing systems to take greater responsibility for the control of vehicles will still initially require the driver to pay attention to the road, to monitor for situations where the automated systems may struggle to cope.

Bryan Porter, Editor of the *Handbook of Traffic Psychology,* and Professor and Ph.D. Programs Director of the Department of Psychology, Old Dominion University, Virginia, is in two minds about whether the car could soon become a mobile office: "We are absolutely going to see the attempted dissemination of autonomous vehicles throughout the US, Western Europe, and Australia at least, and such testing is already here. Counterbalancing this trend will be the challenge that must be overcome before we can call the car an office." Indeed, a fear echoed by many is that an autonomous car simply will not be able to compete with human skill.

Double workload

Human error is currently a contributory factor in more than 90% of collisions - a fact which could be remedied by an effective autonomous transport system. But before the car can perform autonomously, completely unaccompanied by a driver, many developments will need to take place. Indeed safety research will need to be ongoing: Dr. Nicholas Reed, Principal Human Factors Researcher at the Transport Research Laboratory (TRL), predicts that new dangers

will present themselves through the use of autonomous office systems.

"It creates potential risk in that drivers will have the opportunity to be distracted, and may seek stimulation, by other tasks when their attention is still required - with the danger that they fail to respond effectively when their input is required," said Reed.

TRL is an independent company which has long had an interest in the concept of autonomous vehicles, and is currently investigating and evaluating what is needed for the successful deployment of increasingly intelligent vehicles from various perspectives, including those of the driver and the road network operator.

The next level, according to Reed, is for the vehicle to take full responsibility in situations such as highway driving, where the human driver will be able to engage in other tasks, but regain control when needed. However, Reed continued, "It will be important to ensure that if the driver is required to resume control by reaching the end of the highway or because the vehicle encounters conditions for which it is not prepared, they can do so in a manner that is timely, and such that they have sufficient situation awareness of the current vehicle, traffic and environment conditions."

Mark Scerbo, Professor of Human Factors in the Psychology department of Old Dominion University, holds an opposing view, believing that a human driver regaining control of an automated car may not be possible in an emergency situation: "Researchers who study user or pilot interaction with automated systems have found that they can become overly complacent in operating the aircraft. This can lead to several serious problems. First, they tend to accept that the automation is working properly and spend less time monitoring it. Thus, if the technology should fail they are less likely to notice it and take corrective action in a timely manner."

Scerbo continued, "My own research and that of others shows that this problem becomes more severe with more reliable systems, and prolonged reliance on automated systems can result in skill degradation. That is, when the user needs to take back control it may require a period of skill readjustment. In emergency situations, that period of readjustment may be too long to avoid an adverse outcome."

So will we be able to rely on autonomous or semi-autonomous cars to keep us safe? Despite Scerbo's concerns, Reed thinks we can, "Predictions by a number of major players suggest that this timeframe is reasonable. However, although the technology is maturing rapidly, and I'm sure will lead to significant improvements in road safety, there is still a lot to learn about how human drivers will interact with such systems. It will be interesting to observe whether the introduction of automation leads to any unanticipated adverse behavioural consequences that result in safety risks previously not considered."

Overcoming obstacles

This gradual extension of situations where a driver is able to engage in other tasks when driving will require vehicle/system manufacturers and the insurance industry to figure out where the risk lies in automated driving situations, and who is responsible for paying for that risk. "We also need to develop a better understanding of how drivers will interact with automation systems and the extent to which their use requires additional driver training and/or leads to skill degradation of drivers, if drivers become habituated to the vehicle detecting hazards and applying a suitable response," said Reed.

Agreeing with Reed, Porter commented, "The need for operator's attention at some point will not go away. It's clear we have more to do in that arena and in other areas to support the expectation drivers can play an inactive role in an automated vehicle."

Senior Vice President Global Chevrolet Alan Batey (right) shares the stage with President and CEO of AT&T Mobility Ralph de la Vega and moderator Morgan Webb during the introduction of the new OnStar 4G LTE connection in Chevrolet vehicles, running on AT&T's network

Another obstacle which needs to be overcome, before the widespread use of cars as mobile offices can occur, is supporting infrastructure. Similar to electric vehicle charging points, road systems with the infrastructure to support a network of mobile offices has not yet been deployed. "Specifically, we are not close to having a system where drivers know with certainty that vehicles around them are automated or are communicating with their own vehicles. There is a lag in car deployment, and years that used cars remain on the market," Porter added.

Staying on

Growing hunger for connectivity means that drivers now expect to have a fast connection wherever they go - and it is set to be an integral part of any potential mobile office.

Staying connected to the Internet while driving has never been so important and will undoubtedly be key to remaining productive on the move. OEMs and suppliers are racing to keep up with the pace of change seen in the consumer electronics industry, and customer demand for in-car infotainment and connectivity is constantly rising.

A recent study by Deloitte supported this, showing that almost three quarters of Gen Y consumers (72%) want technology that recognises the presence of other vehicles on the road, while 63% want technology that lets them know when they have exceeded the speed limit.

From this comes a new breed of connected cars, inspiring ever more enduring relationships between driver and OEM. Now, from the click of a button through to touch and voice controls, drivers have access to a multitude of in-car devices that, with the introduction of open source development platforms, are rapidly expanding, helping to turn vehicles into connected - and ultimately intelligent - cars.

One supplier working towards staying connected while on the move is Harman, the global audio and infotainment group. Forming the core of the BMW ConnectedDrive experience, the Harman infotainment unit delivers a seamless experience into the vehicle, combining wireless connectivity, enhanced navigation and even productivity applications that transform the car into a mobile office safely and intuitively.

Road work

While the technology for the mobile office may be almost here, a full diffusion of it into our culture is not. Porter noted, "We are much more likely to discuss the interaction of automation and manual driving vehicles, and that interaction's effects on safety and risk, than on whether drivers can do office work or be able to give up all decision-making to automation."

Alongside automation, suppliers and OEMs alike are working on the necessary car connection to the Internet. Although many have established a connected experience for the driver, building this into a fully-autonomous in-car experience has not yet become a reality.

"Consumer technology reveals the art of the possible and the car is the latest mobile device for many consumers," said Philip Monks, Automotive Managing Director at Accenture UK & Ireland, but before this can happen, many challenges undoubtedly need to be overcome.

FEV

THINGS WE CAN HELP YOU FIND:

- [ ] A WAY TO LOSE 10 LBS
- [x] 54.5 MPG
- [ ] YOUR GYM MEMBERSHIP CARD
- [x] SUPERIOR NVH
- [x] FASTER DEVELOPMENT CYCLES
- [x] LOWER EMISSIONS
- [ ] DISCOUNTED GAS PRICES
- [x] INFOTAINMENT AND TELEMATICS SOLUTIONS
- [x] REDUCED VEHICLE WEIGHT
- [ ] A FREE LUNCH

FEV congratulates all of this year's Ward's Top Ten Engines winners. FEV helps its customers to make the impossible, possible. When you are faced with a challenge, FEV stands ready to provide solutions you can use, from a partner you can trust. We can take your ideas into Überdrive.

ÜBERDRIVE™

Engineering Innovation

FEV.com/**uberdrive**

248-373-6000 | **www.fev.com**

ENERGY STAR PARTNER

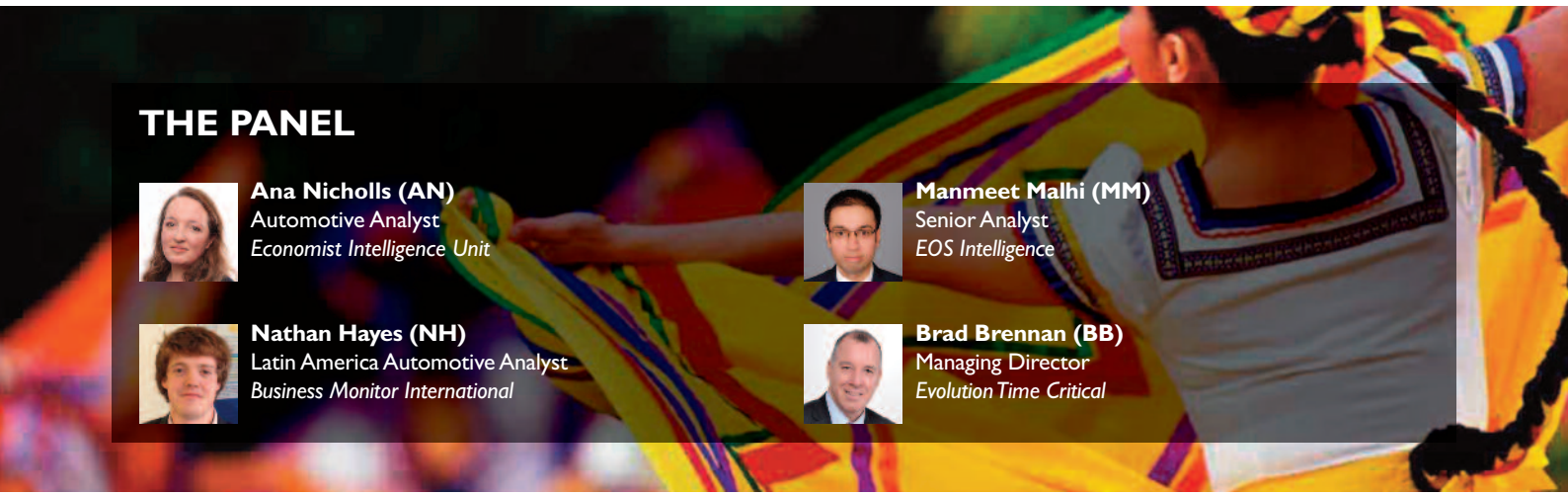
What can Mexico learn from its neighbours?

Ruth Dawson

Mexico, the world's eighth largest automotive producer, has hit new production and export levels for the fourth year running, and is even set to become the number one exporter of cars to the US in 2014, overtaking Japan.

However, many watchers say that the Mexican market still has a long way to go, claiming that it would be wise to learn from the experiences - both good and bad - of the automotive industry in neighbouring South American countries.

What exactly can the Mexican industry learn from other nearby countries going forward? Four market experts discuss the future of the automotive industry in Mexico.



THE PANEL

Ana Nicholls (AN)
Automotive Analyst
Economist Intelligence Unit

Manmeet Malhi (MM)
Senior Analyst
EOS Intelligence

Nathan Hayes (NH)
Latin America Automotive Analyst
Business Monitor International

Brad Brennan (BB)
Managing Director
Evolution Time Critical

What should Mexico take on board from the experiences of automotive industries in other South American countries?

AN: One major lesson is the need for a stable macro-economic situation. As several other countries in the region have demonstrated - particularly Venezuela but also Argentina - high inflation can have a major effect on local producers, and attempts to impose price or exchange rate controls only exacerbate the problems. Although sometimes the effect can be a short term boost in demand for cars, nothing scares off long-term investors faster than this kind of instability. Indeed, any short term market boost, whether it's cheaper loans or scrappage schemes, unusually has a long-term downside, so should be used with caution.

MM: In 2012, Brazil and Mexico accounted for about 85% of the total vehicle production in South America. So, with all due respect to other South American countries, there is only Brazil to learn any lessons from.

For instance, in October 2012, the Brazilian government approved a new programme to encourage vehicle technology innovation, to foster industry competitiveness by encouraging OEMs to produce more efficient, safer, and technology-advanced vehicles while investing in Brazil. The programme, Inovar-Auto, provides these incentives in two ways. It first increases a tax on industrialised products (IPI) by 30% for all light-duty vehicles and light commercial vehicles. Secondly, it imposes a series of requirements for manufacturers to qualify for up to 30% IPI discount. In other words, IPI taxes will remain unchanged for those OEMs that meet the requirements, thus incentivising investments in vehicle efficiency, national production, R&D, and automotive technology. Such an initiative by the Mexican government could propel production of more innovative vehicles in the country.

NH: Ensuring that labour remains competitive is important, both in terms of productivity and wages, relative to rival countries; labour costs in Brazil have risen from previous levels, hampering competiveness.

Developing a domestic supply chain is vital for the manufacturing sector to mature and attract new investment, while also reducing costs and overcoming currency effects. The supply chain in Argentina and Venezuela has really struggled in recent years, hampered by government interference in the industry, and problems with importing materials and components. Accordingly, the supply chain has received very little investment and has not matured to its potential.

BB: Mexico's neighbours have developed as manufacturing countries for far longer; the importance of a robust supply chain is understood at a greater, more involved and senior level now, just as the benefits of dependable supply are more visible and the consequences of failure well publicised.

Suppliers setting up in Mexico should also now be aware of the level of production agility required. Be it through fluctuating OEM demand, difference of trim or component supply, or the ability to handle alternative materials, they can factor this in during planning and set-up of facilities. Previously, plants could be set up more rigidly with a limited ability to react to diverse demands as the requirements of vehicle manufacturers were easier to predict.

Rather than working on international trade agreements, should Mexico build better relationships with Argentina and Brazil, both of which have capped Mexican imports at US$1.55bn for three years?

AN: Mexico clearly needs to diversify its export markets because, although US exports have been strong in the past year or so, the market is expected to slow. Many OEMs, including the Japanese, are keen to use Mexico as an export base for the wider Latin American region, so improving relations with Argentina and Brazil would make sense, but I wouldn't expect it to be easy. Both countries have a history of reverting to protectionism whenever their local auto industry feels threatened. In that context, I think Mexico is wise to join in global trade talks, particularly those over the Trans-Pacific Partnerships. Obviously, even if it is agreed, shipping costs are going to be a bigger factor in supplying Asian and other markets involved, but a multilateral trade agreement tends to be more stable long term than bilateral arrangements that can quickly turn sour.

MM: Brazil already produces more vehicles than Mexico and is fairly self-sufficient. So Brazil is unlikely to allow Mexico to build a strong export presence, especially with a focus on the Brazilian market. Moreover, Brazil is also an exporter to neighbouring South American countries and it will see Mexico as a competitor.

With regards to Argentina, as already proven by the limited sanctions, it's unlikely that Argentina would allow Mexico to increase its cars in the country - unless Mexico is able to offer a form of partnership that is mutually beneficial to both countries - such as offering indigenous Argentinean products incentives to sell in Mexico, as a trade-off to Mexican vehicle import into Argentina - we do not see much change in the capping of Mexican imports in the near future.

Beyond Brazil and Argentina however, the next five biggest markets in Latin America - Chile, Colombia, Ecuador, Peru and Venezuela - present a strong opportunity for the Mexican industry. 2012 saw these five countries recording combined sales of 1,000,000 units, indicating the underlying opportunity.

Mexico produced more than 3,000,000 units in 2012 and since the South American countries can only whet so much of the Mexican manufacturers' appetite, it's imperative that Mexico views trade agreements with South American neighbours as complementary to the trade agreements with rest of world.

NH: Total shipments to Latin America accounted for only 13% of Mexico's autos exports in 2013. Following the trade caps with Argentina and Brazil, shipments to the region declined 16% from 2012 levels. Autos sales in Argentina and Brazil will be fairly weak over the medium term. This, combined with the ongoing trade restrictions, will hamper growth in Mexican autos exports to the region. Therefore, building closer relationships in Latin America is unlikely to boost trade.

On the other hand, shipments to the US constituted some 68% of Mexico's auto exports, representing a 9.5% increase over 2012 levels. The rest of the world accounted for around 19% of Mexico's autos exports. We expect to see further gains in many key export markets over the medium term, including the US. This, combined with new FTAs under negotiation, should help drive export growth globally.

BB: It is crucial for Mexico's long-term establishment as a hub for manufacture that is strikes a balance between relationships with competing countries and the benefits of global trade agreements. A broadening base of strong links is able to provide contingency through a level of alternative business sources should they be required; the nimble production footprint of the automotive industry is unable to provide suppliers with long-term assurances over continued demand, so consideration of the worst-case scenario should be on the agenda for companies worldwide and not just Mexico.

Do you agree with the idea that Mexico has been the biggest 'winner' in the first 20 years of NAFTA?

AN: Mexico has clearly been the biggest winner from NAFTA in terms of auto production. The US and Canada now produce fewer vehicles than they did in 1993, whereas Mexico produces more than twice as many, overtaking Canada in the process. That has helped its economy more than double in size too. But Mexico has not been the *only* winner from NAFTA in economic terms: GDP per head in purchasing power parity has doubled in all three countries - Canada, USA and Mexico - over the past decade. The economic growth has had most impact on living standards in Mexico, because of its lower starting point, but actually Canada and the US have seen a bigger boost in value terms.

MM: The Mexican automotive industry has definitely gained immensely due to NAFTA over the past decade. Since the passage of NAFTA in 1994, the transformation of the automotive industry in Mexico has seen the biggest makeover of any industries in all three of the countries. In 1995, the automotive industry represented 2% of Mexico's GDP; it is now the main engine of growth of the Mexican economy, accounting for more than 17% of the GDP and 15% of jobs in the manufacturing sector.

Automotive manufacturing in Mexico has reached such a high level of maturity and competitiveness that it's one of the largest suppliers of vehicles to the USA and, in 2011, bilateral trade in the auto sector reached US$30bn.

American consumers have also benefitted significantly as the relatively low costs of production in Mexico has led to cheaper cars. OEMs have also gained as this has spurred vehicle sales in the USA, and Mexico has gained by emerging as a strong manufacturing hub.

NH: Certainly in terms of manufacturing, yes. A great deal of auto sector investment into Mexico is centered on exporting to the North American market. This has led to huge growth in manufacturing, technological innovation, and job creation for Mexico.

Indeed, there is evidence that OEMs have chosen to produce for the US in Mexico over certain parts of the States. According to a report from the Centre for Automotive Research, of US$43bn invested in North American by auto firms between 2010 and 2012, only 5% went to Canada; southern US states claimed US$4.9bn and Mexico US$7.8bn.

Do you think having so many Free Trade Agreements is a good idea for the domestic automotive industry in the long term?

AN: I do think that FTAs benefit the industry. The lesson from several countries is that it is impossible to sustain a strong automotive industry in the long term if it is not competitive internationally. Unlike some other products, the auto market really is a global one, and on the demand side that has proved to be a benefit over the past few years, with market growth in some emerging countries helping to stave off problems caused by market declines elsewhere.

Moreover, investment in the auto industry always has to be long term. Some forms of trade protection can undoubtedly be helpful in early stages of building up the industry: localisation quotas, for example, can help to build up a supply base, as long as they are not too high, while sometimes restrictions on second-hand imports are necessary both for environmental and economic reasons. But long term, trade barriers are not helpful.

MM: Vehicle penetration in the Mexican automotive market is already very high and it'll soon get fairly saturated. Once that happens, it won't remain attractive to import cars in the country due to lack of demand.

Moreover, Mexico doesn't really have domestic or home-grown automotive OEMs - so there is no one who will be a net loser really. For instance, the decision will be up to GM or Toyota or VW to decide whether they want to import a car to Mexico or whether they want to sell cars produced from their respective plants in Mexico itself.

NH: Mexico is a very competitive manufacturing location and most production is export-orientated, so opening up new markets through FTAs is advantageous to manufacturers. Low labour costs allow Mexico to produce more efficiently than its competitors. Furthermore, companies won't be too worried about cheap imports flooding the market - as the lion's share of Mexico's output is for export and therefore not in competition for domestic market share.

FTAs would facilitate more export-orientated manufacturing in Mexico, as companies seek to take advantage of the low cost production base. This would result in the sector maturing, with investment across the supply chain.

BB: Free trade agreements encourage the increasingly agile production footprints that were witnessed in 2013, which will undoubtedly intensify throughout 2014. What we do not want to see is a situation where agility is replaced by fickle fleet-footedness: however well prepared manufacturers, supply chain managers and suppliers are, a certain level of continuity is required before quality of product is jeopardised and dependability of supply is compromised.

What key issues does Mexico need to address as its automotive industry develops over the next ten years?

AN: The growing number of FTAs and the development of manufacturers in emerging markets, particularly China, are going to make the auto industry increasingly competitive on a global level. Moreover, the global industry has now seen four successive years of record sales, and even the setback in 2008-09 was only a blip. Despite the emergence of new fast-growing markets, particularly in Africa, there is going to come a time when global growth will slow or even go into reverse. When that happens, the overcapacity problems that are already affecting some markets will become global. Mexico needs to make sure that it gets the automotive investment to cope with that, and that as its economy and living standards grow further, it manages to stay competitive as a producer. The key to combining the two is obviously to focus on quality and skills, but that's a path that plenty of other countries are trying to go down too.

MM: Already boasting a high vehicle penetration rate of 275 vehicles per 1000 inhabitants, Mexico is no China or India or Brazil in terms of potential for domestic demand for vehicles; there is only so much domestic demand that production can cater to. Therefore, it does not come as a surprise that Mexico exported more than 80% of its total vehicle production in 2012, and is likely to continue serving the global automotive industry as a low-cost manufacturing hub.

Mexico is already the fifth largest exporter of automobiles in the world, however, what sets it apart from the top four is that it doesn't have any indigenous brands. Germany has VW, BMW and Daimler; Japan has Toyota and Honda,;the US has GM and Ford; and South Korea has Hyundai-Kia. These companies have expanded operations across the world and made critical contributions to respective countries' economies. But Mexico is unique and the emergence of its automotive industry is without precedent since it is not meant to serve the home population or driven by a particular homegrown company. The inherent risk in such a market characteristic is that the government has no real control over the presence of foreign OEMs. If in the future OEMs think it isn't a feasible base any more, they will move on. Of course it would hurt the OEMs as well since they have invested so much, but they would rather cut their losses and move on rather than keep bleeding.

The most important thing for the government is to have domestic automotive know-how, similar to what China has done by making it mandatory for OEMs to enter the market only through JVs with domestic companies.

NH: A big issue for Mexico will be remaining cost competitive - many countries have seen wages increase on the back of surging manufacturing, thereby reducing their competitive edge.

Ensuring that the country's supply chain develops is also key: companies are increasingly looking to localise the entire production process, so the presence of globally competitive supply manufacturers is paramount to facilitate investment.

Infrastructure investment will also be of paramount importance: road and rail links to ship parts and cars, and shipping ports and airports will greatly affect the competitiveness of the industry and could influence investment.

BB: It is crucial for Mexico to prepare for the agility required to support the constantly moving footprint of automotive production. Infrastructure needs to be in place, capable of supporting this dynamic industry, and investment in human resources with the requisite skillsets to manage world-class manufacturing. If the overall value of exports drops off, then alternative routes to sustained profitability need to be lined up to avoid, in the worst case scenario, a rapid decline in manufacturing and a sudden drop-off in the country's economy.

Is it up to OEMs to address the disparaging safety standards on the same car models between Europe and South America? Or should Mexican authorities enforce stricter standards?

AN: Manufacturers have an incentive to improve car safety because of customer demand, particularly if they can do so in a way that harmonises with other markets they may be involved in, thereby reducing production and development costs. But making cars safer does involve substantial investment on their part too, which they might be unwilling to make. It may also involve compromises on other desirable aspects of the vehicle, such as comfort or speed, and different OEMs are inevitably going to make different decisions about those compromises.

For those reasons, even if it involves voluntary agreements as well as legislation, safety has to be led by the government and other authorities, which can have a more single-minded focus. Also, given how desirable it is to make the legislation as compatible as possible with that of other countries, this really needs to be led at a national rather than company level.

NH: Governments must work with OEMs to overcome disparities. Legislation needs to develop alongside industrial growth - although this can be difficult in emerging markets as output is growing at a fast pace. Safety standards are increasingly becoming normalised globally, and will allow for greater export diversification. Safety legislation in Brazil, for example, has lagged far behind industrial development, and is now a major concern for OEMs, over exporting cars produced in the country.

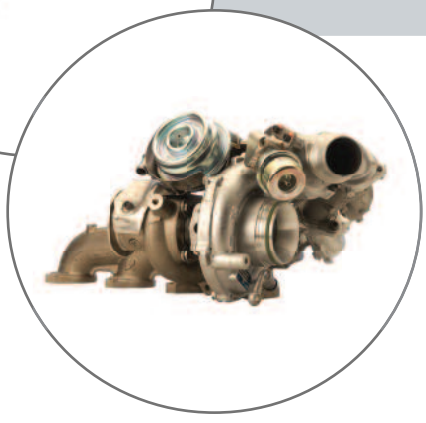
MM: In 2012, the Mexican government tried to introduce fuel efficiency rules, on the same lines as those that exist in the USA, but Toyota and a few other OEMs arm-twisted the government to back track, and the requirements were eased significantly.

When it comes to safety standards, it is the responsibility of OEMs to deliver vehicles to the Mexican consumers with the same features that are delivered from vehicles - Mexico to the US and Western Europe. However, if the Mexican government observes that OEMs aren't voluntarily passing on the safety features to its consumers, then it should introduce safety proposals to make it mandatory. Mexico hasn't introduced any safety proposals other than general safety belt requirements. This is in stark contrast to the US and Europe, where cars must meet stringent safety criteria .

To make the case worse for OEMs, the price of the vehicles fitted with elaborate safety features being exported to the US and Europe are almost the same or only marginally higher than vehicles being sold in Mexico. This clearly indicates that the OEMs are avoiding providing the safety features.

BB: Safety is a standard-bearer for modern vehicle manufacturers who strive for the most positive results in an increasingly competitive market. Investment in R&D is intensifying, and where authorities stipulate differing basic standard requirements for safety this will ensure OEMs strive to hit individual targets and drive up safety levels. Consumers' awareness of safety issues is heightening and driving a competitive environment for technology development - manufacturers will not simply make do with attaining bare-minimum safety requirements.

Go further on each tank. We know how.



Smaller engines use less fuel and emit lower emissions. But drivers want great performance. BorgWarner knows how to help compact, down-sized engines run more efficiently, reduce emissions and deliver the fun-to-drive experience drivers crave. As a leading automotive supplier of powertrain solutions, we support your engine and drivetrain designers to meet specific challenges and optimize systems. For powertrain innovations that deliver results, partner with BorgWarner.

BorgWarner

borgwarner.com

feel good about driving

"The future is not hybrid, but *pure electric*"

***Martin Kahl** catches the (electric) bus with the Managing Director of BYD Europe, Isbrand Ho*

Most of the press attention on electric vehicles focuses on the lack of growth in electric passenger car sales and the fickle nature of consumers' buying habits. However, much less has been devoted to an area where electric power seems destined to take off: city buses. These vehicles, which travel on fixed routes, hour after hour and day after day, using predictable duty cycles, present an ideal opportunity for electrification. A company which - uniquely - is a battery maker turned automotive giant is leading the charge: the Warren Buffet-invested Chinese corporation, BYD.

Here, Isbrand Ho, Managing Director of BYD Europe, discusses his views on why catching the ebus is soon going to become commonplace in the world's leading cities.

Where is BYD to date in the rollout of its electric bus programme?

The history of BYD's ebus programme can be traced back to BYD's entry into the vehicle making business in 2003. Since then, we have produced 2.5 million vehicles. BYD is the world's largest producer of rechargeable batteries. Very early on, our founder, Chuanfu Wang, wanted to use his expertise in battery making to bring about a revolution in the auto business.

He conceived BYD's 'green city solution', a programme which aims to transition public transportation from petrol and diesel-fuelled vehicles to fully electric powered ones. So BYD set out to design a vehicle for the private hire and taxi market, the BYD e6, which is now entering service in London and other major cities. We also developed the ebus, a family of fully electric buses, including a variety of lengths, a double decker and an articulated version.

BYD swiftly acquired a well experienced Chinese bus plant in Changsha and

converted it from making diesel buses to making 100% electric ones. We now have several hundred ebuses in service in China which have proven the strength of our concept - a fleet of 220 in the southern city of Shenzhen alone has covered more than 22 million kilometres.

The BYD e6 is entering service in Britain, but what is being done to bring the buses to the rest of Europe?

We have embarked on a major fleet evaluation programme which so far has reached over 25 major cities, including Paris, Bremen, Bonn, Madrid, Barcelona, Salzburg, Warsaw, Amsterdam, Brussels and Budapest. Our buses are now also in service in London, 35 have been ordered by Amsterdam Schiphol Airport, and further major fleet orders are in the pipeline.

How does the company recover the high cost of shipping buses from China to Europe?

It is costly, which is why we are examining the creation of bus assembly facilities closer to the markets we intend to serve. We have already opened a plant in California and are on record as saying we plan to open two in Europe, one of which we expect to be in the UK. The critical point will be when we secure orders for around 100 buses, and we are now virtually there.

Are you planning any further announcements, or adding any additional cities to your ebus testing?

We will certainly be announcing further orders very shortly, and it is our intention to continue our trials programme. This year we will be making available a large fleet of demonstration vehicles in Europe so that more potential customers can try our products and understand the many environmental and economic benefits which can accrue from using them.

In North America, an intensive trial programme in New York ended recently with the BYD being rated as 'performed excellent' by the Metropolitan Transit Authority and further fleets have been ordered in California. Trials have also taken place in South America and other parts of Asia beyond China.

Are you bidding against other companies in these countries and cities, or are you alone in offering ebuses?

No, of course not. We face some of the best engineering brains in the world from some of the world's most experienced bus makers, and all are squaring up to the challenges of reducing emissions in city public transport vehicles. But many have got themselves mired in complex and expensive hybrid technologies. I liken them to Kodak - a great

company which nevertheless found itself still making film cameras when the world had gone digital. We are wondering when some of these companies are going to have a 'Kodak moment' and realise that the future is not hybrid but pure electric.

A big problem with EVs is up-front cost: has it been a barrier to convincing municipalities to adopt ebuses?

Of course it's a significant consideration, but when you take account of the many governmental incentive programmes which are in place, and the total life cost of our low maintenance ebuses together with their dramatically reduced cost of operation - thanks to electricity being cheaper than diesel - then these can easily be overcome.

With that in mind, have your trials demonstrated running cost benefits to convince municipalities of the viability of ebuses?

Yes they have. In a recent analysis, a major fleet operator compared the purchase price, maintenance cost per kilometre and the cost difference between electric and diesel power including infrastructure costs. This analysis

showed that the life cycle cost of the BYD ebus was lower than the latest technology Euro VI diesel bus offered by a competitor. And this was despite the fact that in that city only 'green energy' is used, which typically costs three times more than electricity produced from other sources. That means that operators not using green electricity could enjoy even greater operational cost savings compared to diesel. I'm pleased to say that we have secured a sizeable fleet order from that operator which will be announced shortly.

Where are ebuses best suited, both in terms of applications and geography?

There are really no limits. In Europe, our trials programme so far has spanned Tel Aviv in summer and Copenhagen in winter. Obviously hilly environments can be challenging, but what goes up has to come down and our ebus recovers electrical energy during braking and decelerating. In fact, our next generation, heavy duty electric bus is designed for cities with extreme hilly environments.

Charging the vehicle presents obvious challenges. What is BYD's preferred method of recharging?

We have developed our own range of chargers, including - where electricity supply permits - fast chargers which can recharge the bus from fully exhausted to fully charged in only four or five hours. We think this is an optimal solution. In New York, a very tough operating environment, our ebus completed a 24 hour duty cycle without recharge, and in London, the two buses in service now charge overnight at off-peak electricity prices for only just over US$30 per bus.

We are aware of other charging methods, for instance so-called wireless or inductive charging. However, that is necessary on buses which have considerably less energy storage than provided by our BYD Fe lithium-ion iron-phosphate batteries, and which cannot complete a duty cycle on a single charge. Besides, we think that is technically complex and not without some potential issues concerning passenger safety, not to mention the additional infrastructure cost and weight increment to the bus.

Besides operating costs and emissions, perhaps the most important part of a bus business is the passenger. Have you had any feedback from passengers riding your ebuses?

Almost all of the comments we hear are positive and usually revolve around the quietness and the jerk-free ride, since our ebus does not have a conventional gearbox. Of course, the environmentally aware passengers are also full of praise for the reduced emissions in their city streets.

Just how eco-friendly can automotive production be?

***Manmeet Malhi** analyses the OEM initiatives making cars greener by the minute*

Over the last few years, the automotive industry as a whole has adopted several initiatives to reduce carbon, water and energy footprints. These schemes are separate, acting in parallel to innovations being undertaken to 'green' the vehicle itself - which have necessitated advancement in powertrain, and the use of lightweight composites to improve fuel economy.

Although in the past, OEMs have stayed stubbornly clear of similar proposals, a driver of this new change in mindset is that - contrary to popular belief - some of the technologies being employed actually help manufacturers reduce operating costs. Consequently, both OEMs and automotive suppliers have realised that being environmentally conscious makes financial sense and is not just merely in vogue, spurring a shift towards leaner operations and greener manufacturing. Advancements in renewable energy and other related clean technologies have meant that OEMs can choose to overhaul facilities, keep a lid on their costs by streamlining operations or, in some rare instances, even use green technologies as an incremental source of revenue.

General Motors

GM reuses and recycles more waste from its manufacturing facilities than any other OEM in the world. By challenging conventional manufacturing operations, creating efficiencies and cutting scrap, between 2000 and 2010, GM managed to reduce total waste from global operations by 43%, and shrink non-recycled waste by 73%. The company recycled 2.6 million tons of waste in 2012, and recycled or reused nearly 90% of its worldwide manufacturing waste.

The company currently has 105 landfill-free facilities across the globe and plans to make all its 125 facilities landfill-free by 2020. Such sites adhere to a zero waste mandate: all production waste generated at the site is reused, recycled or used to create energy.

The US-based OEM generated US$2.5bn in revenue between 2007 and 2010, through its various recycling initiatives. The company estimates that by-product recycling and reuse revenue now generates an annual revenue of US$1bn.

GM's eagle-eyed focus on waste reduction is having a tremendous impact on its carbon emissions too. In 2011, GM prevented more than ten million metric tons of CO2 equivalent emissions from entering the atmosphere, as a direct result of the company's reuse and recycling programs.

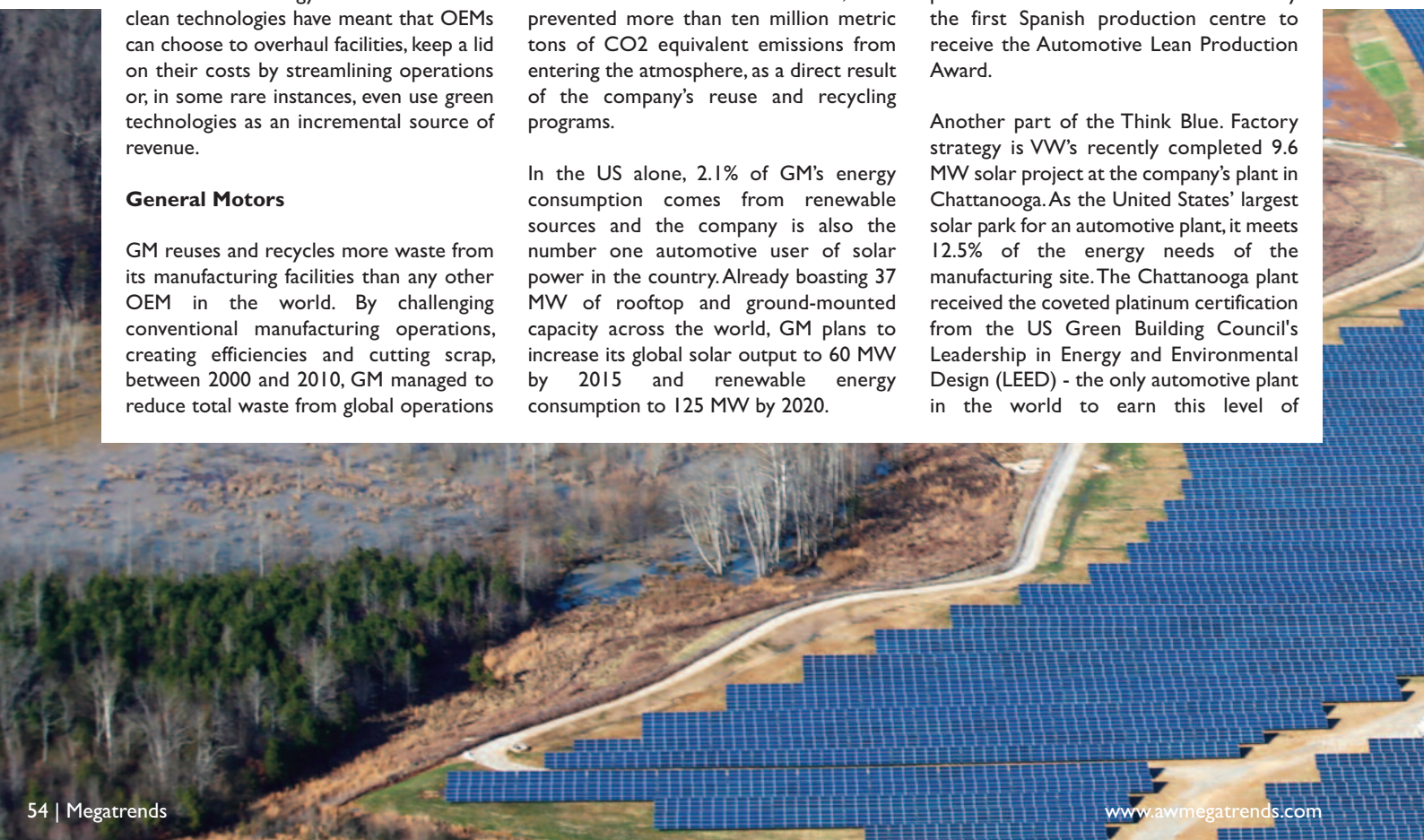
In the US alone, 2.1% of GM's energy consumption comes from renewable sources and the company is also the number one automotive user of solar power in the country. Already boasting 37 MW of rooftop and ground-mounted capacity across the world, GM plans to increase its global solar output to 60 MW by 2015 and renewable energy consumption to 125 MW by 2020.

Volkswagen

VW recently implemented the 'Think Blue. Factory' philosophy at manufacturing plants across the world, aiming to be more energy, material and water efficient, reducing waste and emissions. The German OEM is aiming for a 25% reduction in environmental impact from its production operations by 2018.

In November 2013, Seat inaugurated the automotive industry's largest solar plant, at the company's facilities in Martorell, Spain, intending to generate approximately 15 million kWh per year. The solar farm provides a quarter of the power required to produce the new SEAT Leon, and reduces carbon emissions at the plant by 7,000 tons a year - equivalent to eight and a half times the amount of CO2 absorbed by Central Park in New York City. The quality and efficiency applied in production processes has made the Martorell factory the first Spanish production centre to receive the Automotive Lean Production Award.

Another part of the Think Blue. Factory strategy is VW's recently completed 9.6 MW solar project at the company's plant in Chattanooga. As the United States' largest solar park for an automotive plant, it meets 12.5% of the energy needs of the manufacturing site. The Chattanooga plant received the coveted platinum certification from the US Green Building Council's Leadership in Energy and Environmental Design (LEED) - the only automotive plant in the world to earn this level of



recognition. The company achieved the certification by using energy efficient equipment and machinery, storm water collection and reuse, and renewable power generation.

Honda

By 2020, Honda is aiming to reduce CO2 emissions by 30% from its global products, compared to levels in 2000. To achieve this objective, the company has launched a number of initiatives to reduce emissions across all business activities, including production and supply chain.

While most automotive OEMs have focused their renewable energy efforts solely on solar power, Honda has also embraced wind energy. In January 2014, Honda Transmission Manufacturing of America finalised installation of two wind turbines at its plant in Russells Point, Ohio. The combined output from the two wind turbines is estimated at 10,000 MW hours per year, supplying approximately 10% of the plant's electricity. It is the first automotive plant in the USA to obtain such a substantial amount of electricity directly from wind power.

In 2013, Honda also became the first automotive company in Brazil to begin construction of a wind farm. The wind farm is expected to generate 95,000 MW hours per year, equivalent to the electricity needs of the company's plant in the country. By using wind energy, the company expects to reduce CO2 emissions by about 2,200 tons per year.

Honda has also launched renewable energy initiatives in the UK, Japan and Turkey. These plans use solar energy to meet the electricity needs of their respective facilities and are expected to reduce CO2 emissions by about 3,250 tons per year in total.

Renault

In 2012, Renault completed the installation of solar farms that provide a total power output of 59 MW, at six production facilities in France. The photovoltaic solar panels cover approximately 4.7 million square feet of parking lot shelters, and the annual electricity production is said to be sufficient to meet the power needs of a city of 14,000 inhabitants.

In June 2013, the French OEM, through its Korean subsidiary Renault Samsung Motors, launched a 20 MW solar power generating system in Busan, South Korea. The project cost US$50m and will provide 11% of its electric output to 7,500 local homes. The solar power will also offset 10,600 tons of CO2 emissions annually.

In addition, the company is also looking at its facilities in Slovenia, Morocco, Brazil, Colombia, Chile and Romania for further solar installation opportunities.

Benefit acknowledgement

The initiatives undertaken by GM, Volkswagen, Honda, Renault and other automotive OEMs around the world are tacit acknowledgement of the benefits accruing from the adoption of green and sustainable manufacturing methods and technologies. The positive impact of such initiatives and actions has far-reaching implications than simply attaining 'green' status. OEMs have now successfully identified several clean technologies and strategies that help them streamline their operations, minimise environmental impact and, in some cases, increase profitability.

The depth and variety of manufacturers' investments reflect the automotive industry's transition towards building the sustainability concept into manufacturing operations. However, this is only the tip of the solar iceberg and a tremendous amount of untapped potential - both in sustainable manufacturing and in the renewable energy domain - remains to be explored.

To realise this potential, OEMs need to take a holistic approach to manufacturing by updating and, where necessary, overhauling production facilities. They need to define detailed sustainable strategies that are scalable, replicable and financially viable. Simply 'green-washing' a facility is not enough. Automotive manufacturers need to consider the environmental impact of their decisions, as well as the operational and economic impact of investments in clean technologies and renewable energy.

If each of the top OEMs were able to generate US$1bn in revenue from recycling and reuse, and reduce carbon emission by several thousand tons, one can only imagine what significant positive change that would have on the overall automotive industry.

Manmeet Malhi is a Senior Analyst at EOS Intelligence.

Powering alternative powertrains

While consumers continue to lament the fact that modern electric vehicles cannot be green without a sustainable power source charging the onboard battery, industry players are making waves of change to attain a truly zero emission vehicle.

***Ruth Dawson** investigates the push for carbon footprint-free EVs*

"When solar was invented in the 1950s, it was about 3% efficient. Today, these panels are 21% efficient in terms of sun-powered production"

- Mike Tinskey, Ford's Global Director of Vehicle Electrification and Infrastructure

2015 may well be the year that the long-awaited fuel cell vehicle takes to the roads, but for the next twelve months at least, the battery electric vehicle (BEV) will continue to remain under the spotlight in the alternative powertrain market.

One question that has remained largely unanswered so far when it comes to BEVs, however, is whether they can be a truly clean, green mode of transport if the electricity used to power them comes from burning coal, gas or any other polluting source. Surely these vehicles should be powered by energy from renewable sources, such as tidal, wind or solar power, to have real eco-friendly credentials?

Solar-powered cars in themselves are nothing new, but until now they have been futuristic-looking concepts, following space age design cues with an aerodynamic pod shape and a roof made almost entirely of solar panels. They have been largely relegated to engineering projects run by specialist firms and dedicated enthusiasts - that is, until the International CES in January this year.

The Las Vegas event saw Ford unveiling the new C-MAX Solar Energi Concept, a hybrid car featuring a roof of solar panels, with the potential to replace the traditional plug-in charger.

"In recent years, we've seen advances in innovations and efficiency relative to solar," said Mike Tinskey, Ford's Global Director of Vehicle Electrification and Infrastructure. "When solar was invented in the 1950s, it was about 3% efficient. Today, these panels are 21% efficient in terms of sun-powered production. Each panel can do just over 100 watts, totalling 300 watts on top of the C-MAX. So, over the course of a day we can generate about one-eighth of the charge that a battery needs just through solar, unassisted."

Internal data at Ford has suggested that the sun could power up to 75% of all trips made by an average driver in a solar hybrid vehicle. Fully charged, the OEM estimates the car to have the same total range as a conventional C-MAX Energi: 620 miles (998km), with up to 21 solely electric miles.

"I think there will be two use cases," Tinskey said. "The first will be the workplace. You drive to work, park under a concentrator, go and do your job and when you come back you've topped up your car for free. The second use case is going to be in developing countries that don't have a reliable grid, maybe not such a clean or renewable grid."

The potential for heavily polluted countries trying to change their image - such as China - is huge. "Because so much coal is burned, an electrified car powered by the grid is worse than a gasoline powered car. So this completely takes it off the grid. Somebody can park it, recharge, and then still drive on electricity."

For now, the car will be subject to more testing at the Georgia Institute of Technology in Atlanta: "We've seen a great level of interest in it, but this is our development car, so we're going to do a couple of auto shows with it and then it's going right back into development," Tinskey explained.

Shining bright

While Ford's innovation may take some time to reach the market - if indeed it ever does - power providers around the world have been working to make energy supplies greener. According to *AFP* reports, US analysts are expecting "phenomenal growth" for renewable solar power in the next twenty years, thanks to 60% market gains in 2012, and a further 30% growth in 2013.

Globally, different views on the best power sources are continuing to develop: a preliminary report of Spanish electricity systems conducted by Red Eléctrica de España, for example, showed that wind power contributed the most to annual electricity coverage (21.1%) in 2013, reaching the same level as nuclear for the first time (21%). Hydroelectric power also saw its share double compared to 2012 levels, reaching 14.4%. Meanwhile power contributions from coal-fired and combined power stations fell by 14.6% and 9.6% respectively.

China too has embarked on "the greatest push for renewable energy that the world has ever seen". Furthermore, the *BBC* has reported, the country is now planning to achieve a capacity of 200GW in wind power alone by 2020.

However, despite the best attempts of OEMs, and energy providers leading the charge for green power, no one can completely control what electric is powering which vehicle. But that is not to say that automotive manufacturers cannot at least try to be as green as possible actually making the vehicle in the first place.

Take the BMW i3 for example: the carbon fibre reinforced plastic (CFRP) that makes up the frame of the car is the result of a highly sophisticated production chain which begins

Envision Solar's EV ARC is the first portable solar charging station for electric vehicles

in Moses Lake, Washington, moving on to Leipzig in Germany, via Wackersdorf and Landshut. The US plant is powered by 100% hydroelectric power, while the entire electricity requirement at Leipzig is fulfilled using self-generated wind power.

Combine a green-manufactured car such as the i3 with a renewable power charging connection and, so far as energy is concerned anyway, the industry is well on its way to the first wholly carbon emissions neutral vehicle.

"There's no question about that whatsoever," Dennis Hayter, Vice President of Business Development at Intelligent Energy said. "As we increasingly move towards the use of renewables - wind, solar and the like - and have a much better understanding of waste to energy options, then you will see an increasing proportion of transport being met by those options."

Regulating renewable

For government legislators and market regulators, particularly in Europe, reconciling alternative powertrain diversity with single market visions has already proved difficult.

In Norway, electric vehicles have a strong foothold in the market thanks to the country's hydroelectric infrastructure - a positive for green power. But other European markets are catering to different infrastructure and demand requirements: Germany, for example, is working to build up the number of hydrogen refuelling stations.

A market of carbon emission neutral vehicles would undoubtedly need some kind of government incentive or regulation to succeed, but for now attention is focused elsewhere, on the matter of actually creating the infrastructure that can support any power in the first place.

"Policy initiatives from the EU have so far often addressed the development of alternative fuels and/or alternatively fuelled vehicles and vessels, without considering the need for the build-up of an appropriate alternative fuel distribution infrastructure," Barbara Bonvissuto, Deputy Head of the Sustainable Mobility and Automotive Unit, DG Enterprise and Industry, at the European Commission explained. "The efforts of member states and the EU to incentivise the development of alternative fuel infrastructure have been uncoordinated and insufficient, and the development of infrastructure for alternative fuels is very uneven among the different member states."

So while governing bodies are still grappling with the old 'chicken and egg' problem of infrastructure and EV uptake, a new wave of green-keen companies are working on portable, renewable solutions.

Envision Solar International has developed the first fully mobile, autonomous and sustainable EV charging station. The EV ARC generates approximately 16kWh a day, which is stored in a battery internally, ready to charge an electric vehicle when needed.

"The EV ARC is ideal for any entity looking for rapid, hassle-free deployments of a charging infrastructure without all the challenges associated with conventional units," said Desmond Wheatley, President and Chief Executive of Envision Solar. "The fact that the energy is clean and renewable, unlike 75% of America's grid-supplied electricity, is important too. EV ARC makes EVs truly emissions free. It changes the deployment story and further advances us to a day when range anxiety is a thing of the past."

Likewise, Tesla plans to add solar panel canopies to select supercharger units in "sunny locales" to allow drivers to recharge their cars with renewable power on the go.

While the future may look bright so far as solar power is concerned, the disparate weather systems across the world will mean that solar power in itself can never be a global solution. Indeed, Tesla's restricted sunny locales attitude can be regarded as a wise move by the young OEM.

Although it may take some time for a fully green vehicle to reach the marketplace, any advancement in charging or manufacturing is certainly a step in the right direction.

INNOVATION IN THE AIR, NOW STANDARD ON THE GROUND.

Garmin, the global leader in satellite navigation, now extends our aviation and marine OEM engineering expertise to the automotive industry. From simple removable solutions to full vehicle infotainment systems and rear seat entertainment, Garmin can develop and manufacture a system that meets your specifications. Garmin software and hardware infotainment platforms not only provide best-in-class navigation but can also include audio and climate control functions, digital instrumentation and smartphone integration.

To learn more about Garmin solutions customized for your business, contact your Garmin Automotive OEM Sales Rep, visit Garmin.com/infotainment or email Mkt.Autooem@garmin.com

GARMIN®

here maps

Redesigning the urban landscape

Ivaylo Dimov *analyses how OEMs are driving the change towards sustainable mobility*

Forty years from now an additional two billion people are expected to live on this planet. New megacities will emerge, and capital cities will continue to expand and become even more densely populated. This rapid urbanisation will place more vehicles on the roads, which will not only deteriorate the efficiency and safety of our existing transportation systems but will also have severe implications on our changing climate and air quality. Such a gloomy picture of the future may soon become a startling reality if cross-industry measures are not taken to tackle these complex issues. Collaboration amongst regulators, cities and industries is therefore essential, with the world's major vehicle manufacturers leading the way to a solution that results in safe, reliable and low carbon movement of people and goods.

One of the biggest concerns over conventional combustion engine vehicles is GHG emissions: about 15% of manmade emissions contribute significantly to climate change and air pollution. In an attempt to tackle the issue, regulators in the EU and the USA have adopted more stringent requirements for tailpipe emissions. Driven largely by these new rules, manufacturers have now set ambitious targets to reduce emissions from vehicle use. However, over the years there has been only a slight improvement. In fact, most companies still do not show how they are considering the relationship between absolute emissions reduction and plans for business growth. The leaders of the future should be embedding low carbon solutions in their overall sales and growth strategy.

Why?

There are seven billion reasons why car manufacturers need to address company sustainability impact: every person has unique mobility needs, and with growing demand the automotive industry now faces the challenge of providing sustainable options to tackle the issues of road congestion and stay ahead of the evolving urban lifestyle.

As part of this year's Tomorrow's Value Rating (TVR), the largest car manufacturers were studied, to see how prepared they are for driving the change towards sustainable mobility. Findings revealed that the leaders in the sector have built partnerships and invested billions to bring about innovation in the field. The most promising technologies revolve around developing low carbon and alternative powertrains, advancing telematics and integrating vehicles into multi-modal commuting routines. Each of these areas of innovation represents a point of interaction and collaboration with other industries and governmental institutions.

The approach adopted by manufacturers is the development and introduction of alternative powertrains such as electric vehicles and plug-in hybrids . Although latest sales figures reveal that alternative powertrains have not yet passed the critical point of mass market adoption, there is already growing concern over potential disruption to the current electricity supply due to simultaneous charging of a large amount of EVs and PHVs. To address this, Toyota has taken advantage of smart grid technologies to pilot test the Smart Toyota City in partnership with the Japanese Ministry of Economy, Trade and Industry. In the period between 2010 and 2014 the Japanese OEM aims to understand the energy use dynamics at home, during transportation, and at destinations in a real city. Of course, the effects on global GHG emissions of electric powertrain technology also depends on decarbonisation of the power generation sector, which itself appears to be a long way off.

The second area of focus is the use of telematics such as wireless technologies, sensors and global positioning systems, with the aim of improving vehicle and road safety, increasing transportation system efficiency and enhancing connectivity. Daimler's @YourComand - a preview of future infotainment features, including superior voice control, and car-to-X communication technology, which aims to significantly expand the vehicle's range of vision and interaction is a great example of the level of current progress. Incredible prototypes and concepts

The Tomorrow's Value Rating

The sustainability agendas of large automotive companies are dominated by the need to manage complex dynamics along the supply chain, tackle their significant contribution to climate change and air quality, and meet the mobility needs of the rising world population.

Despite the challenging economic context, the 2013 Tomorrow's Value Rating (TVR) reveals that sustainability leaders in the automotive sector continue to invest in innovation, develop partnerships and enhance their risk management so that sustainability remains central to business performance. Out of the five industry sectors studied in the analysis, it is automotive that had the highest average score.

BMW, Ford and Fiat performed especially well and displayed many elements of sustainability leadership that will help them face and meet the challenges of tomorrow:

- The automotive sector demonstrated strong performance with an average TVR score of 70% - ahead of all the other sectors studied in the 2013 TVR;
- Unlike other sectors, there was a high score convergence: even the weakest performer scored 60%, with an average of 63% across all five sectors covered;
- BMW and Ford both scored 80% and retained their sustainability leadership position, while Fiat made a great debut in the TVR by ranking third;
- Leaders use stakeholder feedback to drive sustainable product innovation.

The report also identified several emerging sustainability issues which will play an important role in the future sustainability strategies of the automotive sector:

- Reporting on Scope 3 CO2 emissions;
- Sustainable materials in manufacturing;
- Low carbon vehicle affordability;
- End-of-life recycling and recovery;
- Building sustainable mobility infrastructure.

The full results of the 2013 Tomorrow's Value Rating can be viewed at twotomorrows.com/tomorrows-value-rating.

The 2013 Tomorrow's Value Rating examines the sustainability programmes of 50 companies eligible for the 2012 Dow Jones Sustainability Index (DJSI), providing in-depth analysis of sustainability practices and performance in each of five sectors: automotive, energy utilities, food and beverages, ICT and oil and gas.

have been developed by automotive leaders but they still seem to be far away from a launch date.

Combining several means of transport has become the daily routine of many mega city residents around the world. To enable such multi-modal commuting, each major car manufacturer has launched its own car-sharing programme: Volkswagen has Quicar, Daimler Car2go, BMW DriveNow, Peugeot Mu and Ford FORD2GO. BMW i Ventures has also invested in ParkAtMyHouse.com, an innovative solution for finding parking spots in the UK. This online marketplace is designed to link free spaces with drivers in search of parking. The service has more than 150,000 registered drivers, as well as parking spaces at over 20,000 locations in the UK. While making parking easier may encourage more regular driving, this solution improves the utilisation of parking space in the cities and thus reduces overall road congestion.

Co-pilots

However, pursuing innovation in isolation will not provide all the solutions. Companies need to strengthen their intra- and cross-sector collaboration, and search for solutions outside the boundaries of their business. For PSA Peugeot Citroën that is "a commitment to keeping the group one step ahead". The French OEM's Open Innovation programme includes partners from a variety of backgrounds, including universities, laboratories and other scientific organisations; technological institutes or agencies, such as Institut Français du Pétrole (IFP) and the French Alternative Energies and Atomic Energy Commission (CEA); technology companies in the automotive and other industries; and PSA Peugeot Citroën automotive equipment suppliers.

As evidence of innovation and one-off partnerships mounts through the TVR findings, there continues to grow the conviction that sustainable mobility is too big an issue for one company to solve alone. A radical lifestyle changing solution calls for large scale collaboration, such as the World Business Council for Sustainable Development (WBCSD) work on mobility. This dedicated working group taps into expertise, identifies synergies and considers the needs of not only the automotive industry but also energy utilities and smart grid providers, ICT companies, national and local governments, builders, consumers and other interested parties. As Henry Ford envisaged back in the day "coming together is a beginning; keeping together is progress; working together is success".

The trophy

This approach of collaborative innovation towards sustainable mobility also presents a myriad of opportunities to stimulate economic recovery and growth. In the case of the UK, a leader in ultra-low carbon technology, there is good potential for further R&D investments to drive the already booming automotive manufacturing industry. Nissan's Sunderland plant, the largest car factory facility in the UK, broke production records in 2012, and has created thousands of new jobs in order to respond to the growing demand for the 100% electric Leaf model.

Economic prosperity, more efficient and safer transportation systems, improved convenience and connectivity on the road, cleaner air and a stable planet are among the major benefits of working towards a shared vision of reliable and low-carbon mobility. The prize is no longer for the one who gets there first, but for the concerted effort of getting there on time.

Ivaylo Dimov is a Consultant at DNV GL.

Navigation for ALL

NNG

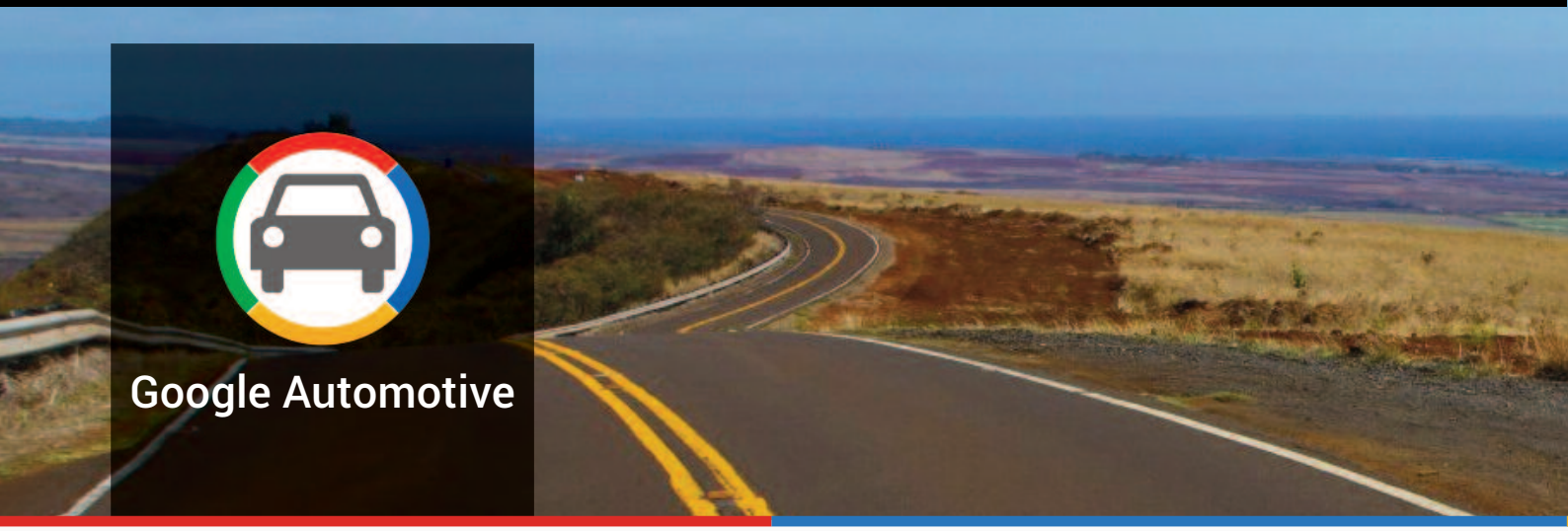
iGO navigation

www.nng.com

Google Automotive: *a new brand perspective*

Away from driverless cars and the newly-formed Open Automotive Alliance, Google has been working with OEMs to help them take advantage of the digital world.

Here, ***Ruth Dawson*** *talks to Meredith Guerriero, Global Head of Automotive, about collaborating with the industry*



Google Automotive

Profile: Meredith Guerriero, Global Head of Automotive, Google

Based in New York, Meredith Guerriero works with a global team to sell and deliver strategic planning to automotive stakeholders seeking a new online presence.

Not only does Guerriero have a high level of automotive industry knowledge, but her previous work with Fortune 500 advertisers in the areas of search, video, mobile and display, means that she has a strong knowledge of just what brands need online.

Tell us about your role at Google Automotive - how did you become Global Head of the department?

My entire career has been focused on digital advertising, and for the past eight years at Google I've been working exclusively with the automotive industry on helping them understand, develop and execute digital marketing strategies. In my current role, I manage a team that is dedicated to our top auto clients across the globe. Prior to joining Google, I spent several years in various roles at an ad network and a digital agency.

What does the automotive team work on, and what are your aims?

Google works with brands and marketers across a broad spectrum of industries. My group works directly with the marketing teams and executives of global auto manufacturers across Google's suite of advertising products and technologies. Our priority is to help our clients deliver against their marketing goals and objectives by working both globally and locally with our various teams and agency partners.

Does the team tend to work more with OEMs and suppliers or in the aftermarket?

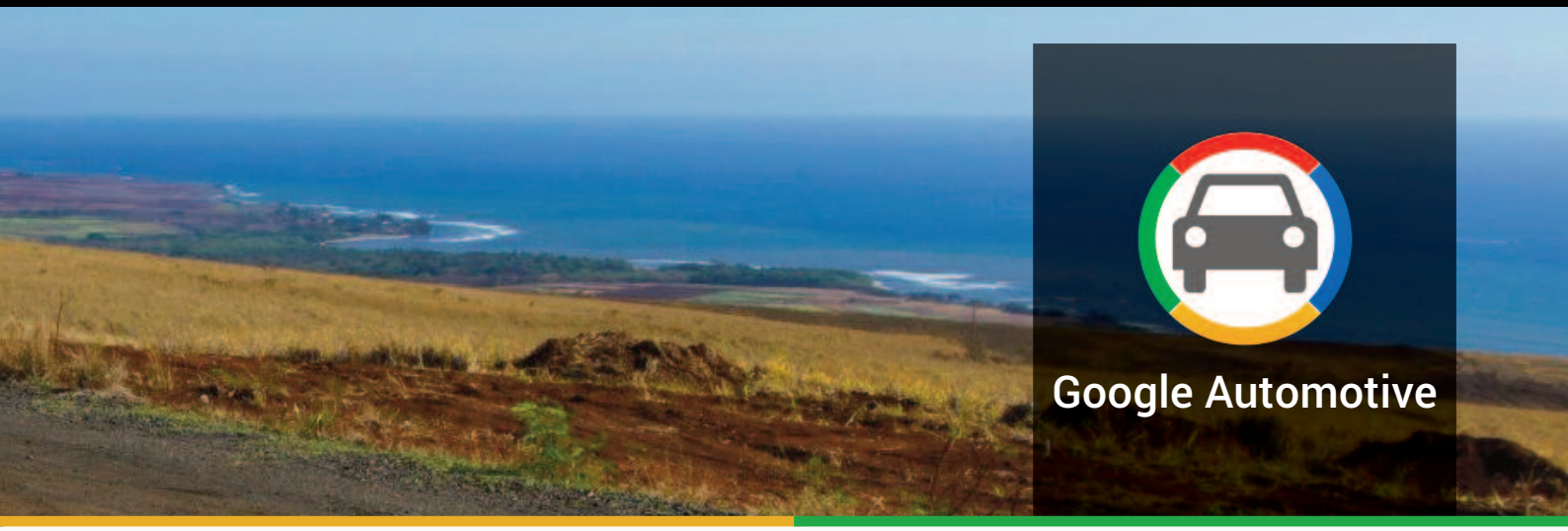
While aftermarket is a huge part of OEMs' business, my team works mainly with OEMs and their agencies. That said, many OEMs and dealers focus heavily on their aftermarket business so there are instances where we develop strategies and recommendations to assist with this.

Why does a search giant like Google want to work with the automotive industry?

Our digital marketing solutions helps millions of companies of all types and sizes grow their businesses, and we work with businesses across a whole range of industries to help them succeed online. Technology and digital advancement are having a transformative effect on the vehicle shopping and purchase experience, resulting in a highly informed and empowered buyer. We work closely with auto brands because we believe we can assist them in reaching consumers in today's always connected world. They also happen to be some of the most savvy marketers out there, continually innovating and evolving their approach in response to the overall shift towards digital engagement.

Google Automotive is at 'the intersection of automotive and digital' - but what is the search giant trying to bring to the automotive industry?

Today, consumers are overwhelmingly online. In fact, eMarketer reported that last year, for the first time ever, consumers spent more time with digital media per day than any other medium, including television. This is actually great news for automotive brands. The shift towards digital has fundamentally changed how people shop for vehicles, with a greater percentage of time before purchase being devoted to research, primarily online. This provides brands with a greater opportunity to connect with and influence these potential buyers. We can help these brands leverage our platforms across search, display, mobile and video to engage, inform and inspire consumers throughout the purchase consideration process.



Google Automotive

Do you think the automotive industry is a little behind the times when it comes to marketing online?

For most automotive brands, I would actually say that it's quite the opposite. We see automotive marketers continue to evolve and innovate their approach to engaging with consumers online. It's no secret that several brands now identify the digital platform as a core pillar to their marketing strategy. As an example, as part of a multi-country European launch of the Chevy Captiva, Chevrolet wanted a centralised online destination to promote the vehicle, and used high-profile YouTube celebrities to produce a collection of short films demonstrating the vehicle's features. Using the full suite of Google's advertising tools, they were able to drive consumer awareness and engagement.

How can Google complement OEMs' strategies of marketing to different generations?

We work closely with the OEMs to understand their marketing objectives and help them reach the relevant audiences with the right messages. Marketers have the ability within their campaigns to customise the specific audiences they wish to reach across the web. YouTube, for example, reaches more 18-34 year olds than any cable network, according to Nielsen, and we see automotive advertisers leveraging the opportunities in online video to connect with the Gen C consumer.

Where do you see things headed for automotive brands in the digital environment?

The connected nature of today's consumer has upped the ante for automotive brands, as consumers now expect seamless integration of messages and experiences as they navigate across screens, channels and platforms. You will continue to see brands innovate and take a holistic approach to engaging with consumers across all the available and emerging media.

We will also see brands taking greater advantage of the unconstrained canvas online to test and learn, something that isn't possible through traditional media. We've already seen many automotive brands try things online that wouldn't be possible elsewhere. For example, as part of their 24 Casetas campaign, VW Mexico developed unique content that was released every day at 12pm for two weeks on YouTube. The content was available across devices, and users could influence the ending of the story via Twitter. At the end of the campaign, the series had over 15 million views.

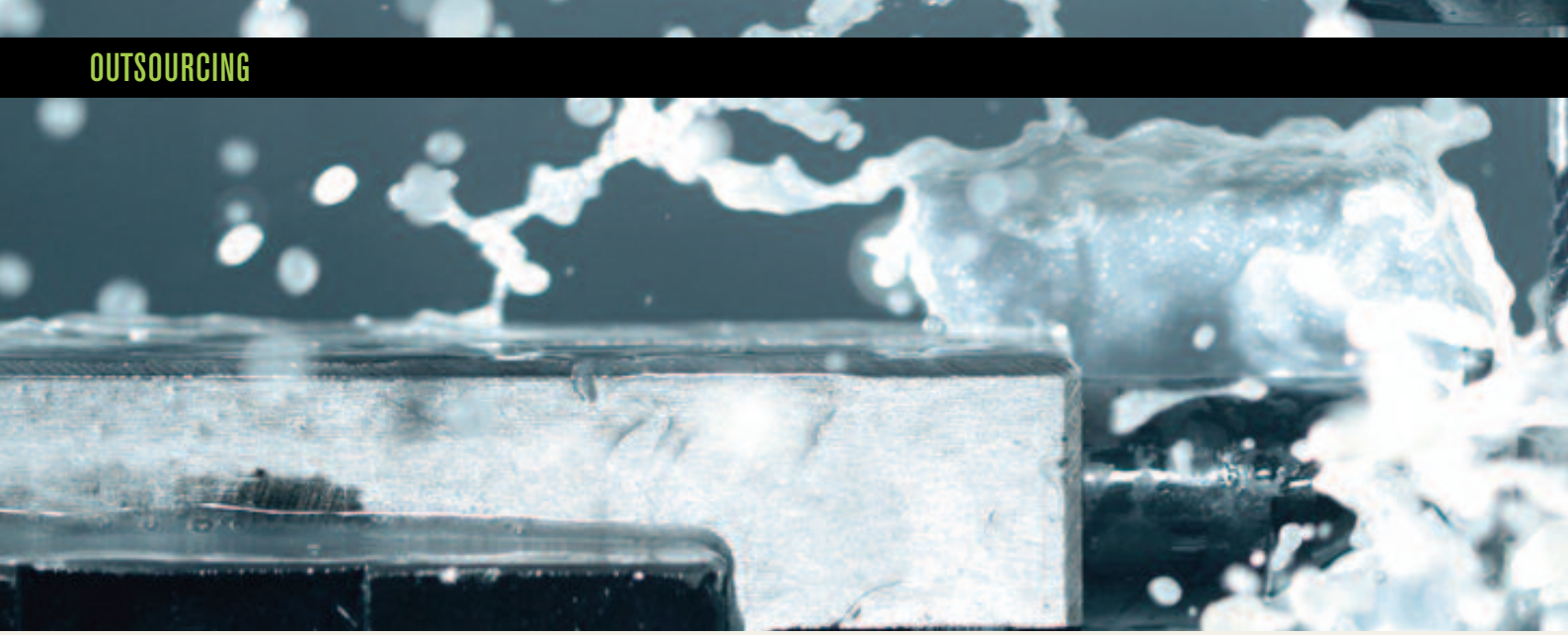
Finally, we expect to see more global coordination and alignment with OEMs surrounding their dealer programmes and online presence. These efforts are designed to form a centralised and comprehensive brand strategy across digital platforms in order to maximise the marketing impact and bring a consistent consumer experience.

#LifeTest

June 2013 saw Chevrolet adopting a new digital tactic to promote the Captiva. In what was the first brand content partnership with YouTube outside the United States, Chevrolet worked with the site's homegrown celebrities to promote the car via the social video platform.

Google has been working with Chevrolet as a strategic global media partner since 2011, notably running the award-winning 'Firsts' campaign of video stunts for the Sonic Aveo model in the US, and using targeted in-stream advertising during the Red Bull Stratos space diving project.

Outcome objectives of the #LifeTest campaign ranged from simply raising interest in the new Captiva model, to cultivating a group of brand enthusiasts from the web-savvy, connected demographic of 30-50 year olds. The subsequent series of short films in this latest promotion showed comedians, a beauty vlogger and a product review team, being tasked to use the SUV in real-life situations. From road trips to quirky challenges, the presenters documented the Captiva in use in a variety of ways, encouraging viewers to join the Chevrolet brand on other social media sites such as Facebook, Twitter and Instagram.



Quo vadis, engineering outsourcing?

***Dr Wolfgang Bernhart** and **Dr Stefan Gutberlet** investigate the future of engineering service outsourcing in the differing markets of Europe and China*

Automotive manufacturers now have to deal with an all-time-high of technology complexity, driving engineering spend and creating the necessity to have a clearly defined strategy regarding core competences and outsourcing of engineering services.

Four areas in particular have seen an increasing demand for skills and capacity:

- *Powertrain electrification technologies,* requiring new competences for energy storage technologies and electric drives;
- *Connectivity solutions,* making the car part of the Internet of Things, and creating the need to combine automotive safety and quality requirements with agile development principles, especially in infotainment;
- *Advanced driver assistance systems* (ADAS) and moves towards piloted or autonomous driving, which again increase complexity significantly, especially around sensor, map and object data fusion;
- *Lightweight materials,* especially with regards to competences around carbon composites and the respective production and assembly technologies.

Powertrain and powertrain electrification account for a major proportion of the engineering services market, driven mainly by legislation enacted in Europe and China. In Europe, all OEMs will need to reduce their CO2 emissions by 25-30% by 2021. In China, there will also be major regulations to be faced - especially if the nation opts to introduce a fleet-based emissions standard.

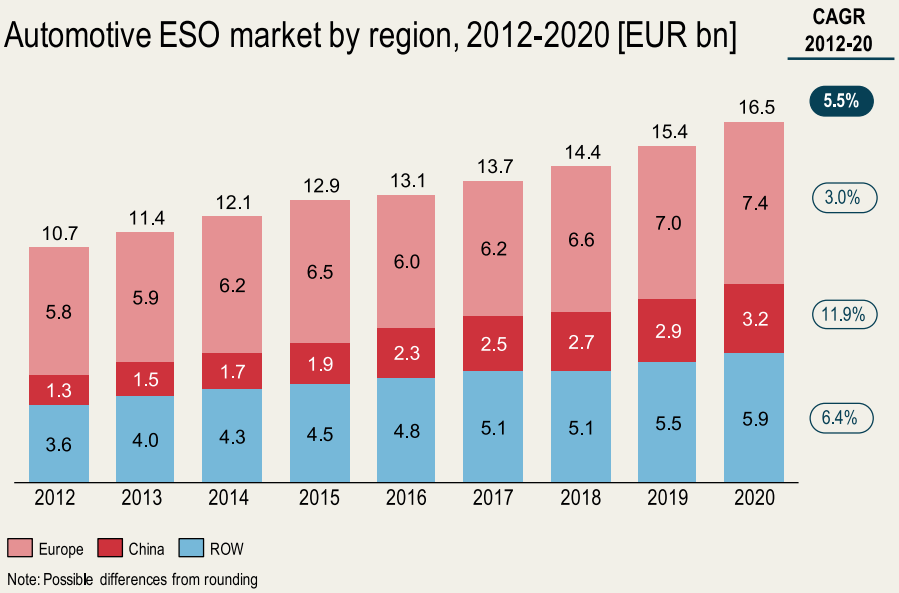
By the same token, OEMs will also strive to increase their use of weight reduction technologies. The relative importance of weight reduction technologies varies greatly in the two markets, with very high importance being attached to it in the EU, whereas in China it is not yet relevant. All major OEMs plan to realise about 3-4g/km in CO2 emissions savings through lightweight design.

In-vehicle infotainment (IVI) and onboard connectivity solutions are already increasing in complexity, with a growing number of products and features using driver interaction and control of data becoming available. At same time, connectivity boxes are being integrated into head-units and instrument clusters - as shown by Audi in its virtual cockpit at the International CES in Las Vegas. The development costs for the different solutions vary widely, however: HMI, specific functional software, and system integration are often seen as OEM core competences and thus are major outsourcing opportunities for engineering service providers (ESPs).

Auto ESO in figures

In 2012, the worldwide automotive engineering service outsourcing (ESO) market was worth around €10.7bn (US$14.7bn). However, growth in recent years has been slowing down, mainly due to the fact that the peak of new model introduction has nearly been reached. With a worth of almost €6bn (US$8.2bn), Europe is by far the biggest automotive ESO region: almost five times as big as the Chinese market, with a volume of about €1.3bn (US$1.5bn). However this size and the relation to the European ESO *market* will change within the next years.

While global passenger and light commercial vehicle production will increase



by about 4% per annum until 2020, global automotive R&D expenditure is expected to grow at 6%-7% each year in the same period, thanks to a more complex technology portfolio and higher R&D share in emerging markets. Outsourced share is expected to slightly decrease at the same time due to regulatory issues - especially in Germany - but increasing share of modular kits for cars and subsystems will make outsourcing of complete work packages harder than before.

The global automotive ESO market will grow by 5-6% per annum until 2020, totaling at around €16.5bn (US$22.6bn). The reason for this development can be found in captive engineering centres, which will increasingly be used to develop subsystems and vehicle derivatives, significantly lowering the growth in the ESO market, especially in Europe.

The European ESO market will stand at circa €7.4bn (US$10.1bn) in 2020, an annual growth rate of around 3% from 2012 onwards. The Chinese market will grow at a faster rate of 12% from 2012 on, and reach €3.2bn (US$4.4bn) by 2020, almost half the size of the European ESO market alone.

The highest share, with approx. 30% of outsourced work in Europe, will remain in electrical and electronics (E/E), which also includes connectivity/in-vehicle infotainment, resulting in a total volume of c.€2.5bn (US$3.4bn) by 2020 - equivalent to a total increase of around 50% compared to 2012. The share of powertrain-related work will stay around 15% in Europe, growing absolutely by around 10% from 2012 to c.€1.1bn (US$1.5bn) in 2020.

In China, however, the breakdown of domains differs greatly: the highest share, with approx. 25%, is in powertrain in general and electrification of powertrain, doubling the volume in 2012 from €400bn (US$550bn) to roughly €850bn (US$1.16trn) in 2020. High growth can also be found in the E/E domain which will grow to more than three times its 2012 size of c.€150bn (US$206bn), to a volume of c.€500bn (US$687bn) in 2020.

The difference between Europe and China in the weighting of the powertrain domain is mainly due to the fact that core powertrain know-how has been built up by western OEMs, which rely less on external knowledge in this area. Chinese OEMs, on the other hand, still need to close the gap in both ICE and electrified powertrains. The high increase in the E/E domain in Europe and China is mainly due to the significant impact of connectivity and in-vehicle-infotainment solutions in both countries.

Regarding the form of contracting, in general, the expert-on-demand as a pure resource based service is becoming less important, whereas project-based work and longer term contracts with clearly defined work packages will increase. This shift will however be stronger in Europe than in China due to contractual regulations - especially in Germany - which make expert-on-demand type work challenging for OEMs from a compliance perspective.

Implications for OEMs

Taking into account the different trends and impact drivers of the ESO market, as well as its overall global development, there are some clear implications which can be given for OEMs and ESPs.

OEMs need to be organised in such a way that the outsourcing of all engineering services is as efficiently structured as possible in terms of resources, coordination and location - which must also be taken into consideration in terms of the contract design. Especially in the case of German OEMs, there is a need to reorganise in such a way that engineering services can be outsourced using service contracts, instead of leasing staff from ESPs in a compliant way.

For the providers of engineering services, the main challenge will be to have a best-cost-country footprint (for example, with a hub in China or India) in order to stay competitive in terms of cost structure. Project-based service contracts will allow for this more easily, but at the same time provide an opportunity, in particular to large Indian players, which are making a big push to enter the European market.

Dr Wolfgang Bernhart is Partner, and Dr Stefan Gutberlet is a Senior Consultant, at Roland Berger Strategy Consultants.

GENIVI® How the GENIVI Alliance Works

The GENIVI Alliance is an automotive and consumer electronics industry association that drives collaboration among vehicle manufacturers and suppliers, to build open source infrastructure for in-vehicle infotainment (IVI) systems. IVI is a rapidly changing and expanding field within the automotive industry. It covers many types of vehicle infotainment applications including music, news and multimedia, navigation and location services, telephony, internet services and more. The alliance aims to align requirements, deliver reference implementations, offer compliance programs, and foster a vibrant open-source IVI community.

The majority of GENIVI's work is conducted through the technical and marketing teams and groups. There are currently six topical "expert groups" – Automotive, CE Connectivity, Location-based Services, Media and Graphics, Networking, and System Infrastructure. The EGs establish and prioritize the technical requirements, identify and enhance components that implement those requirements, and together develop the GENIVI Compliance Statement. In Asia, regional expert groups also develop specific requirements unique to their locations. All of these requirements are collected, reviewed and integrated by the System Architecture Team, resulting in a comprehensive compliance specification.

The Program Management Office develops and monitors the technical working plan resulting in a regular, six-month release cadence. The Baseline Integration Team provides a continuous build environment where EGs and members can test their developed software against a number of GENIVI compliant Linux distributions.

The GENIVI compliance program is a key deliverable of the alliance, providing the set of specifications for GENIVI member companies to measure their products and services. Those that meet the specifications may be registered as GENIVI compliant and listed on the GENIVI website. Compliant platforms consist of Linux-based core services, middleware, and open application layer interfaces. These are the essential but non-differentiating core elements of the overall IVI solution set.

Automobile manufacturers and their suppliers use these compliant platforms as their common underlying framework and add to it their differentiated products and services (the consumer-facing applications and interfaces). GENIVI is identifying these common automotive infotainment industry requirements to establish an open and robust baseline from which to develop products for the common good of the ecosystem.

The GENIVI Alliance is open for membership to all organizations engaged in the automotive, consumer electronics, communications, software, application development and related industries that are invested in the success of IVI systems and related products and services.

OEMs

BMW Group, Honda, Hyundai, John Deere, Jaguar, Land Rover, Nissan, PSA Peugeot Citroën, GM, Renault, SAIC, Volvo

First Tiers

AISIN AW, Alpine, ALPS, Bosch, Clarion, Continental, Delphi, Denso, Desay, Harman, Johnson Controls, Lear, LG Electronics, Mitsubishi Electric, Magneti Marelli, Mobis, Pateo, peiker, Pioneer, Valeo, Visteon

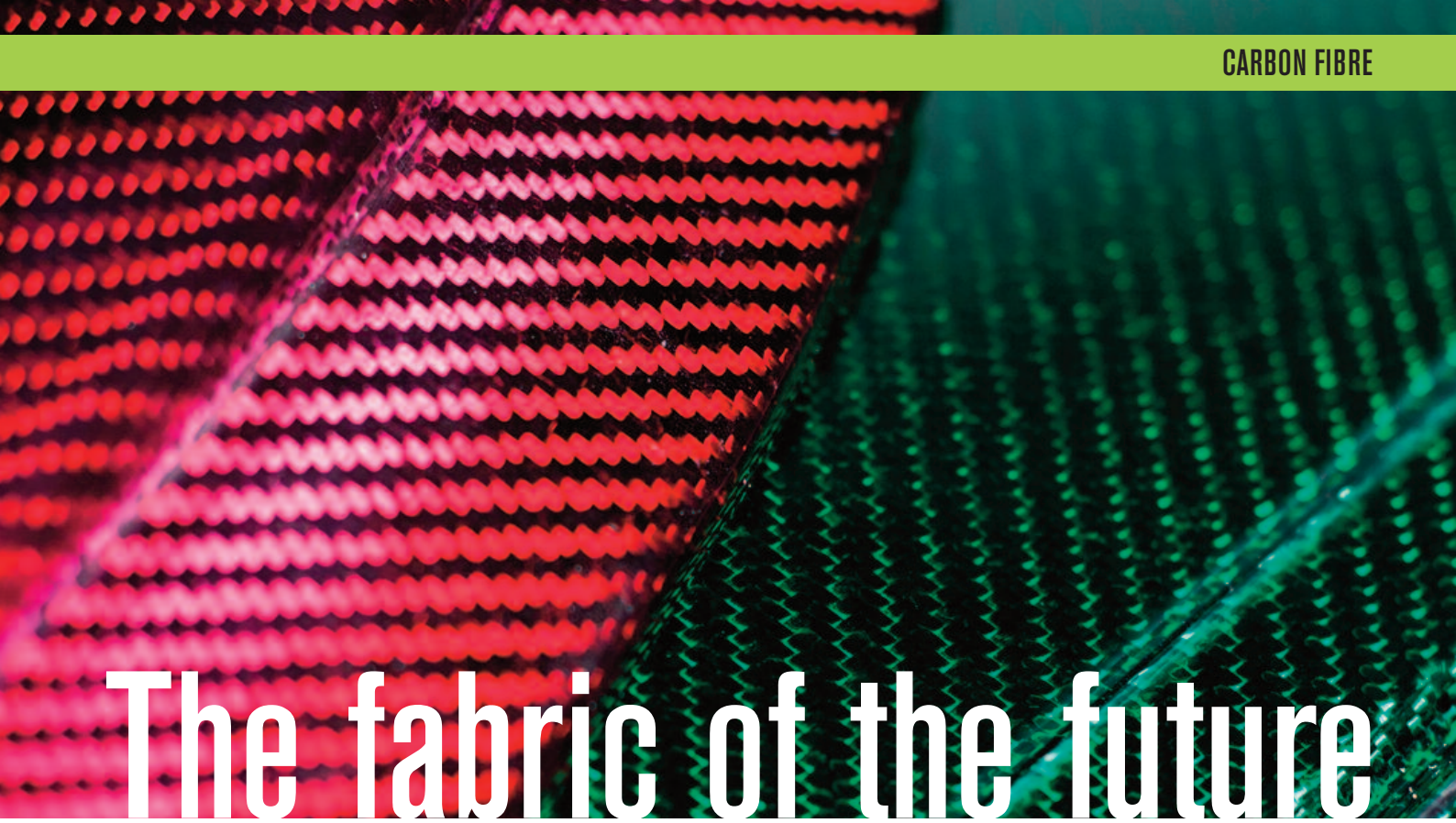
OSV, Middleware, Hardware, and Services Suppliers

ecosystems, abinsula, accenture, ACCESS, Advanced Driver Information Technology, AEC, Agero, aicas, Airbiquity, akhela, AllGo, altran, alticast, ARBITRON, ARICENT, Arkamys, arynga, Atos, ATP, AUDIOVOX INCAR, AutoNavi, blackduck, BSQUARE, CANONICAL, CETECOM, cinemo, CodeThink, Collabora, CTAG, CYBERCOM GROUP, digia, dts, electric CLOUD, ERICPOL, ESG, ETRI, Fraunhofer ESK, GARMIN, GTSYSTEM, HCL, HI CORP., HITACHI Inspire the Next, iAV, IBM, iGATE, Infobank, intecs, Ittiam, Green Hills SOFTWARE, jambit, K2L, klocwork, KPIT Cummins, LARSEN & TOUBRO, LUXOFT, JUNGO, Livio Radio, Mahindra Satyam, mapscape, McAfee, mds, Mentor Graphics, MITAC, montavista, MTA, mobica, MPHASIS, navmii, Nav N Go, Neusoft, novero, NOMOVOK, OSIGO, OpenCar, openmobile, OPENSYNERGY, OTSL, PARASOFT, PATHPARTNER, Parrot, pelagicore, Red Bend Software, sasken, Savari, SPANSION, secunet, SIERRA WIRELESS, SIRIUS, Suresoft, SWI, swedspot, SYBASE, 表行科技, symbio, TATA, TechniSat, teleca, TeleChips, Telemotive AG, TomTom, T-Systems, TUXERA, TWEDDLE GROUP, UNWIRED, VIVANTE, vTuner, WIND RIVER, WIPRO, XSe

Silicon

ANALOG DEVICES, ARM, csr, freescale, FUJITSU, intel, ISSI, MICREL, MEDIATEK, NVIDIA, NXP, QUALCOMM, RENESAS, TEXAS INSTRUMENTS, Vitec, XILINX

www.genivi.org



The fabric of the future

David Isaiah

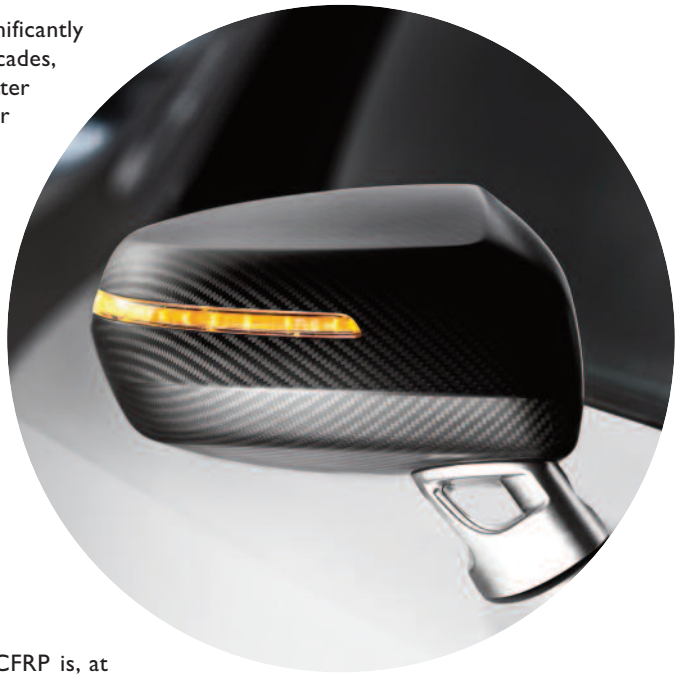
Carbon-fibre reinforced plastic (CFRP), a strong and light fibre-reinforced polymer, offers distinct structural and weight advantages in the automotive segment. Once used exclusively in motorsport, the material has trickled down to on-road, low-volume luxury sports cars, and onto higher volume models - albeit still in the premium segment.

Carbon fibre has really come into its own since the enforcement of stricter emissions standards, which brought about the need for better fuel efficiency. What this translates into is the need for lighter vehicles. Replacing steel with CFRP has the potential to significantly reduce vehicle weight by up to 60%. Weight savings in this range would transform into an increase in fuel efficiency to the tune of around 30%, and of course, this in turn would cut emissions by up to 20%.

"The penetration of carbon fibre depends on several factors, such as the development of emobility and the strictness of emission regulations. With introduction of WLTP [Worldwide harmonized Light vehicles Test Procedure], weight becomes increasingly more important. In mature markets it seems realistic that within the next decade carbon fibre becomes, for premium OEMs, an attractive option, but mostly in larger, high-priced vehicle segments and mainly as part of 'hybrid' body structures," said Dr Wolfgang Bernhart, Senior Partner at Roland Berger.

Although the material has a high potential for vehicle weight reduction, costs are still very high at present. This is, however, expected to drop quite significantly over the next couple of decades, bringing the material into better competition with other lightweighting materials, such as aluminium.

"From its technical material performance level, carbon fibre has a great potential for substituting steel or aluminium. However, current and mid-future manufacturing technologies will not be able to meet mass market cost levels," Dr Bernhart continued.



Production advantages

Owing to the cost factor, CFRP is, at present, predominantly used in low-volume, luxury cars, and mainly for prominent sections, such as roofs, interiors and decorative parts. The next step will be entire vehicle modules, as BMW has shown with its significant use of CFRP on the electric i3 - the first use of the material for large series production in the automotive industry.

"The body structure of the BMW i3 is completely made of this extremely lightweight and durable material, compensating for the additional weight of the battery for the electric drive," said Dr Rüdiger Bräuning, Technology Validation Manager, responsible for CFRP Production Technology Development at BMW Group.

According to SGL Automotive Carbon Fibers, a joint venture between SGL Group and BMW Group, one of the advantages using this material is that different functional parts, such as fasteners and supports, can be integrated into the component. Even complex structural parts, or entire body assemblies, can be produced on one machine tool, translating into a significant reduction in the number of individual components required to produce the vehicle body.

"A CFRP component can assume the function of several metal components and therefore represent a better choice when summing up its properties. Through integral construction processes enabled by this material, the number of parts can be reduced, which is usually rewarded with a cost reduction across the entire production chain," said Dr Lars Herbeck, Managing Director of Voith Composites, the competency centre for carbon fibre products within the Voith Group.

Then there is the aforementioned weight advantage. CFRP is around 50% lighter than steel, and 30% lighter than aluminium. In addition, the material is stable, rigid and resistant to corrosion and aging. Another clear advantage is the reduction in effort that would otherwise be required to produce highly integrated and extensive body components, compared with production of the same using steel or aluminium.

"Different functions like attachments and carriers can be integrated into the component. Even complex structural parts or whole body assembly units can be made from one tool. This allows a massive reduction of individual components in body construction," Bräuning noted.

"In the longer term...composites offer very exciting opportunities for weight reduction that will inevitably start to replace steel and aluminium," Prodrive Composites' Managing Director, Dominic Cartwright commented. "At first in body panels, and then in the structure of the chassis and wider applications. The weight reduction goal is so pressing that this transition is inevitable."

Paying the price

The elephant still sat in the room, however, is cost. At present, the price of carbon fibre components is much higher than high-strength steel and aluminium. There are also other issues, such as manufacturing cost, recycling and supply - or lack thereof. "This is the reason why carbon fibre will not be immediately be adopted by the automotive sector in mainstream vehicle manufacturing, but more likely in three to five years' time," said Leonidas Dokos, Research Director of Chemicals, Materials and Food at Frost & Sullivan.

There is also the matter of maintenance and repair of components and parts made using CFRP. According to a study conducted by McKinsey & Company, often damage to such components cannot be determined through a visual inspection, requiring acoustic emission detection, or thermal, ultrasonic or X-ray imaging - all of which involve potential investment costs for dealerships.

Post-crash repairs present another problem: lack of sufficient knowledge and understanding of damage diagnosis and remedial requirements for carbon fibre. As Andrew Hooker, Future Vehicle Engineer, Thatcham Research puts it, carbon fibre "is not one wonder material, and to say a car is made of carbon fibre is akin to saying its made of metal. For a repairing workshop to have the knowledge and materials to repair all will be unlikely."

Positives and negatives aside, the shift of CFRP from luxury vehicles to higher volume cars has begun, and will gather momentum in the future as the cost of carbon fibre composites drop further. For the present time, however, use of this material is likely to be confined to higher end cars.

"We might also see some carbon fibre in premium volume cars until the middle of the next decade. As the cost level for budget cars or within emerging markets is very low, it is rather unlikely that carbon fibre will penetrate those segments or regions within the next 15 years," said Bernhart.

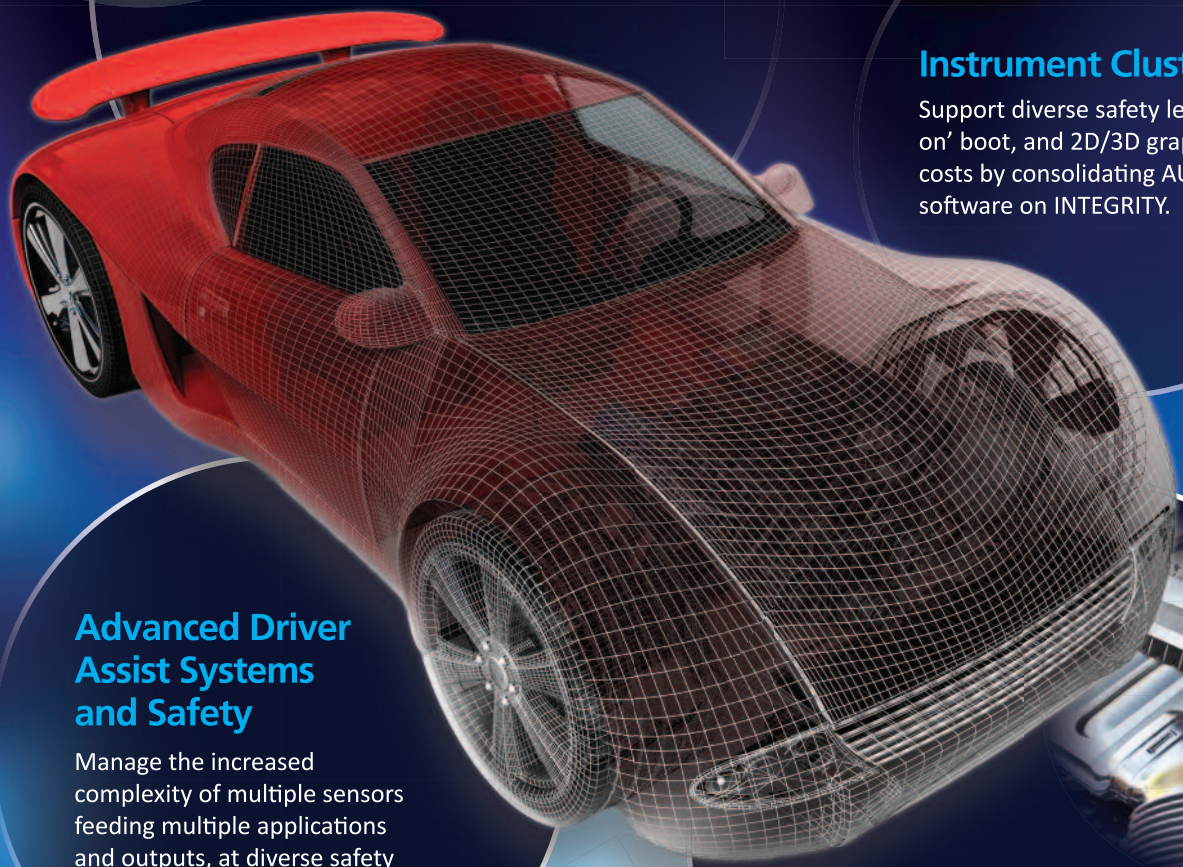
REDUCE PER-UNIT PRODUCTION COSTS WITH GREEN HILLS AUTOMOTIVE SOFTWARE PLATFORMS

In-Vehicle Infotainment

Secure virtualization framework for Linux and Android built on the INTEGRITY RTOS enables virtualized and real-time safety components to run concurrently.

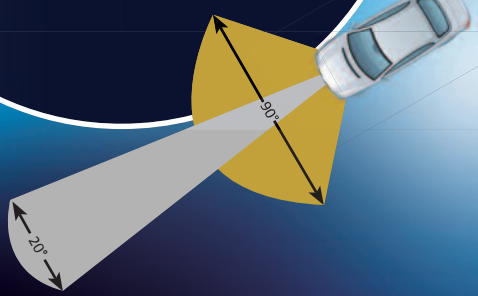
Instrument Clusters

Support diverse safety levels, 'instant-on' boot, and 2D/3D graphics. Reduce costs by consolidating AUTOSAR software on INTEGRITY.



Advanced Driver Assist Systems and Safety

Manage the increased complexity of multiple sensors feeding multiple applications and outputs, at diverse safety levels on the INTEGRITY RTOS.



Powertrain, Chassis and Body Electronics

ISO 26262 ASIL D qualified compilers and tool suite. Essential for any project with ISO 26262 requirements.

Green Hills Software provides the world's leading automotive companies with software platforms. To reduce the production costs of your next project, visit www.ghs.com/p4a

Green Hills® SOFTWARE

Driven by safety

***Matthew Avery** discusses how car technology is changing to keep pace with Euro NCAP crashworthiness ratings*

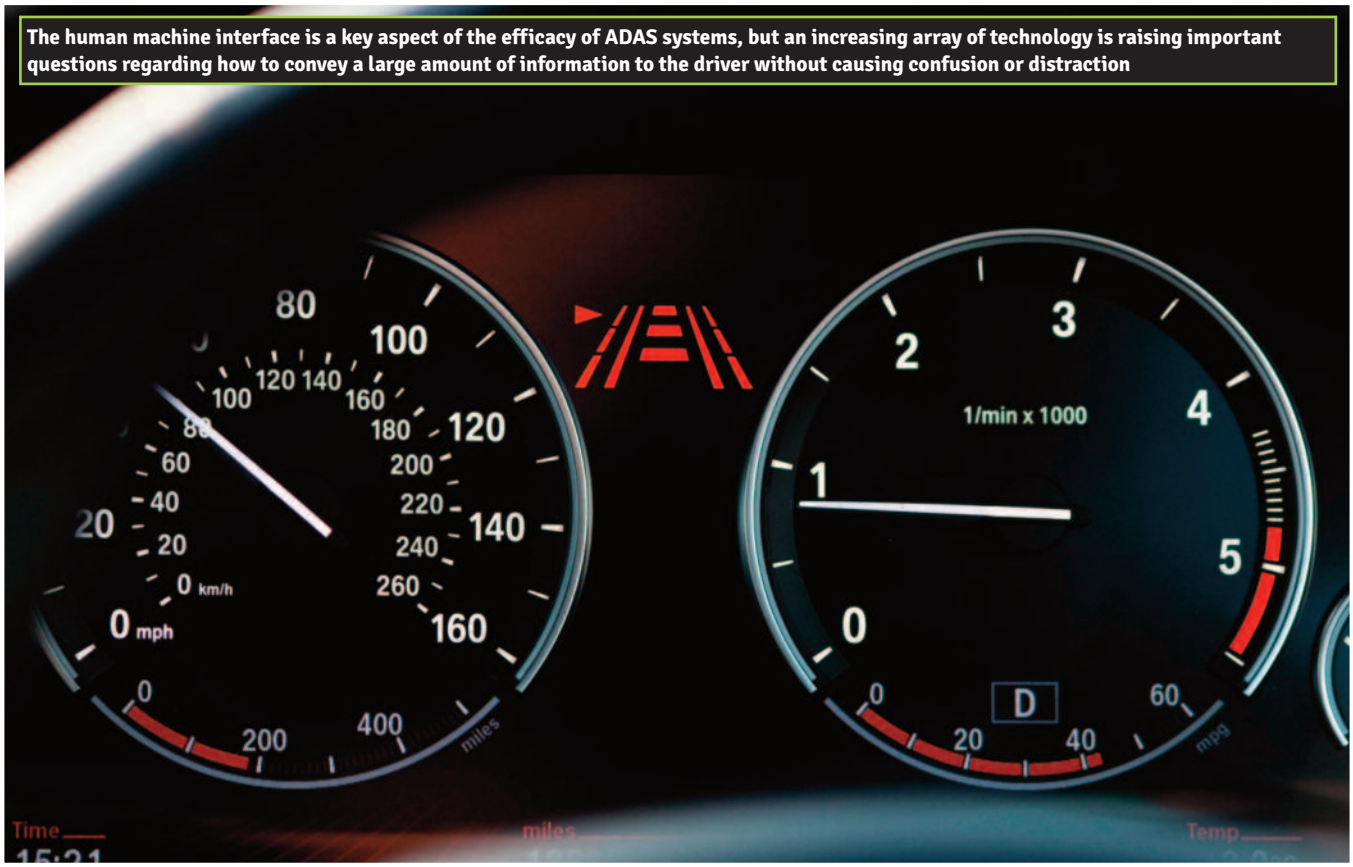
Just as engines are influenced by emissions regulations, car body design and material choices have been steered by attempts to improve standards of crashworthiness.

Since its first crash tests in February 1997, Euro NCAP has been the key driver here, awarding up to five stars for the safest cars on the road. This is very much a fast-moving target however, with the tests getting more arduous every year. So much so that if a car that scored five stars just 36 months ago were to be retested, it might only achieve three stars on today's test protocols.

With fewer affordable wins left in secondary safety - that is, protecting people in the event of a crash - vehicle manufacturers have had to look to primary safety or crash avoidance for breakthroughs. Technology is the key enabler and a new breed of advanced driver assist system (ADAS) is appearing, warning of imminent hazards and even stepping in to take corrective action if the driver gets it wrong. Again, it is the Euro NCAP test programme that is providing a very clear strategic roadmap for OEMs.

However, a big bump in this roadmap appeared of the start of the year, when autonomous emergency braking (AEB) formally entered the Euro NCAP test. Many high-end AEB systems use sophisticated radar combined with a camera behind the windscreen to read the road ahead and give accurate target assessment. While extracting a strong Euro NCAP test result without these fitted may be technically achievable today, the next stage will make it almost impossible: from 2016, AEB also needs to work with pedestrians. The test protocols here include both adult and a child target dummies, that emerge from between parked cars. The new 'pedestrian protection score' is worth as many points as the current city and inter-urban AEB tests combined.

This is where Thatcham expects to see the technology really take hold, as OEMs look to extract the maximum functionality from the now essential AEB systems on the car. Additional safety features such as lane departure warning and active correction (lane keep assist) are already under examination by Thatcham for possible future Euro NCAP inclusion. Other functions include intelligent lighting systems and road



The human machine interface is a key aspect of the efficacy of ADAS systems, but an increasing array of technology is raising important questions regarding how to convey a large amount of information to the driver without causing confusion or distraction

Euro NCAP and Thatcham are focusing their research on an ever increasing array of technologies designed to assist drivers, such as lane departure warnings and blind spot sensors

sign recognition to provide speed and warning alerts. The overall contribution to safety of many of these systems is unclear, but initial results look remarkably positive.

Looking even further ahead, the next ADAS technologies are expected to focus on intersection protection. From around 2018, consumers can expect to see side-mounted RADAR and cameras emerging that prevent drivers from pulling out of a junction if another vehicle is approaching.

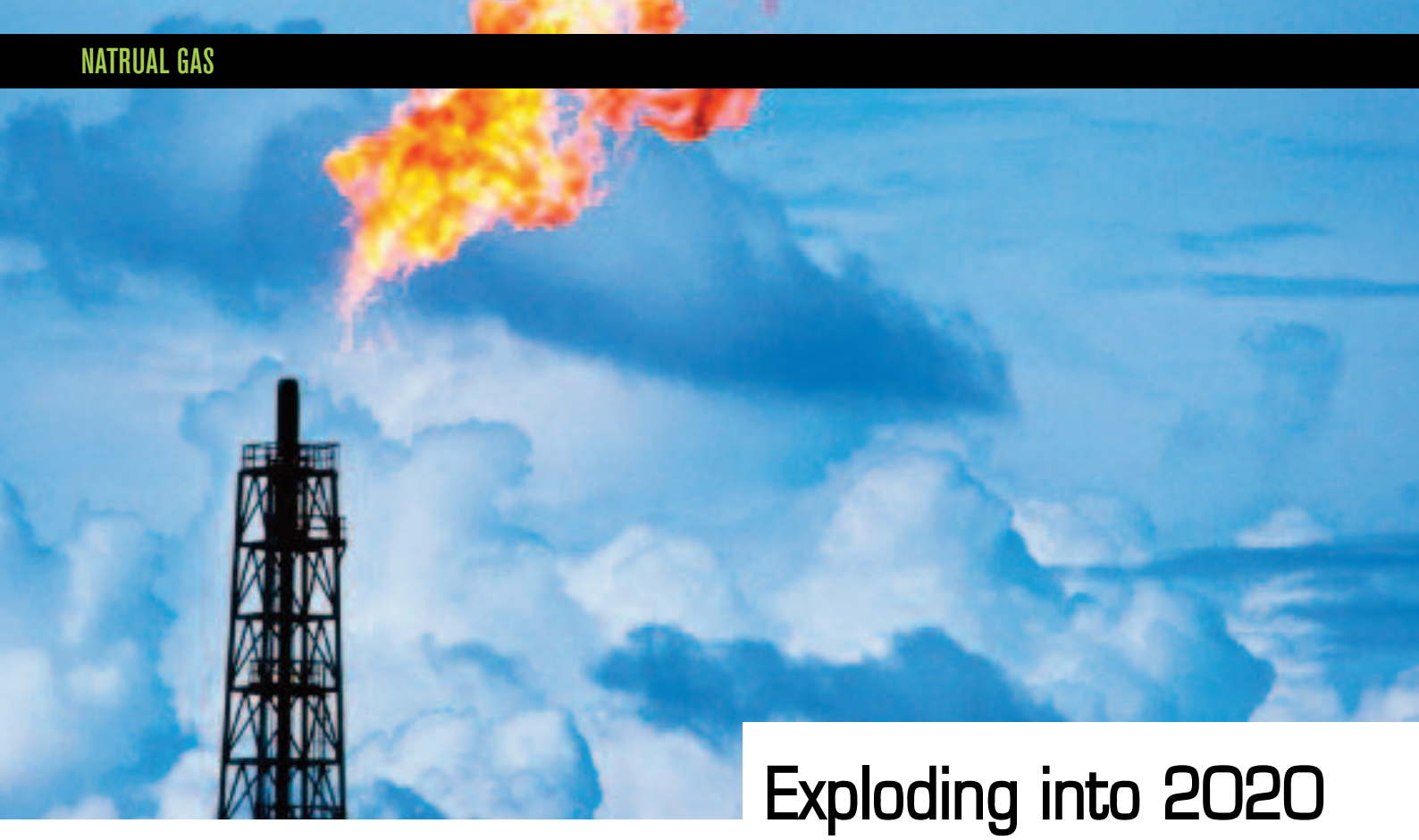
Euro NCAP testing is also sparking another technology debate around the Human Machine Interface (HMI). The AEB tests found that warning-only systems can be 50% less effective than those that intervene, raising the question of which types of warning work best. In the aircraft industry, these were standardised some years ago, so moving from one aircraft to another did not require much relearning. Other than the blue 'high beam' warning light, most cars today differ.

Volvo for example uses a row of bright LED along the top of the dashboard as part of its AEB warning. Other OEMs use haptic technology to give lane departure warnings by introducing a tactile sensation such as seat or steering vibration, to recreate rumble strips. As the number of scenario warnings increase, so will the opportunities for confusion. Euro NCAP is preparing to study this area to find the best practice from which evaluation criteria can be developed.

In safety terms, the ultimate goal is the autonomous car and many manufacturers have already stated that we can expect to see semi-autonomous driving by 2020. This is no pipe dream: Thatcham recently tested Volvo's new queue assist function that will feature on the new XC90, allowing the vehicle to drive and steer itself up to 30mph in city traffic. The enabler here is simply a combination of the camera and radar from an AEB system with the steering correction function of lane keep assist. The challenging part is the scene interpretation and system calibration, which must be completely robust in all situations.

As Euro NCAP keeps driving crash prevention forward, manufacturers will respond with ever more intelligent ADAS. These provide the building blocks for new functionalities that not only help cover the costs, but also accelerate the next level of progress.

Matthew Avery is Director of Research, Thatcham.



Exploding into 2020

***Rachael Hogg** discusses the latest prospects for natural gas in commercial vehicles*

Emissions regulation, urbanisation and CO2 reduction are all driving fleet operators and governments to look for fuel alternatives that not only save money, but lower emissions. Air pollution in Europe alone is estimated to contribute to around 406,000 deaths, and the loss of more than 100 million days of work due to illness annually - which, in economic terms, accounts for between €330bn and €940bn (US$449bn and US$1.28tr) per year. Thus, natural gas is becoming increasingly appealing, and new drilling techniques and pipelines are making it an even more competitive fuel alternative.

In its recent report *Natural Gas Trucks and Buses,* Navigant Consulting identified the key forces in the global market which are now driving natural gas vehicle sales: the economic benefit, increased availability of vehicles, environmental benefits, government influence, and the growth of refuelling infrastructure. Like most aspects of the commercial vehicle industry, natural gas is captive to forces impacting the overall market - so as the economy recovers, demand for natural gas has increased. However, the refuse truck, day cab truck and transit bus markets have seen stronger overall growth, mainly due to the relatively short payback period.

These price and short payback factors are significant incentives. According to Navigant, on average, the price of compressed natural gas (CNG) is only 42% that of diesel. Although liquefied natural gas (LNG) is a little higher, it has more variability than CNG. With these figures, the payback period for heavy duty trucks can be as little as one and a half years in the US; storage tanks for both CNG and LNG account for 52.9%-75.9% of the total incremental costs. However, natural gas has so far been more appealing in the United States due to lower market prices - but move east from the US, all the way to Japan, and the price of natural gas changes dramatically from around US$2 to US$11.

Commenting on these seemingly great prospects, Sandeep Kar, Global Director of Commercial Vehicle Research at Frost & Sullivan warns, "There's a huge price disparity for natural gas, and when North America starts to export shale gas to other parts of the world, the will price come down, further enhancing the applicability of natural gas as a global fuel for the transportation industry. Natural gas is one solution that is cleaner, greener, cheaper and is getting more and more abundant, especially in North America, and eventually other parts of the world."

A hybrid competitor

Since 2005, the price of diesel in North America has been extremely volatile and has affected the operating costs of fleets, which have turned to other fuel solutions. The US has been a prime mover in terms of natural gas, with proactive OEMs and customers more willing to adopt natural gas.

"The problem with hybrid is that it has higher upfront costs and higher lifecycle costs, as the battery requires replacement every four to five years," says Kar. "With natural gas, you don't have that problem - but the problem hybrids don't have is that they don't require any infrastructure support - but natural gas does." Last year, of all the 23,000 or so medium and heavy duty alternative power trucks sold globally, 71% were natural gas and 29% were powered by hybrid/electric.

As emissions regulations become increasingly tight, natural gas is looking ever more attractive across most markets. Similarly, emissions restrictions in urbanised areas are driving out diesel vehicles. While the price of diesel and gasoline has also helped the appeal of a simpler natural gas exhaust system.

Over the past few years, refuelling infrastructure has grown significantly in the US and Asia, as countries have stepped up natural gas usage in vehicles. Navigant predicts that natural gas refuelling will grow 30.2% between 2013 and 2022, which will result in 41,133 stations globally. While most of the growth is due to private industry, government incentives and promotions are having a positive impact. By 2022, of all the natural gas stations, 4,048 are expected to be LNG. The focus for these stations will be

where the demand is, mainly China and the US, which accounted for around 96% of the global LNG in 2013.

Navigant also forecast a combination of factors leading to natural gas growth in most countries around the world, and predicted that the market for natural gas trucks and buses will continue to grow at a compound annual growth rate (CAGR) of 12.6% and 6.4% respectively, between now and 2022. This should result in the sales of 398,395 medium and heavy duty trucks and buses being sold in 2022 alone. Split into global markets, Asia Pacific will account for 76.2%, the US, 12.7%, and Eastern Europe, 8.6%. Because of higher fuel usage, heavy duty trucks and buses will outsell medium duty, and resulting in strong payback periods.

Kar comments, "What we are forecasting at Frost & Sullivan is, in North America by about 2020, 8-10% of all medium and heavy duty trucks sold in the US alone will feature a natural gas powertrain system. If you look at Europe, it's interesting because a lot of OEMs have invested in NG technology in-house, whereas in North America, Cummins is the engine manufacturer offering natural gas engines and every other truck maker is buying. In Europe, we are forecasting that by 2018, 3.8% of all medium and heavy duty trucks and buses will feature natural gas engines."

Blocked up

But there are still other, rarely discussed, barriers to the industry. Mark Sealy, Global Technical Director of the Commercial Vehicle Sector at Norgren, has witnessed challenges for the fluid control industry as the numbers of natural gas vehicles increase. It appears that infrastructure will not be the only difficulty when it comes to natural gas adoption: "Natural gas is a very significant challenge. It could be that a third of the world's trucks are actually converted to gas in 15 years, so that's a huge undertaking."

Navigant concluded that by 2022, the number of natural gas vehicles will be around 1.9 million trucks and 1.8 million buses. To meet the demand for this, it is expected that 994,404 CNG cylinders will be sold the same year. The consulting firm further expects natural gas trucks and buses to consume 3.8 trillion cubic feet of natural gas in 2022, accounting for 69.8% of all natural gas used for transportation purposes.

Frost & Sullivan, meanwhile, predicts that sales of CNG, LNG, hybrid and electric enabled trucks will account for over 500,000 units by 2020. Natural gas will emerge as a key fuel of the future and, by 2022, will account for 8.5% of fuel globally. Kar believes that currently natural gas is most important in South America, Russia, China and India, and while it will not displace diesel, it will have the highest growth rate. Globally, around 86% of MCV and HCV trucks will continue to run on diesel by 2020, but 8.5% of trucks sold will feature natural gas engines, 3.8% hybrid-electric and 1.4% gasoline.

While the figures are not directly comparable, due to the inclusion of alternative powertrains, both point towards one thing: natural gas engines will see significant growth rate over the coming years and fast become one of the most important fuels of the future.

"The biggest segment in the CV trucking market is long-haul trucks and, unless you have fuelling infrastructure on a continental basis, we will not see rapid adoption of natural gas powered trucks," Kar concludes. "That is changing slowly but surely, but we are not quite at a stage where we can say natural gas is a fuel that is widely adopted by the CV market. We are quite a few years away from there."

Global platforms: the killer app for system control or the Holy Grail for engineers?

***Aaron K. Warner** talks to Olivier Raynauld, BWI Group's Global Manager of Suspension Technologies, about the practicalities of engineering a vehicle platform*

After a decade of only partially fulfilled promises, global platforms are finally demonstrating their true value. With similar vehicles now built in Europe, Asia, the USA and Russia, opportunities for cost saving and avoiding the proliferation of parallel specifications have never been greater.

As OEMs turn increasingly to global platform strategies, they walk a tightrope between two conflicting challenges: too great a commonality of components compromises the individuality and competitiveness of the individual regional models; too little commonality undermines the goal of platform sharing, as multiple specifications increase the parts count and reduce economies of scale.

This is perfectly illustrated by the dilemma facing chassis engineers. The drive towards global platforms has shifted the emphasis of damper development beyond improving specific damper performance to developing sufficient dynamic range, so that chassis engineers have the elbow room to meet global requirements with common hardware. "We are giving the vehicle engineers a bigger sand pit in which to play," says Olivier Raynauld, Manager of Global Technology and Business Development at BWI Group, the Tier 1 suspension and braking system supplier.

The 'sand pit' Raynauld refers to is the system operating envelope, which must be big enough to satisfy different regional preferences and road conditions. "A system with insufficient bandwidth effectively 'locks up' at higher frequencies, meaning the control of wheel-hop motion is no better than with a passive damper," explains Raynauld. "The challenge for any controlled suspension is therefore to minimise the time spent operating as a passive system; the lower the available bandwidth, the earlier the point at which the system must rely on its passive characteristics, making wheel control and ride comfort harder to achieve. This explains why there are fundamental differences between the on-paper performance of some systems and their capabilities in practice."

Stable tyre forces are essential for predictable vehicle handling and improved safety: their effective management requires control of wheel-hop frequencies around 10-15Hz. Ride comfort depends on good body control when subjected to road features, typically involving frequencies in the range of1-2Hz. Disturbance from the wheels must be minimised - this is the basic requirement of effective Skyhook semi-active damping control - so the wheel frequencies really should be actively controlled. And that, in turn, dictates the required bandwidth of a successful system.

Equally important is the response time of the system: if too long, the appropriate damping force is not provided when required. The response speed, from firm-to-soft and soft-to-firm, must be short enough to ensure the selected damping coefficient is kept in the correct phasing in order to provide the required damping at all times. "It is important to achieve times below 20ms for the soft-firm, firm-soft damper transitions, combined with the necessary bandwidth to separate body control and wheel control effectively," says Raynauld.

"The key to greater hardware commonality, across different regions and markets, and between different models, is to eliminate the need to change the passive hydraulic damping," Raynauld continues. "Once this point is reached, all the differences can be accommodated through fine tuning by wire, enabling the OEM to accommodate the variations in road types and surfaces that occur in different markets without introducing regional variations in damper hardware.

"One OEM, for example, produces an exclusive, long wheelbase variant for China, which required a recalibration of the software, while the hydraulic damper hardware remained the same" he says. "With shared platforms, the calibration is often changed between models such as the Audi A3 TDI and TT RS, but all the hardware remains common."

The use of regional assembly plants, building products in parallel and supported by local supplier networks, further complicates the picture. "In order to ensure uniformity of hardware performance between regions, common specifications alone are not enough; global quality standards for every manufacturing step must be maintained," says Raynauld. "In this respect, the role of quality and manufacturing engineers can be as crucial as that of the original development team."

In a global market, where product differentiation is often paramount in achieving and retaining market share, controlled or semi-active suspension systems can help by delivering ride and handling performance that is optimised for each market, and on every model variant, while minimising expensive hardware proliferation. Aligning with recent trends and public expectations for infinitely configurable products, controlled suspension that can be individually configured by the customer may be just around the corner.


intel
Driving in-vehicle innovation with the Internet of Things.
Learn more at
intel.com/automotive
It's only natural for our digital, connected lives to extend to our cars to make our rides safer and more enjoyable. Intel is setting the wheels in motion by partnering with the automotive industry. We are using our technology and expertise, and investing in research and ecosystem alignment, to accelerate the development of innovative, unique experiences from the car to the cloud.

Interview: Elliot Garbus

President, Internet of Things Solutions Group and General Manager, Automotive Solutions, Intel Corporation

The rapid increase in the number and variety of Internet-enabled devices that can communicate with each other is constantly adding credibility to the concept of the Internet of Things (IoT). This incorporates everything from individual smartphones and portable electronic devices, to smart cities and healthcare.

But the question remains where the car fits into this picture. The *automotive* Internet of Things includes factories, the supply chain and retail network, explains Elliot Garbus, Vice President of Intel's Internet of Things Solutions Group, and General Manager of the company's Automotive Solutions division.

"Different automakers are in different places in their thinking. And there are challenges and opportunities that relate to the traditional model for connectivity. The focus has been on safety and convenience to date. From emergency calling to listening to Pandora or Spotify in your car, the opportunity is to start thinking about how to use information from the vehicle to transform the relationship with the customer, or to improve operational efficiency.

"Toyota just got hit with a recall for a software update for the chargers in the Prius. 1.9 million vehicles need to go back to the dealer for a software update. At the other end of the connected car scale, Tesla is doing almost continual software updates. There's a very interesting opportunity in operational efficiency and cost avoidance. I've heard that it's not unusual for it to cost an OEM between US$200-400 to call a car in to the dealer."

Words: Martin Kahl

Software updates avoid cost; they can also deliver a new level of customer convenience. "The car is really about a brand relationship with the customer. And brand loyalty is always lowest when you've got a problem," says Garbus. "That can be as simple as a flat tyre. It's time to start thinking about using connectivity to transform the customer relationship. If my car has a slow leak in the tyre, I would prefer to get a text, and with the push of a button have a tow truck at my vehicle changing the tyre. That would transform the relationship. There are opportunities for automakers and suppliers."

Automotive within the IoT

For a car to be truly connected, and to really be part of an Internet of Things, it needs to be connected not just to other cars but to the wider infrastructure. Wake up in the morning, you're informed of traffic and weather conditions, advised when to leave and which route to drive. At the end of the day, your car knows when you're leaving work, selects your route, and adjusts the temperature in your house.

Achieving this involves improving the notion of context and intent. Get it right, and there are untold opportunities, says Garbus. "It's about delighting customers, and engaging them in the unexpected."

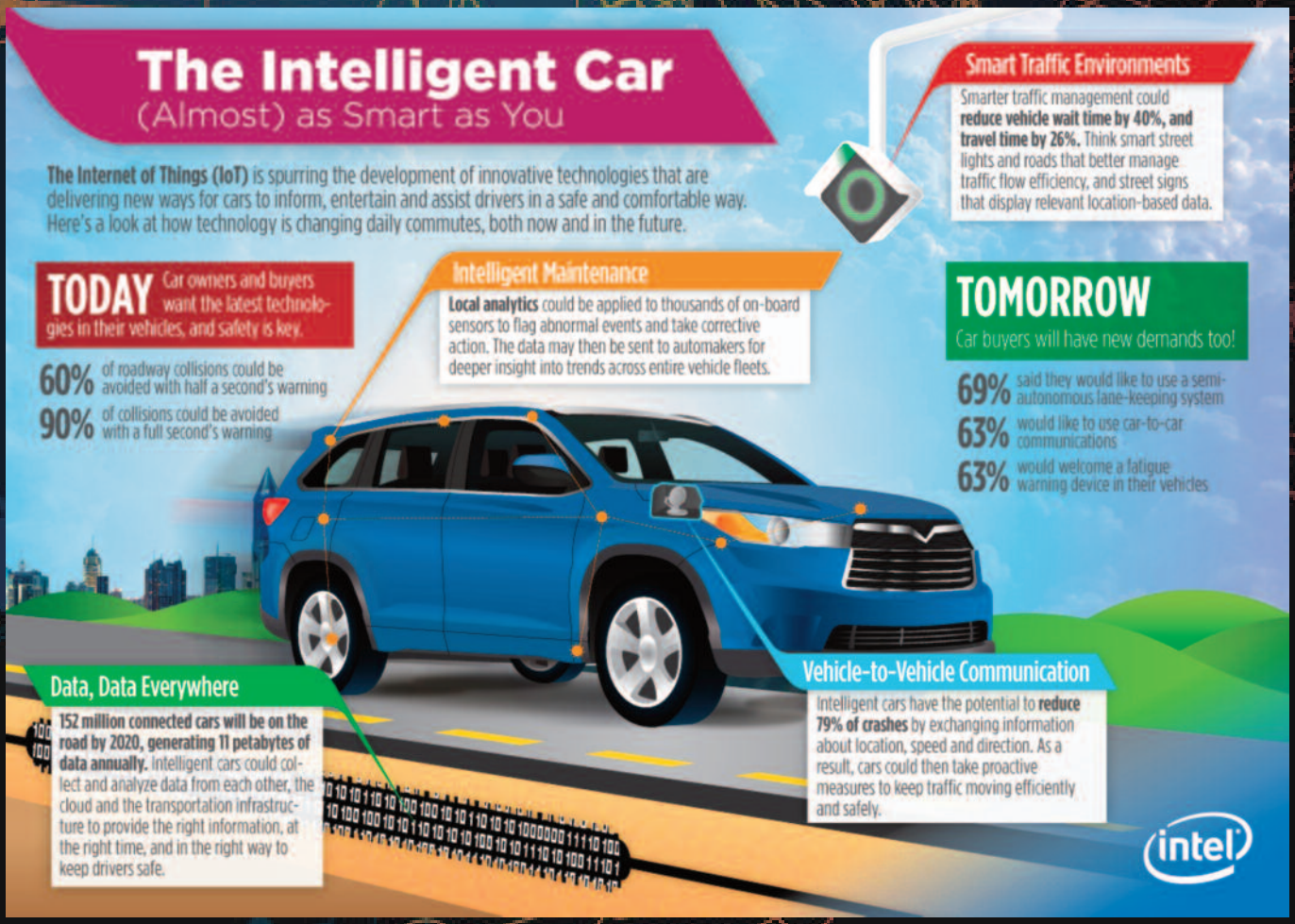
OEMs are beginning to see the benefits of controlling this. "Traditionally, much of this technology has been outsourced to a Tier 1 supplier. But I'm seeing a number of automakers bringing this technology in-house because the in-car experience is so critical," he explains. "And the user experience opens up all kinds of opportunities. What are the partnerships? How do you leverage data? How can you build a system that evolves? So much of what we see in vehicles is almost the same design, re-engineered, because the suppliers have been changed. We need to evolve towards a truly platform-oriented approach."

Garbus cites the transformation of the software-defined cockpit as a key megatrend driving Intel's activities in the automotive industry. "This involves the need to bring together connected experiences, both inside and outside the car, into a seamless environment that integrates centre stack and instrument cluster - and a heads-up display is critically important to delivering a compelling, safer capability. Integrated and extending into that are advanced driver assistance systems, or ADAS. All of these screens create an opportunity for the appropriate level and place for visualisations, to help keep us safer. That in turn opens up interesting opportunities in mobile augmented reality."

Another key megatrends is the impact of cost reductions in the core technologies required to accelerate the uptake of IoT-related technology. "I'm seeing investments being made to aggressively drive down the cost of sensors." The cost of computing will continue to fall, as will the cost of connectivity, in terms of service, network bandwidth and silicon capability. Add to that the falling costs of data centre and Cloud infrastructure, and the economics of computing and analytics change considerably. "That in turn creates an overall megatrend around the collection and transformation of data into usable information."

It is the integration of these car-specific systems and safety, says Garbus, that creates unique high value automotive experiences. "Moving forward," he adds, "the vehicle becomes context aware, first for safety, and then on the path towards the autonomous vehicle."

Crucially, concludes Garbus, the IoT itself is a megatrend. "And it's happening now".



VECTO, the truck industry's truck configurator

Martin Kahl

VECTO, the truck configuration simulator being developed by the European Commission's DG CLIMA with support from ACEA, will help truck buyers evaluate truck performance ahead of purchase

If there's one factor that is common to CV fleets in any market, it is that fuel economy is a top customer priority. While total cost of ownership (TCO) is heavily affected by fuel efficiency, TCO itself ranks relatively low in the top ten customer priorities, says the European Automobile Manufacturers Association (ACEA). Citing a 2010 survey conducted by Oliver Wyman Analysis, ACEA says West European customers ranked fuel consumption third, behind reliability and service quality, respectively; TCO ranked ninth. In the same survey, Eastern European customers ranked fuel consumption second, behind reliability, with TCO again ranking in ninth place.

According to an ACEA paper, "fuel efficiency is one of the most important competitive factors in developing and selling trucks and buses. Therefore, market forces ensure continuous progress in fuel economy and CO2 emission reduction." ACEA thus takes the view that any "legal requirement regarding fuel efficiency and CO2 emissions should aim to further strengthen these market forces."

The latest regulation to reduce emissions came into effect on 1 January 2014. Widely regarded as a "landmark technological achievement in emissions reduction", Euro VI has been achieved thanks to considerable investment in development on the part of the OEMs. As a result, Euro VI products require considerable up-front investment on the part of the OEMs' customers, namely the fleets.

With Euro VI now in place, the truck industry may feel it has just cause in calling for some respite from regulation, with an added suggestion that other industries should also deliver such levels of improvement. However, at ACEA's Truck of the Future summit, held in Brussels in December 2013, Connie Hedegaard, Europe's Commissioner for Climate Change, made it clear that, since regulation has succeeded in achieving such significant improvements in emissions reduction, there is a place for further regulation on CO2.

Always read the label

The European Commission (EC) says that it develops regulations in partnership with the industry. And, whilst private discussions with fleets, OEMs and suppliers indicate that the level of dialogue is far from where it needs to be, attempts are being made to create a 'voice of the industry' to work with the Commission to shape legislation. Specifically, since one size does not fit all when it comes to heavy duty vehicle (HDV) regulation, there is growing acceptance that there is a need for usage-based and duty cycle-related assessment.

ACEA believes that fuel efficiency cannot be calculated using a litre per kilometre approach, as it only compares similar vehicles carrying out similar duties. Instead, the Association proposes a drive cycle-based fuel used/work done metric, where work is calculated as ton/km, cubic metre/km or passengers/km.

With that in mind, ACEA is now working with the EC to develop a simulation tool to calculate the fuel efficiency of complete HDVs, based on the work done concept, using a common computer simulation tool. This is intended to satisfy the EC's 2008 HDV Energy Efficiency Labelling Policy Instrument, requiring the labelling of CO2 emissions from HDV engines, and the labelling of entire vehicles to predict the overall efficiency of the whole vehicle combination in operation.

"The truck industry has done its job so far, but it's not the end of the story"

- Connie Hedegaard, European Commissioner for Climate Action

ACEA's solution involves a modular approach to fuel efficiency declaration of HDVs, which should define and develop common metrics and methodologies. Using a tool for calculating fuel efficiency and CO2 generation, ACEA aims to enable fleet buyers to match vehicle classes with missions and duty cycles.

VECTO

As it stands, the range of vehicles classified as commercial in Europe stretches from 3.5t to 76t - thanks to new regulations in Finland. This, coupled with the broad combinations of trailers and axles, means that OEMs do not know what tractor/truck configurations will be sold in any given year until orders come in. As a result, manufacturers cannot apply traditional vehicle testing.

But the aforementioned simulation tool will change this. ACEA's development process is being aided by former Director Regulatory Projects and industry consulant Stefan Larsson, together with the EC.

The Vehicle Energy Consumption Calculation Tool (VECTO) is aimed at fleet customers, says Larsson, to enable them to evaluate whether a certain tractor/trailer configuration is suitable and beneficial to them. The advantage of a simulation tool, he notes, is that it enables users to compare different configurations.

"VECTO calculates the expected energy consumption of different HD truck and bus vehicle configurations using ten different mission profiles. These are based on cycles which are distance-based for improved accuracy," explains Larsson. "Users can select different vehicle configurations from different manufacturers to see metrics such as fuel consumed and CO2 generated as g/tonne-km, g/passenger-km and average speed in the cycle used."

The VECTO programme has been put together by the Technical University of Graz and, although currently in prototype phase, it is expected to go live in 2017 as an internet-based service. The focus in development has been on air drag and engine mapping. However, once up and running, every vehicle that rolls off a production line will include data indicating the purposes and applications to which it is suited.

As with any database, the tool is only as good as the data it contains, which, in this instance, will be provided by OEMs and suppliers. This is complicated by the intricate methodology required - "transmission efficiency alone ran to about 20 pages", Larsson comments.

It may be complicated, but it is accepted by the EC, and, Larsson says, has the backing of the commercial vehicle industry.

From a regulator's perspective, VECTO enables the EC to monitor improvements in HDV performance. During her keynote address at Truck of the Future, Commissioner Hedegaard acknowledged the CV industry's improvements to date, but suggested the likelihood of further regulation. "The truck industry has done its job so far, but it's not the end of the story."

The industry, on the other hand, is keen to support anything that keeps fuel efficiency improvements in the hands of market forces, and out of regulators' control. "We believe that market force is the best way," says Larsson.

Future trucks

Speaking at the November event, Dr Wolfgang Bernhard, Chairman of the ACEA Commercial Vehicle Board and Chief Executive, Daimler Trucks, emphasised the truck industry's concern about further regulation: "Additional gains in fuel efficiency will be more and more difficult to achieve. The truck industry cannot face all of them alone. That's why we need to support the idea of an integrated approach." He adds, "ACEA truck manufacturers have committed to a 20% fuel reduction from 2005 to 2020. We're making good progress, but due to diminishing returns, further progress will be even more difficult to achieve."

In addition to the oft-cited concerns surrounding the cost of meeting regulation, ACEA is worried about the creation of a false market. The use of a traditional, broad stroke approach to regulation in such a wide industry sector leads to generalisation, explains Larsson, and fails to take into consideration the variations in use and their application. Trucks thus have to meet regulations, but are then used in applications that fail to exploit the efficiency improvements forced by those regulations. "We are afraid that this artificial market will move away from the real market. Therefore we as an industry need to be as close as possible to the real market, rather than showing that we are compliant with an artificial market," says Larsson.

For post-Euro VI CO2 emissions reductions, ACEA supports a cost-effectiveness-based integrated approach. CO2 emission reduction is a global issue that encompasses much more than road vehicles alone, so the Association is calling for the inclusion of road freight in a global, non-sector specific emissions trading scheme, as well as globally harmonised policies for HDVs.

As a result of industry and market consolidation, "there are very few towing vehicle manufacturers, yet there are at least 4,000 body and trailer manufacturers in Europe alone," says Larsson. Light commercial vehicle manufacturers are responsible for the emissions and fuel consumption of the full vehicle, body or no body. "Don't put this responsibility on the HGV manufacturer, who cannot be responsible for the use of the complete vehicle including bodies and trailers," he adds.

By creating a tool for fleets, ACEA is helping its members to help their customers. Buyers will be able to evaluate the expected performance of whole-vehicle applications before purchase, enabling them to pick the most appropriate vehicle for the job.

Driving future-forward mobile connected transportation solutions.

Developing technology products and services with dedicated teams who strive for partner success.

Delivering end-to-end innovation in mobility through user experience and next generation design, data analysis, and cloud architecture.

LIXAR.COM

The connected consumer

In the modern automotive industry, the word 'communications' is increasingly related to the latest in electronic connectivity. But there is another application of the word which should also be the subject of focus, says ***Martin Hayes****: the more traditional matter of delivering your message to the public*

Since Henry Ford was a boy, getting car news to consumers has relied on a variety of tools, with advertising having the highest impact - albeit at the highest cost - and the words of the motoring journalist being arguably the most influential. The stars of the cars, from Jeremy Clarkson to Jay Leno, via the motoring correspondent of your local newspaper, have a treasured place in communicating brand and product differentiators. It is their opinions which guide and focus those discussions across the world wherever motoring enthusiasts are gathered together.

But this is changing, and those whose role it is to transmit brand messaging and new product features need to understand what is going on. The same revolution which is delivering the connected car is also delivering the connected consumer, able to access a vast array of facts and opinions about his or her car from their desktop or mobile device. In this fragmented world, it is much more difficult to pick out the source of those opinions: yes, the truly committed will search for the views of their trusted guide, but for many a comment is a comment without much quality control.

So how are OEMs' communications teams shaping up to this new world? Well, the product launch is still king - and flying groups of journalists around the world to some exotic destination or other to test drive the latest model on offer still works. But it is expensive, and the increasing speed of introductions makes affordability worse, putting more pressure on launch events.

At the same time, the question has to be asked, who to take? With the plethora of motoring blogs, are traditional print titles where it is at any longer? This is a complex picture and with a generation of new car drivers and buyers rapidly approaching, for whom a Tweet is more likely to be of influence than a five-page carefully crafted road test report in a specialist magazine, it is one which is not going to go away.


August 31 2013

Video: Jay Leno, the first man outside McLaren to drive the P1 supercar

It is becoming increasingly apparent that a new model is evolving for getting messages out to consumers. There will always be a group of journalist 'gods' for whom nothing is too good, no location too exotic and no slice of the chief executive's time too expensive. But there is going to be a much larger group of pundits for whom simpler, cheaper and more accessible communications tools will need to be deployed. The webinar will have an increasing role but that does not deliver on a new car's driving qualities.

Will the dealer have to step forward to provide access to models close to each media outlet? That may be a frightening thought for OEM PRs but there are few alternatives. At a Chinese motor show not long ago, police had to take action to control thousands of 'journalists'. The writing is on the wall: look for changes in the way cars are launched and written about: there will certainly be more opinions and more tests, but not necessarily clearer messages.

Martin Hayes is Executive Chairman of Orb Communications Group, parent company of Automotive PR (APR) and Torque PR

Interview: Andrew Poliak

Director, Automotive Business Development, QNX

There are many reasons why automotive manufacturers are now looking outside the industry for companies to develop in-car electronics, but most notable is the need to build high-quality products that can stay current with the rapidly moving consumer electronics industry.

QNX, the wholly owned subsidiary of Blackberry, is just one electronics company which has moved over into the automotive sphere, announcing collaborations with multiple OEMs and suppliers. QNX believes that the car needs to keep up with the rate of consumer electronics development while maintaining a quality standard. Indeed, recent work with Google, Apple and Nokia has ensured QNX is catering to consumer needs.

"Many suppliers are now moving towards an automotive environment, but we all have to work towards and maintain that automotive quality standard," says Andrew Poliak, Director of Automotive Business Development at QNX.

Poliak started working with QNX in 2000, to deal with the company's alliances, and in 2005 formed the Automotive Business Development team, after noticing increasing possibilities for CE suppliers and automotive OEMs. He also helped to launch the QNX CAR application, which reduces the engineering needed to develop connected in-car systems, enabling the technology to develop and update without the need for the car to go back to a dealer. The platform combines QNX's automotive grade operating system with the ability to run web or Android apps.

"We focus on getting a lot of the problems with boot speeds, with the ability to interact with iPods and iPhones, and all these things, figured out in advance and then we give it to the car company, which benefits the grand scheme of things, especially when the car leaves the garage," says Poliak.

QNX bypassed the slow development of the automotive industry in electronics by creating a platform with the ability to be updated after installation in a vehicle. "What we have found is that with many suppliers it would take three to five years to build an automotive platform," Poliak comments. "So what we decided to do is take all those little building blocks that we made and combine them into one reference implementation."

The supplier recently worked with Chrysler on the Chrysler 8.4-inch UConnect Touch, a QNX-based system with the ability to download apps after purchasing the vehicle, along with other automotive grade developments such as autonomous, semi-autonomous or advanced driver assistance systems. "The advantage of our operating system is, while we can support all these consumer things, we also have auto grade underpinning the non-operating system, so we're also being used for safety critical applications," says Poliak.

However, Poliak still considers both built in and brought in technology as essential for development of the connected car: "whether it's a brought in experience and projected from your phone; whether it's a built in and you can download apps to the car; or whether you're using the Cloud for a lot of your content and services - the point from QNX perspective is we're enabling all of them. I think they will change a lot, too. Over the next two to three years, you'll see a lot of brought in experiences from your mobile handset, and more downloadable apps and content directly in the vehicle. Ultimately, any content will be available to any device, purchased any time, and that will be something that the automotive realm will migrate to."

Amongst these ideals comes challenges, which Poliak believes lie with matching the experience in the car to the one that users have on their smartphones. "One of the biggest challenges is that, in many cases, the same processors used in smartphones are being used in cars. However, that happened in the last ten years, not the average year to two years that you find on a smartphone," Poliak notes.

"I think a big trend is going to be how you capitalise on these huge developer ecosystems and application environments to get an automotive version. The solution is not to adopt a consumer phone application, that's really geared for 0mph use, into an automotive screen that's geared for 70mph use, so leveraging those developer communities to find the appropriate flavours of those apps to use in an automotive screen will become very important."

Closely linked to this, in Poliak's view, is the blending of safety systems with non-safety systems. "We see a big trend as you drive down into low-end vehicles of trying to consolidate cluster with infotainment; or advanced driver assistance, or semi-autonomous functions, or surround-view cameras, with infotainment. QNX is working on this right now. Overall, it's a trend to blend things that require safety certification with things like Android apps, which aren't safety certified."

Words: Rachel Boagey

Quality Software Makes the Car Better.

Continuous Delivery Makes the Software Better.

Accelerate Software Delivery

electric CLOUD

www.electric-cloud.com

/ @electriccloud

An industry of innovation: *but are we ready for the next century?*

John Flavin

Since Karl Benz introduced the first automobile in 1886 and Henry Ford brought the world mass production in 1914, manufacturers have constantly worked to improve upon motor vehicles and the processes they use to build them.

Safety concerns, environmental issues and consumer demands for speed and comfort have driven advancements ranging from anti-lock brakes and air bags to automatic transmissions and lumbar supports. Volume, speed and cost demands have also forced manufacturers to think outside the box about the production process. Today robotics, lean manufacturing and cellular assembly systems are all employed to streamline and speed up operations on the plant floor. But while the technology has changed over time, one thing has remained constant: the goal of efficient and cost-effective manufacturing.

Smart parts

The key elements of today's automotive industry involve so much more than just nuts and bolts. Electronics are now being heavily integrated with the parts that make up a vehicle's engine, transmission, chassis and brake systems - in turn creating a more complex component. Sensors and other electronic parts, for example, must be embedded into mundane components like head gaskets and axles so that data on wheel load, torque levels and thermal conditions can be fed back to the vehicle to improve safety and drivability.

Innovations rely upon the many ways that high-tech capabilities can be integrated with the traditional parts and manufacturing processes. It is crucial to not only improve the automotive components and systems but also to streamline the steps involved in building them.

Smart questions

Changing the mindset of manufacturing from a focus on the physical product to a broader view of the entire automotive system has been essential to take advantage of opportunities for innovation.

Today's automotive leaders know that it is not enough just to understand how to forge, fabricate or assemble a part to meet customer specifications: workforces must be trained to thoroughly comprehend the operating value and characteristics of every single part. Employees need to constantly ask themselves which operating parameters of each part can improve the overall operation of the vehicles they support. Only then can a company team with a customer to introduce enhancements.

It is this kind of thinking that is allowing visionary manufacturers to keep pace with the evolving needs of OEMs, consumers and the industry as a whole.

Smart people

But how can today's manufacturer ensure that its workforce maintains the broad view needed for innovation? First, management must buy in to the key elements of innovation by maintaining collaborative dialogue with customers, suppliers and partners. Organisations should share business information with the entire workforce, encourage employees to submit new ideas and reward them for taking calculated risks.

Secondly, automotive manufacturers must ensure that they are attracting the best and brightest people into their workforces. Many companies are still struggling with filling the gaps created when a flood of experienced automotive professionals left the industry during the struggling economies of 2007 through to 2009. Conveniently, however, industry leaders have been able to rely on the very technology they have used to improve their manufacturing processes in order to attract and maintain staff with the exact experience they need.

The recruitment process is especially easy for those companies that make use of the latest enterprise resource technology (ERP) solutions. When today's 20-somethings see that the technology they are able to use in manufacturing jobs is elegant and intuitive - nothing like the now basic green screen systems previous generations had to work with - they are right at home. Raised on tablets, smartphones and social media, the incoming workforce already knows how technology can allow them to access and use real-time information in their personal lives. And now, more than a century after the assembly line began its run, the evolving workforce is ready to use the tools of its generation to drive innovation into the industry's next century.

John Flavin is Executive Vice President of Global Manufacturing at Infor.

DOCOL®
HIGH STRENGTH STEEL

He couldn't care less about bumpers.

But we care about him.

When you're in the business of protecting lives, you need a team of the best experts. A team that is ready to solve any problem and ready to take the next step. A team that actually cares.

For over 30 years the global team at SSAB has supplied Docol branded Advanced High Strength Steel, which makes products lighter, stronger and more sustainable – so that every single car safety component can be optimized and more lives can be saved.

It's not about steel. It's about life.

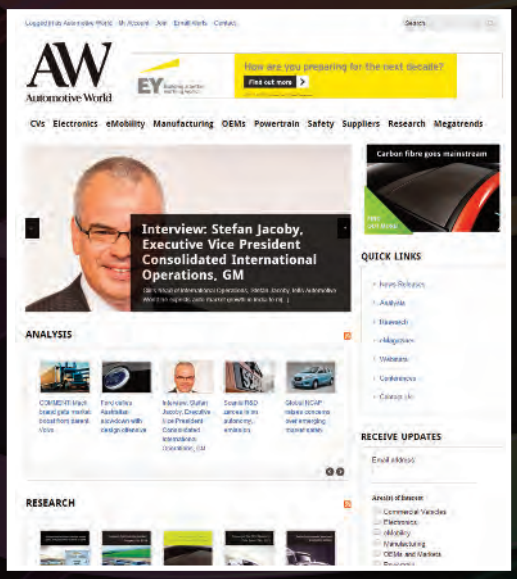
www.docol.com

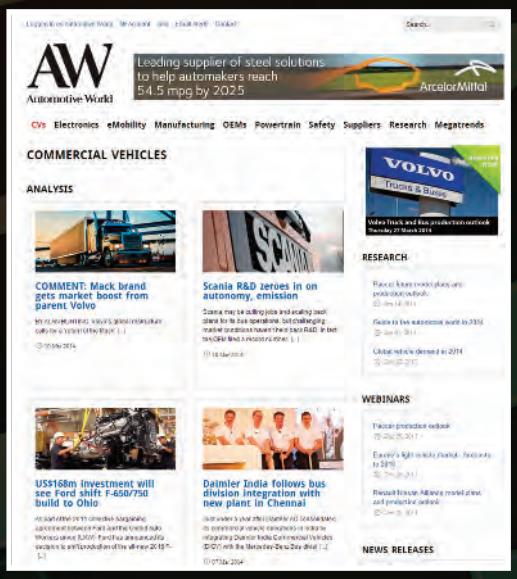
SSAB

Automotive World

automotive industry news analysis, research and events

Visit *AutomotiveWorld.com* for the latest CV and passenger car industry news analysis and comment





Featuring: Webinars, Briefings, OEM production and regional sales forecasts and eMagazines and more

AW
Automotive World