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BEHIND THE SCENES AT FORMULA E AS
IT PREPARES TO LIGHT UP MOTOR SPORT





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ISSUE
#7

AUTO

INTERNATIONAL
JOURNAL OF THE FIA

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We would like to thank the following
for their help with this issue of AUTO:

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GALLAGHER, EDUARDO LESSA, ADAM
McDAID, TOM PHILLIPS, AUDE RAYNAUT,
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CHARGING FORWARD

More than ever before, motor sport is at the forefront of engineering technology.

The new hybrid powertrains used in Formula One are pushing the boundaries of what is possible in terms of engine design, energy recovery and power output. And later this year motor sport's first all-electric global championship is set to break more new ground.

The FIA Formula E Championship is leading the charge when it comes to motor sport's cutting-edge credentials and its relevance to the automotive industry. In this issue, AUTO talks to the teams, technicians, drivers and power players behind the new series and finds out what's in store for this exciting addition to the racing landscape.

Another series to be propelled forward in 2014 is the FIA World Touring Car Championship, following the addition of nine-time World Rally Champion Sébastien Loeb to the Citroën team. AUTO follows his progress as he switches codes to circuit racing with stunning results.

He will be hoping to match the success of another world champion who switched codes - John Surtees. In an extensive interview he looks back on his career, including his regrets and triumphs. Some even more significant victories have been achieved in the world of motoring, with the FIA successfully campaigning for safer systems to be added to trucks across the EU. In South America, the FIA Foundation-supported Gonzalo Rodríguez foundation has been equally effective in bringing in legislation to improve school bus safety for children.

THE FIA

The Fédération Internationale de l'Automobile is the governing body of world motor sport and the federation of the world's leading motoring organisations. Founded in 1904, it brings together 236 national motoring and sporting organisations from over 135 countries, representing millions of motorists worldwide. In motor sport, it administers the rules and regulations for all international four-wheel sport, including the FIA Formula One World Championship and FIA World Rally Championship.

THE FIA FOUNDATION

The FIA Foundation is an independent UK-registered charity that supports an international programme of activities promoting road safety, the environment and sustainable mobility. It was established in 2001 with a donation of \$300 million from the FIA and is governed by a Board of Trustees. Among its activities, the Foundation participates in various UN road safety and environment related partnerships and is a member of the UN Global Road Safety Collaboration.

THE FIA INSTITUTE

The FIA Institute is an international not-for-profit organisation that develops and improves motor sport safety and sustainability. It leads projects that encourage the rapid development of new and improved safety technologies; that facilitate higher standards of education and training; and that raise awareness of safety and sustainability issues. The Institute was established in October 2004 and funds its activities through annual grants from the FIA Foundation.

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From protecting schoolgoers in Uruguay to schooling young racers in Italy, this is AUTO



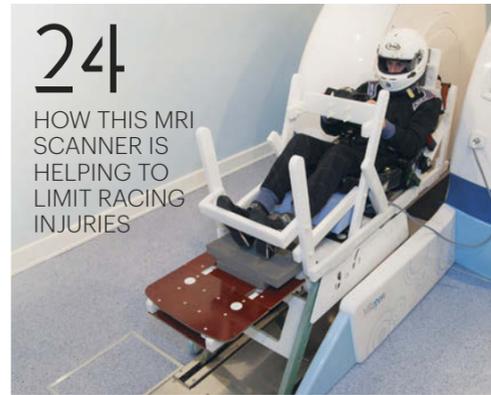
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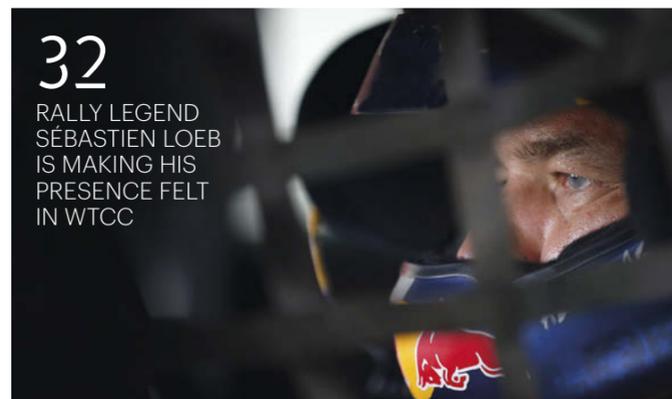
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FIA Academy driver Gabby Chaves is putting his experience to good use in the US Indy Lights series

Rally Açores

HOME OF THE BRAVE

Not only did Portugal's Bernardo Sousa claim his maiden FIA European Rally Championship victory on Rallye Açores, he also won the prestigious For the Braves accolade.

For the Braves was a new initiative introduced for this year's 49th running of the spectacular gravel event, aimed at rewarding the driver who showed the greatest will to win.

Driving a Ford Fiesta RRC, Sousa won the prize for overcoming significant mechanical problems during the event and also for holding his nerve in a tense closing-stage battle with second-placed Kevin Abbring. Going into the final test, Sousa held a narrow 5.1-second lead over Abbring, but he powered forward to stretch the gap by a further 1.1 seconds over the 21km stage.

"We thought it would be hard but day-by-day, stage-by-stage I started to believe it would be possible," said Sousa, who also celebrated his 27th birthday on the event. "The fans were pushing and cheering. It's incredible, a dream come true. Last year the win was blown away by a mistake of mine. Now it's my time and I hope this win brings me much more in the future."

Sousa's fist ERC success vaulted him to seventh in the standings as the championship approaches its halfway mark. Finland's Esapekka Lappi leads with 98 points, 29 clear of Ireland's Craig Breen, with Russia Vasily Gryazin third.

The Rally Açores was notable too for the drivers gathering pre-event to pledge their commitment to the FIA's Action for Road Safety campaign (below). The campaign, in support of the United Nations Decade of Action for Road Safety, aims to help save five million lives on the world's roads by 2020.



EYES ON THE ROAD...
Bernardo Sousa and co-driver Hugo Magalhães tackle the most spectacular stage on Rallye Açores – Sete Cidades, which is based around a huge volcanic crater on the island of São Miguel.

PHOTOGRAPHY: DRPH

Island dream

FESTIVAL OF SPEED

It may be a small island nation in the Caribbean but Barbados has a secure future on the grand stage of world motor sport after the launch of the new Bushy Park circuit with two of racing's biggest stars – Lewis Hamilton and Ken Block.

Thanks to a Motor Sport Safety Development Fund grant and assistance from the FIA Institute, which helped to develop a master plan for the circuit, it was ready for its first event in May. It did

not disappoint as the Top Gear Festival pitted Hamilton's Mercedes AMG F1 car against Block's rallycross racer.

"The fund's Facility Improvement Programme provided an opportunity to develop a professional and sustainable case for the Bushy Park circuit," said Andrew Mallalieu, president of the Barbados Motoring Federation. "The result is a lasting legacy for the development of motor sport in this region."

The circuit, which has been built to FIA Grade 3 standard, has agreed a three-year deal to host the Top Gear Festival, enabling it to showcase the facility as it develops a broader calendar of events. But the ambition does not stop there. As Mallalieu put it: "This facility itself is just one more step in achieving our 20-year vision of having a Barbadian as world champion in one or more FIA championships."



BLOCK vs HAMILTON

Barbadian motor sport fans were treated to a rare spectacle when rallycross star Ken Block pitted his 600bhp Ford Fiesta ST against Lewis Hamilton's Mercedes F1 car at the new Bushy Park circuit.

AUTO NEWS

In this issue, Nissan helps to swell the ranks of World Endurance Championship manufacturers, Mercedes reveals plans to use its F1 hybrid engine knowledge in road car development, Toyota enlists the help of pop star Taylor Swift in a new seatbelt campaign, and Zoleka Mandela and Michelle Yeoh lead calls for greater global road safety

NISSAN BECOMES FOURTH MAJOR MANUFACTURER TO ENTER WEC

Nissan will become the fourth major manufacturer to compete in the FIA World Endurance Championship after the Japanese company confirmed that it

will take on Audi, Toyota and Porsche in the flagship sportscar series.

The company will this year take its ZEOD RC hybrid car to the Le Mans 24 Hours, which forms round four of the WEC, and it will race from the event's Garage 56, reserved for experimental machines. Next year, however, it will launch a full assault on the championship's top LMP1 category with a car to be known as the GT-R LM NISMO.

Nissan vice-president Andy Palmer explained that the car manufacturer had been convinced to take on the challenge by new championship regulations introduced by the FIA and WEC partner the Automobile Club de l'Ouest ACO that put the focus on efficiency.

"We applaud the ACO and FIA for the work they have done to get the rules right," he said. "LMP1 is not just an arms race – all our rivals in the class have taken different technical approaches and we will be doing the same."

He added that Nissan wants "to win in a very different way to that of our rivals".

"We won't be turning up in a vehicle that is a basically another hybrid which looks like a Porsche, Audi or Toyota," he added. "Our intention is to do something a little bit different."

No details of what that approach may be were revealed at the project's launch in London but Shoichi Miyatani, head of Nissan's competition and tuning arm NISMO, said: "The design and build of the Nissan GT-R LM NISMO is a global project with its DNA firmly rooted in Japan. The team comprises engineers and technical crew from Japan, the US and Europe."

FIA ANNOUNCES EDF AS OFFICIAL TECHNICAL SUPPLIER

The Fédération Internationale de l'Automobile (FIA) has revealed that global electricity producer and supplier EDF will become an Official Technical Supplier to the federation.

EDF will aid the FIA in audit and research tests of propulsion, charging and electrical safety in motor sport. The French multinational is an industry leader in the field of research surrounding electric vehicles, batteries and charging systems.

The three-year agreement will promote the sharing of information and best practice between FIA and EDF technical experts on issues concerning the use and practical application of electric battery cells and packs, engines, transmission and charging systems, as well as infrastructure.

FIA president Jean Todt said: "I am very pleased to welcome this agreement with EDF, which will spur innovation and collaboration on the next generation of electric vehicles. As one of the foremost companies carrying out research on electro-mobility, EDF will bring invaluable expertise and input to our championships, allowing the FIA to further strengthen its position as a leading promoter of new technologies."

EDF's input will be of particular relevance as the FIA launches the Formula E electric racing series in September, as FIA technical director Bernard Niclot explained.

"This is a year of major technological revolution for the FIA's championships, with powerful hybrid engines coming into the F1 and World Endurance Championships, and the establishment of the new Formula E Championship," he said. "In this context of new technology development, EDF's high level of technical expertise is essential and I welcome this partnership."

Bernard Salha, senior executive vice-president head of research and development at EDF, added: "[This agreement] will enable EDF to be technically involved at the highest level of motor sport and thus contribute to the progress of new technologies."



HOST NATIONS CHOSEN FOR 2015 FIA ACADEMY

Drivers took part in just one selection event in Europe last year for the 2014 Academy.

Six nations have been confirmed as hosts of selection events for the next FIA Institute Young Driver Excellence Academy.

The events will be held by FIA National Sporting Authorities (ASNs) in the Netherlands, Croatia, UAE, South Africa, Mexico and China.

The global selection process has been expanded further this year to give as many young drivers as possible the chance to apply and participate in the scheme. The Europe region, which accounts for 47 eligible countries, has been split across two events representing the North East and South West areas. The event in China will be undertaken as a collaborative project between the Chinese (FASC) and Australian (CAMS) ASNs.

Last year, five events provided an opportunity for more than 70 drivers – each the top pick of their country – to compete for selection in their region. These prestigious events provided significant opportunities to every participant, with drivers receiving four days of world-class training and education while competing for a place in the main Academy.

This year's events will run from August to late October, with each receiving global coverage on the FIA Institute website and promotion in front of the world's motor sport media. Each ASN can nominate one driver from its jurisdiction to take part in a selection event. The Academy is open to drivers aged 17-23 who have demonstrated ability and competitiveness in their motor sport career so far.

The winner of each regional event will gain automatic selection to the 2015 Academy. A further four drivers will be selected using a wildcard system to form the final class of 10 Academy participants.

The Academy offers a fully-funded training programme to help drivers develop their motor sport careers while increasing safety skills and promoting fairness and responsibility on and off the track. Graduates of the programme include Formula One reserve drivers such as Caterham F1's Alexander Rossi and McLaren's Stoffel Vandoorne, World Rally Championship driver Andreas Mikkelsen and European Rally Championship frontrunner Craig Breen.



Nissan has yet to unveil its new hybrid challenger – the latest car to join its line-up of NISMO racers.



MERCEDES ROAD CARS WILL BENEFIT FROM F1

Mercedes-Benz will benefit from the expertise gained in the development of Formula One's new hybrid engines by turning the attention of its F1 engine development facility to road car research.

The company's High Performance Powertrains facility at Brixworth in the UK has spent the past two years developing a 1.6-litre, V6 turbocharged hybrid powerplant, the PU106A, to conform with new FIA regulations for the 2014 F1 season. The company's F1 team currently leads the drivers' and constructors' championships.

However, with the main development phase of the power unit complete, Mercedes-Benz head of development Thomas Weber says the Brixworth facility will now use the expertise gained to assist with road car projects.

"In combination with AMG there are some new ideas about what we can do together," Weber told UK magazine *Autocar*, adding that with development of F1's powerplants falling under a proscribed life cycle new opportunities can be explored. "Normally we would have to look at reducing the workforce in line with this cycle. It is necessary to reduce spending.

"However, with this qualified team of engineers [at Brixworth], I have some ideas to do advanced engineering studies and development activities, and maybe also production of high-end models. The reason we can play this card is because Brixworth boss Andy Cowell reports direct to me."

The Brixworth centre has had some input into the company's programmes and was responsible for powertrain development on the Mercedes-Benz AMG SLS Electric Drive.

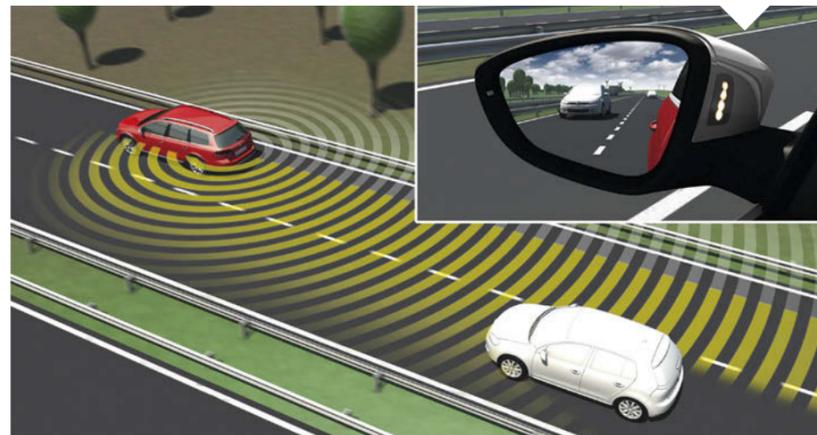
STRONG START FOR WORLD RALLYCROSS

The new FIA World Rallycross Championship produced two different winners from its first two events in Portugal and the United Kingdom in May.

Former World Rally Champion **Petter Solberg** won round one in Montalegre aboard his PS RX team's Citroën DS3, while Ford Olsbergs MSE driver **Andreas Bakkerud** won round two at Lydden Hill.

Bakkerud, who leads the championship by three points from Solberg, said: "This is a dream come true. We had a clean run and it was a close fight until the end."

The sixth FIA championship to be awarded world status has attracted a strong field, with rallycross stars such as Toomas 'Topi' Heikkinen racing against the likes of F1 star Jacques Villeneuve and Solberg. US rallycross ace Ken Block joined the grid for round three in Hell, Norway, on June 14-15.



VW PRESENTS FUTURE DRIVER ASSIST TECHNOLOGY

As part of the automotive industry's UR:BAN research programme into future driver assistance technology for road cars, Volkswagen has unveiled a range of new systems designed to improve safety.

Launched in 2012, UR:BAN involves over 30 automotive manufacturers, suppliers, electronics and software companies, research institutes and cities in collaborative research into the future of mobility. VW's latest contribution centres around cognitive assistance, driver-to-car communication and traffic management at intersections.

In its cognitive assistance project, VW is developing three systems to aid drivers in urban traffic. Its 'Lane Changing assistant' (below) helps drivers during manoeuvres in dense traffic. The system observes surrounding vehicles with 360° monitoring.

The 'Bottleneck assistant' helps drivers when vehicles are stationary or blocking the road. A development of the lane assist system already featured on production cars detects obstacles in the car's driving lane as well as in opposing traffic with a 3D sensor. The system checks whether a safe path exists and assists with active steering intervention. Lastly, the 'Emergency Braking assistant' reduces or even avoids collisions using braking and steering interventions.

VW is also developing a new intelligent communications system to present information to the driver. It believes this will contribute towards an anticipatory style of driving to make hazardous situations safer and promote low emissions.

The final system is the 'Intersection Pilot', designed to improve traffic efficiency. The system informs drivers about traffic nodes ahead, supporting them with optimal manoeuvres and improving traffic light switching by routing vehicle information.



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FIA AND TRANSPORT FORUM JOIN FORCES ON ROAD SAFETY

The FIA will partner the International Transport Forum (ITF) on a new research project aimed at improving the collection and analysis of road safety data in a bid to reduce fatalities and injuries.

The initiative aims to support the United Nations Decade of Action for Road Safety in its goal of significantly reducing traffic-related deaths and injuries by 2020. Around 1.3 million people die in road crashes every year and around 50 million are seriously injured. The global death toll from traffic is expected to rise to two million annually with a further 80 million serious injuries likely by 2020 unless action is taken.

The cooperation, which is supported by grant funding from the FIA Foundation, will focus on improving data collection, the analysis of which underpins road safety policy decisions.

After signing an agreement at the ITF's Annual Summit of Transport Ministers in Leipzig, Germany in May, FIA president Jean Todt said: "We will work on the development of universal road traffic safety indicators, which can be of great help when addressing national road safety problems. The expertise that the ITF has acquired in road safety data collection and analysis will allow us to better evaluate crash trends, improve the analysis of risk exposure and design more effective road safety policies."

ITF secretary-general José Viegas (above with President Todt) said: "Good data is critical for any road safety research, policy and crash prevention activities. The lack of data globally creates significant difficulties in assessing specific road safety issues."

ITF SUMMIT URGES GLOBAL ACTION ON SAFE MOBILITY

A new global campaign to replace the Millennium Development Goals must include safe and sustainable mobility, the FIA Foundation has told a session at the International Transport Forum (ITF) Annual Summit in Leipzig, Germany.

Presenting the 'Safe, Clean, Fair and Green' agenda for post-2015 sustainable mobility, the FIA Foundation urged governments to address road safety, air quality and fuel economy in their negotiations over the new development goals, which are currently taking place at the United Nations. The session featured the Global Fuel Economy Initiative, which is coordinated by the FIA Foundation and is playing a key role in the post-2015 agenda.

Chilean Transport Minister Cristian Bowen and the World Bank's director of transport, Jose-Luis Irigoyen, were guest speakers at the event. Bowen described Chile's approach to sustainable transport and outlined the new fuel economy labelling system for cars that has been introduced with support from GFEI. Irigoyen spoke about the findings of the World Bank's joint study with the Institute for Health Metrics and Evaluation on 'Transport for Health'.

The meeting was chaired by FIA Foundation director Saul Billingsley, who said: "Road traffic injury and poor air quality are placing intolerable burdens on millions of lives. These issues can be addressed with concerted global action to implement road safety, address fuel quality, encourage walkable urban spaces and improve fuel economy."

TOYOTA ENLISTS HELP OF SINGER SWIFT IN SEATBELT CAMPAIGN

Toyota has launched a new road safety initiative in southeast Asia to raise awareness among young people of the importance of wearing a seat belt.

Research conducted by the automotive giant across Indonesia, the Philippines, Malaysia, Thailand and Vietnam revealed that just 25 per cent of drivers and passengers wear seatbelts, and that airbags work 153 times better when seatbelts are worn.

The company believes that education is the basis for improving road safety and as such it is enlisting the help of pop star Taylor Swift (below), who will spread the road safety message to young people across the region during the course of her current tour, which the Japanese car company will partner with. The singer will help educate her fans on the importance of wearing a seatbelt via a video message that will be screened at her upcoming concerts and via online and social media platforms.

The promotion is being run in tandem with Toyota's Be Safety Leaders road safety campaign. The campaign emphasises that creating a safer road environment requires a concerted effort by all road users including drivers, pedestrians and others in embracing road safety as a way of life.



PHOTOGRAPHY: SHUTTERSTOCK

UN ROAD SAFETY DEBATE HEARS CALL FOR POST-2015 ACTION

The United Nations General Assembly has passed a new resolution aimed at addressing the growing epidemic of deaths and injuries on the world's roads.

Governments including Brazil, Jamaica and Russia urged inclusion of road safety in the post-2015 development goals due to be agreed next year.

Many speakers at the debate, including the US Ambassador to the UN Samantha Power pledged support for the Decade of Action for Road Safety.

Speaking at the assembly Global Road Safety Ambassador and member of the Global Road Safety Commission Michelle Yeoh (right), called for further worldwide support for solutions that have been proven to save lives in countries around the world, irrespective of income level.

"In my visits to many countries, alongside the sadness and loss, I have seen the ways in which solutions are being implemented and lives are being protected," she said. "However, if we are to achieve our objectives to save millions of lives globally, we must and can do much more."

"Safe mobility should be something we should all expect, irrespective of whether we are rich or poor, or from the north or south," she added. "Like clean water, like education, we should all have safe access to our streets. This should be true for all, especially so for our children."

"We urgently need new sources of funding to support road safety campaigns. And we need new momentum in support of our shared objective for the Decade of Action, beginning with the inclusion of road safety in the post-2015 goals."

The new resolution passed by the United Nations General Assembly calls for a global ministerial conference to be held in 2015 to assess progress of the Decade of Action for Road Safety. The Brazilian government has offered to host the meeting.

In tandem with the new resolution on road safety, the Assembly passed a second resolution asking the World Health Organisation to plan a Global Road Safety Week in 2015 on the theme of children and road safety.



FUNDING PUTS F1 TECH IN DIGGERS AND BUSES

The UK government has invested over £100 million into projects that will incorporate F1 technology into diggers and buses to improve fuel efficiency and cut carbon emissions.

A consortia led by automotive and construction groups GKN, JCB, Cummins and Ford received the funding from the Advanced Propulsion Centre (APC).

Carbon emissions from bus engines will be reduced through the development of new stop-start diesel engine technology. For diggers, F1 KERS technology will help boost efficiency by modifying the hydraulic power delivery system and using mechanical energy recovery technology.

AUSTRALIAN FORUM MAKES PLEA TO UN

The Decade of Action Policy and Donor Forum held in Melbourne, Australia, joined calls for road safety to be included in the new 'post-2015' goals for global development being debated at the United Nations.

The forum was hosted by the RACV and co-organised by the Australian Automobile Association, the Commission for Global Road Safety, Road Safety Fund and the FIA Foundation. Global Road Safety Ambassador Michelle Yeoh was a keynote speaker, as was AAA executive director Andrew McKellar (below). Yeoh told delegates about the road traffic victims she'd met during a fact-finding missions in Asia. "I've seen parents tending to their son in an intensive care unit in Delhi, or sleeping in the hallway of a Hanoi hospital where their daughter lies hurt," she said. "We have a chance to make their voices heard."

The UN's Decade of Action aims to save five million lives and prevent 50 million serious injuries. But this will not be achieved unless funding, coordination and political support is increased, the forum heard.





FIA GOLDEN RULES I WANT TO BE SAFE I PROMISE TO:

BELT UP

all passengers are my responsibility

RESPECT THE HIGHWAY CODE

rules are there to protect us all

OBEY THE SPEED LIMIT

my car is made of metal, pedestrians and children are not

CHECK MY TYRES

both for wear and for correct inflation, including the spare

DRIVE SOBER

when I am drunk or on drugs, I am a danger on the road

PROTECT MY CHILDREN

keep them safe in car seats

PAY ATTENTION

calling and texting make me dangerous

STOP WHEN I'M TIRED

getting there late is better than not at all

WEAR A HELMET

motorbikes and bicycles don't protect my head

BE COURTEOUS AND CONSIDERATE

respect other drivers

The FIA supports the UN Decade of Action for Road Safety



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SUPPORTED BY



The UN's Ban Ki-moon (second from right) with the FIA Foundation's Sheila Watson and other delegates.

GFEI CONTRIBUTES TO FUEL ECONOMY DEBATE

The FIA's Global Fuel Economy Initiative (GFEI) is playing a key role in high-level discussions on energy efficiency as part of preparations underway in Abu Dhabi for the United Nations' Climate Summit later this year.

GFEI members briefed UN secretary general Ban Ki-moon on vehicle fuel economy in a bilateral meeting on May 5. Sheila Watson (above), executive secretary of the GFEI and FIA Foundation director of environment, participated in the Abu Dhabi Ascend Conference and met Ban Ki-moon.

The GFEI was one of a group of key stakeholders consulted by the UN secretary general on global efforts to address climate change ahead of the UN's summit in September. Key participants included UN environment programme executive director Achim Steiner, UN energy chairman Kandeh Yumkella and environment advocate and philanthropist Al Gore.

Speaking at the conference, Watson urged governments and the private sector to address fuel economy. "We know that cost-effective technical solutions exist, and we are sharing the best practice in policy. Now we need to match the political will of many more countries who want to save these resources with the greater engagement of the private sector, which will invest a staggering \$400 trillion in fuels and vehicles between now and 2050," she told the audience at the conference, which also included former British Prime Minister Tony Blair.

"If we can harness the power of this investment opportunity," she added, "we can help to save CO₂, clean up our air and free up badly-needed resources for better use in health, education and so on in some of the poorest countries on the planet."

FIA AND IFRC TO CO-OPERATE ON POST-CRASH CARE

The FIA and the International Federation of Red Cross and Red Crescent Societies (IFRC) will co-operate on the promotion of post-crash care as a crucial ingredient in saving lives in the event of road accidents.

FIA president Jean Todt, who signed a memorandum of understanding for closer cooperation with IFRC president Tadateru Konoé in Geneva on World Red Cross Red Crescent Day (below), said that the expertise of IFRC staff would be of great benefit in the promotion of post-crash care.

"Post-crash care is a key element of any effective road safety strategy," he explained. "We can benefit greatly from the expertise and network of outstanding Red Cross and Red Crescent volunteers, while also helping to increase public understanding of first aid through our automobile clubs worldwide and the FIA Action for Road Safety Campaign."

The first fruits of the collaboration will come on World First Aid Day, which takes place on September 13. The FIA and the IFRC will promote joint initiatives during that month with member clubs and national partners worldwide, aimed at raising awareness of the importance of first aid knowledge so that victims of road accidents receive immediate care. The initiative will also see the organisation of first aid 'snack' training courses in public areas to increase knowledge among drivers, and the creation of first aid materials and documentation to be used in FIA clubs' driving schools.

ZOLEKA MANDELA LEADS SAFE SCHOOL PROJECT

The granddaughter of Nelson Mandela and global road safety campaigner Zoleka Mandela has led the launch of the first Safe Schools project in South Africa, an initiative for the Decade of Action for Road Safety.

The project has been initiated by the Road Safety Fund and made possible through global support for project work that is part of the Decade of Action for Road Safety. It is primarily funded with a donation from Decade of Action global corporate supporter Janssen, a Johnson & Johnson.

Speaking at the launch school, Sivile Primary in Western Cape, Mandela said: "We can and must do far more to protect our children. Road traffic injury is a man-made epidemic, but it is preventable. The vaccines for this epidemic are readily available: safe crossings, protected footpaths, and speed restrictions; together with well-designed education programmes."

The project is a pioneering approach, introducing safe road infrastructure to protect school children on the route to and from school, combined with road safety education for children and teachers.

Additional financing and technical support is provided by WorleyParsons, IVECO and the FIA Foundation. The International Road Assessment Programme, iRAP, is working with local partners to introduce safe road infrastructure, while the Medical Research Council is coordinating the monitoring and evaluation of the project.

A cluster of schools from low-income settlements in Western Cape have been selected as pilot sites for the project.



FIA president Jean Todt and IFRC president Tadateru Konoé met to discuss post-crash care.

AUTO ASKS

IS MOTOR SPORT OFF THE PACE WHEN IT COMES TO SOCIAL MEDIA ENGAGEMENT?

Plenty of racing drivers and teams have a Facebook and Twitter account these days, but how could they make the best use of them? AUTO sought the views of motor sport and industry insiders



The Driver

KARUN CHANDHOK

FORMULA E DRIVER FOR MAHINDRA RACING AND F1 COMMENTATOR

It's funny how the world has gone social media crazy in the last decade. Today, if you don't have a Facebook or Twitter page, you're looked down on. Teams, drivers, team principals, engineers, designers and mechanics are all now expected to be putting out updates almost instantaneously and are being judged based on the number of followers they have or what their Tweets are like. Drivers who don't share pictures are branded as snobs and aloof, while teams that have a self-deprecating sense of humour are hailed as being brilliant.

There's no question about the importance of social media and digital marketing. Today's question for me is, could motor sport personalities use these platforms to engage with the audience more actively? The answer is yes, of course we could. The problem, however, is that we live in a more politically correct world where people hang on every word and analyse everything that's being said. Teams and sponsors are much more sensitive to comments and criticism than they were 20 years ago. If you compare the attitudes, comments and interviews today to how candid people like Prost, Senna, Lauda and Mansell were, it's poles apart. I would have loved to follow them on Twitter back then!

I have to say, though, that the fan interaction on social media in NASCAR and IndyCar compared to other racing series is hugely different. The American-based series really encourage teams and drivers to say what they think in the press and on social media, and therefore they are less 'on the leash' and the fans take to them more. Perhaps that's the lesson for the rest of motor sport - don't be so sensitive and politically correct and your social media engagement will become a whole lot better!

PHOTOGRAPHY: DPPI

The Social Media Expert

ALEX TRICKETT

HEAD OF SPORT, TWITTER

Motor sports were among the first on the grid when it came to Twitter engagement, and they continue to resonate strongly. The healthy appetite for technology and innovation, present in many motor sports fans, translates well to Twitter.

Formula One teams have done a good job of feeding that interest over the years, breaking their news on Twitter. An exclusive first view of many 2014 cars came via a Tweet, followed by the chance for fans around the world to ask questions about the new designs directly to drivers and engineers. This would never have been possible pre-Twitter and is a great use of the platform. It brings fans closer to the sport and its heroes, which is invaluable.

The challenge now is to push beyond reactive debate, to find ways to empower fans, via social media, to influence the look and feel of the sport they love. That's starting to happen week-in, week-out in the player tunnels and stadia of football, rugby and cricket teams.

However, exclusive access is no good to a fan if they don't know where to find it. F1 and other motor sports need to get better at signposting these fan conversations, by using big screens, cars and drivers to flag pertinent # hashtags and @ handles.

Broadcast also has a huge role to play. In the UK, more than 90 per cent of online, public conversations about TV happen on Twitter, so it is imperative to tell those who are watching races live how to join the accompanying dialogue to deepen their involvement. And when they are on social media, use that opportunity to share instant highlights and bring in extra revenue via a sponsor at the same time. MotoGP has signed a Twitter Amplify deal to do just that.

The foundations are in place, now is the time for motor sports to build bigger and better connections with their fans.



The Team Boss

MARK GALLAGHER

CEO, CMS MOTOR SPORT AND CO-OWNER STATUS GP3 TEAM

If Facebook were a country, its population would make it the third largest on the planet. Twitter has become the most popular means of keeping abreast of breaking news for users in the G20 economies, and 22 per cent of the world's population now owns a smartphone. Those three statistics alone illustrate why social media is a mainstream communications tool.

After a slow start, motor sport has come to see the benefits of being able to communicate easily, consistently and credibly with stakeholder audiences; the general public, fans, media, commercial partners, suppliers, NGOs, regulators and governments.

On Twitter, 20 of the 22 drivers in this year's FIA Formula One World Championship have personal accounts. Lewis Hamilton has the largest number of followers at 2.09 million, and in total F1's drivers have a cumulative following on the platform of 9.7 million. For teams such as Ferrari, with almost 800,000 followers, it is a powerful means of communicating with their fans, and we see the efforts of F1 teams duplicated across other categories of motor sport.

This is good, but we cannot afford to be complacent. Footballer Cristiano Ronaldo has 26.3 million followers - greater than all F1's drivers, teams and sponsors combined - while World Snooker impresario Barry Hearn sells his sport's entire ticket allocation through social media. The commercial opportunities are formidable.

We also have to remember that social media is only one part of a revolution where technologies are converging. In 2013 there were 1.7 billion cumulative viewings of online gamers, including those participating in 'virtual' motor racing. So, 1.7 billion times last year someone logged on simply to watch someone else play a computer game. And they could interact with each other using social media in real time. The advent of professional online gaming and virtual athleticism opens up possibilities for sports to merge the real with the virtual; a powerful means to woo younger audiences.

The technological, data-rich foundation of motor sport is ideal for this new era, as we look towards a future when global audiences can participate and interact with our sport in a very dynamic manner. Social networking will be one of the great enablers of that future. ■

The scanner at the Upright MRI Centre in Leeds in the UK is big enough to take Formula Ford driver Jack Barlow as he would be seated in his race car. The FIA Institute's Dr Paul Trafford (right) can then see how Barlow's seating position affected the back injury he suffered in testing at Thruxton.



AUTO/ANALYSIS

Formula Ford driver Jack Barlow is scanned with the same helmet and overalls he was wearing during his accident.



Motor sport safety

THE BIG PICTURE

The FIA and Toyota are using Europe's largest MRI scanner and a ground-breaking computer model to determine how drivers' seating positions might affect their chances of sustaining a spinal injury in a race accident

TEXT: MARC CUTLER PHOTOGRAPHY: WILL THOM

What do you get when you combine Europe's largest Magnetic Resonance Imaging (MRI) scanner with one of the world's most powerful computer simulations of the human body? A major leap forward in motor sport safety.

At least that is the hope of FIA Institute researchers, who have brought these two worlds together to help understand what happens to a driver's body in a crash and how injury can be minimised.

To do this they are using the latest in scanning technology at the Upright MRI Centre in Leeds, England, which boasts a machine that is much wider and more open than the usual cylindrical MRI scanner. This means that, for the first time, a scan can be taken of a driver while he is sitting in a full-size race seat.

The results of these scans are then sent to Toyota, which has developed a computer model of the human body that it uses for virtual crash testing. Called the Total Human Model for Safety (THUMS), it is made up of almost two million elements that accurately reproduce the human form, from precise bone strength to the structure of organs.

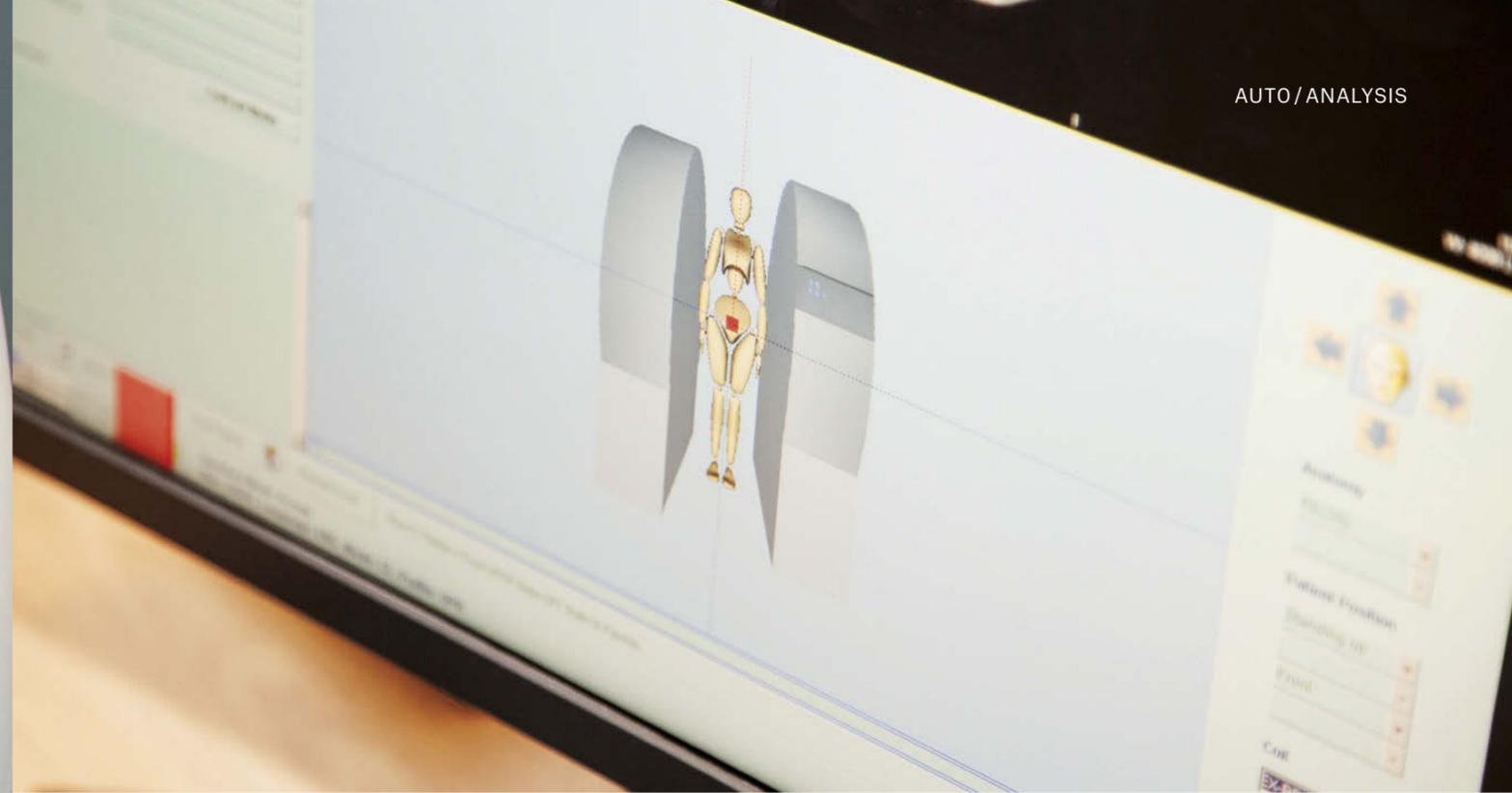
Naturally, this project requires both safety research and medical expertise, which is why FIA Institute medical advisor Dr Paul Trafford and research consultant Andy Mellor have teamed up in Leeds to test the process on the first driver.

That driver is Formula Ford GB racer Jack Barlow, who suffered a high-speed crash while testing at Thruxton. Barlow went off the track at a fast right-hander, rolled his car and came to rest upside down. The 18-year-old was able to climb out once the car had been righted, but was taken to Southampton General Hospital for checks where it was found he'd cracked a vertebra in his back. This scan is aiming to help further diagnose the injury and aid his recovery.

In fact, it will help all drivers in the sport. As Mellor says: "We are seeing a significant number of spinal injuries in motor sport at the moment and they seem to be caused by frontal impacts as ►



Barlow's time in the MRI scanner – and the results (above) – will be used to help him continue to recover from his back injury.



well as vertical impacts. We've done as much research as we can with crash test dummies, but the dummies don't simulate body architecture very well. So we are working with Toyota to get a much better understanding of the way in which the skeleton behaves in impact conditions."

The MRI scans will especially help researchers to get a better understanding of spinal geometry when drivers are in a race seat. The theory is that injury could be minimised by ensuring that a driver's spine is not loaded in an undesirable way, by enhancing seat design.

The scans will enable Mellor and his team to provide accurate environments and seating positions – including F1, rallying and Le Mans – for Toyota to test in its THUMS programme. That programme can provide detail far beyond normal medical simulations.

"The processing power of THUMS is off the scale compared to anything we use on our desks," says Mellor. "There are almost two million detailed elements and it takes over a full day to do one run. It provides lots of detail."

One of the areas Mellor and Trafford will be focusing on with the MRI study is the pelvic position that drivers naturally adopt. They will then view the response from that position as it is forced into different postures to see if that is more or less painful in a number of outcomes.

"There are two things that we think might be relevant for our studies," says Mellor. "First of all, you have the geometry that the driver is forced to sit in by seat design, but also you have the posture that the driver chooses to adopt when he is seated and we think one interesting element of that is pelvic rotation. Pre-position of the pelvis at the start of an accident or before it has developed might be significant in the injury outcome."

Both Mellor and Trafford agree that the position of the vertebrae directly influences the potential for spinal injury in an accident.

"The THUMS system can simulate the position of every vertebra," adds Trafford. "So if we could measure where the vertebrae are in the first place, where the driver is sitting and where his pelvis is, we can give that

information to Toyota to use in the simulation."

For Barlow they already have a lot of information that will help. They have the data from his crashed car, his seat, his HANS device, his helmet and himself. All were put into the scanner along with a model of a steering wheel and pedals so he was in exactly the same position as in the car.

Following the successful scan of Barlow, the next aim in the project is to work with Toyota World Endurance Championship drivers Anthony Davidson and Alex Wurz. During the 2012 Le Mans 24 Hours, Davidson was involved in an accident where his car somersaulted and landed in a crash barrier, injuring his back in the process.

"Toyota can run their simulation to see if the model gets the injury in the same place as Davidson suffered it in real life," says Trafford. "Then we can start moving the seat, altering the foams and changing the geometry to see what happens and whether we can reduce this injury."

Then they will measure Wurz's seating geometry and put that into the programme.

"Wurz is 10 inches taller than Davidson so we should get a much better feel of how different their orientations are when sat in the same car. That is then going to be the key data that will be fed into the THUMS model, so when we are simulating identical accident events for those two drivers we can see whether either one of them is in a better or worse position for the G-loads they sustain."

That is where the programme can really make great strides in improving driver safety.

"It is exciting and interesting work," agrees Trafford. "It's quite complicated getting data to feed into a computer to simulate crashes and predict injuries, but we are trying to build a crash programme on a simulator where we can then change the parameters such as the seating angle to predict and solve problems before they occur."

This is where the potential for safety improvement is huge. "We can then look at whether certain drivers are getting injuries because they are sitting at an angle that puts more pressure on their spines. That is what we are trying to understand." ■

New truck legislation

THE LONG HAUL TO SAFETY

With recent research revealing that over 4000 people were killed in truck-related accidents in Europe in 2011, the EU, backed by the FIA, is taking action to radically reshape the lorries of the future

TEXT: BEN BARRY

According to data assembled by the European Transport Safety Council, in 2011 some 4,300 people were killed on EU roads in lorry-related accidents, and poor visibility from the driver's cab, a lack of crumple zones and the ease with which objects can become trapped under truck wheels is often to blame. Pedestrians and cyclists are particularly vulnerable, with six cyclists killed in London due to collisions with trucks and buses over just two weeks in November 2013.

Now, new proposals voted through by the European Parliament and supported by the FIA aim to increase truck dimensions in order to drastically improve not only safety but driver comfort and fuel efficiency.

The proposals would bring benefits to everyone, from cyclists navigating city centre rush-hour traffic to the long-distance truckers who spend an average of 4.6 nights per week sleeping in their cabs, and the hauliers striving to drive down costs. With lorries currently consuming 80 billion litres of diesel per year and emitting six per cent of all European CO₂ emissions, there are also clear environmental gains.

If European member states approve the new legislation by 2015, it could become mandatory by 2022 and perhaps as early as 2018, radically altering the appearance of trucks on European roads.

Existing regulations have their origins in the 1980s and were last refined in 1996, limiting overall truck length to 16.5 metres. A bluff cab design allows for the maximum cargo space within this footprint, but also creates substantial air resistance, which accounts for up to 37 per cent of the total energy required by all long-haul trucks.

Furthermore, existing truck designs are neither optimised for active (i.e. driver visibility) or passive ►



The MAN Concept S truck and Krone AeroLiner trailer form one streamlined unit that brings huge aerodynamic gains, resulting in reduced fuel consumption and CO₂ emissions

(i.e. crumple zones) safety, nor driver comfort; a change is a high priority for both MEPs and the FIA.

“We strongly support the Parliament’s position to get safer and more fuel-efficient models on the market as soon as possible,” says FIA regional director general, Jacob Bangsgaard. “Truck manufacturers will have more design space for the front end of the cab, allowing a more streamlined nose. Some of the extra cab space will be used to get rid of blind spots, include a crumple zone and make sure pedestrians and cyclists are not knocked underneath the wheels in the case of a collision.”

Under the proposals, a slightly longer nose for the truck cab – known as the tractor unit – would increase aerodynamic efficiency by 12 per cent, yielding fuel savings of three to five per cent. Together, the innovations would cut diesel costs for the average long-haul truck by around £1,450 (€1,800) per year at today’s prices and save billions of gallons of fuel across the EU.

The FIA contributed to making the new cab design mandatory, which would allow for a deeper windscreen, creating a wider field of vision for the driver and making pedestrians, cyclists and other motorists far more visible. In the event of an accident, new designs would also incorporate a crumple zone in the nose, with the aim of preventing cyclists and pedestrians from being run over and reducing the impact of head-on collisions with other vehicles. Against heavy counter-lobbying, the FIA also campaigned for aerodynamic flaps on the rear of trucks to become mandatory.

MAN Truck & Bus’s Concept S gives one possible vision of how the new legislation might be interpreted.

In this design study, the MAN Concept S and the Krone AeroLiner trailer form one streamlined unit to give the cargo volume of a conventional truck but a drag coefficient of just 0.30Cd; that’s a substantial leap from today’s 0.50Cd and equivalent to the most aerodynamically efficient passenger cars. As a result, fuel consumption and therefore CO₂ emissions are

predicted to drop by up to 25 per cent.

“The area in which considerable CO₂ savings can be realised are in the consideration of truck and trailer together, and the aerodynamic design of the vehicle as whole. That’s where the biggest potential is,” says MAN Concept S CEO Anders Nielsen.

At the front, the Concept S’s rounded nose, the reduced area of its mirrors and the streamlined, integrated fuel tanks create far less drag. The spoiler is also integrated into the roof of the driver’s cab, closing the gap between the cab and trailer so that air can flow over the two without interruption.

Further aerodynamic optimisation includes the ‘side finishers’, the body trim that extends towards the road surface. This also reduces noise pollution and the likelihood of pedestrians or cyclists being knocked under the wheels.

But while manufacturers have welcomed the new legislation, the need for clarity and consistency in its implementation has been stressed, as has the

“THIS IS A PARADIGM SHIFT THAT WILL DRASTICALLY AFFECT HOW WE BUILD OUR TRUCKS. WE’RE NOT TALKING ABOUT MINOR CHANGES, BUT A NEW GENERATION AND CONCEPT OF TRUCKS.”

CARL-JOHAN ALMQVIST, VOLVO TRUCKS



requirement for flexibility while fuel-saving technology continues to race ahead.

Carl-Johan Almqvist is traffic and safety director at Volvo Trucks, a subsidiary of the Volvo Group that also owns Renault Trucks, Mack Trucks and UD Trucks. “We need a good regulation that will remain stable, survive over time to provide planning certainty and that ensures sufficient flexibility to accommodate future transport developments and demands,” he says.

Almqvist counters MAN’s focus on aerodynamic optimisation: “Truck manufacturers do need additional space in the cab and chassis in order to drive fuel efficiency, safety and driver comfort, but it is particularly important for incorporating fuel-efficiency innovations such as waste heat recovery and alternative fuel powertrains. Aerodynamic improvements are important but only one means among many others of improving fuel efficiency, since a lot has been done in recent years. A state-of-the-art truck can already gain one to three per cent in fuel savings.”

Volvo’s Concept Truck 2020 addresses the issues raised by the legislation in combining existing technology with more radical ideas. For instance, pilot trials are already being conducted for fully autonomous passenger cars, and the Concept Truck 2020 proposes linking trucks together wirelessly into long trains. These road trains would autonomously slipstream each other along designated ‘green corridors’ at 55mph (90kmh), increasing safety while reducing both driver fatigue and fuel consumption.

Passive safety has been addressed with a lower frontal section of the cab, which projects forward by half a metre compared with existing designs in order to integrate collision-protection technology. This provides a crumple zone in the event of a head-on collision and also improves aerodynamics.

The cab of the Volvo Concept Truck 2020 is spacious and airy. A thin driver’s seat saves space, while a mesh, ventilated backrest increases comfort. Behind the driver a futon sofa folds out into a bed, while electronically controlled blackout screening ensures the driver is rested.

As yet, technical requirements are still to be finalised on the EU proposals, and with the product life cycle of truck cabs being almost double that of passenger cars at 15 years, members of the ACEA (Association des Constructeurs Européens d’Automobiles) are petitioning for a moratorium on new body designs until at least 2025 in order to safeguard ‘competitive neutrality’.

“This is a paradigm shift that will drastically affect how we build our trucks,” says Almqvist. “We’re not talking about minor changes in the form of traditional facelifts, but a new generation and concept of trucks that would need the appropriate amount of time for planning and preparation.”

Despite the diverse benefits, the ACEA states that key to the legislation’s success is reducing haulier costs. Initial research carried out by campaign group Transport and Environment predicts that the implementation of the legislation would add £320-1,200 (€400-1,500) to the typical cost of each truck, a figure that would be recouped within a year through lower diesel expenditure.

Work remains to be done, but a future of safer, cleaner, more comfortable trucks on European roads could be a reality within a decade. ■



Above from top: Carl-Johan Almqvist of Volvo Trucks, MAN Concept S CEO Anders Nielsen and FIA regional director general Jacob Bangsgaard are all striving to improve truck safety for the 21st century. Left: Volvo’s Concept Truck 2020 proposes linking lorries together in a train to run along ‘green corridors’ on roads at a 55mph limit

Loeb in the WTCC

REBORN TO WIN

Since switching codes to the World Touring Car Championship, nine-time World Rally Champion Sébastien Loeb has shown the same sort of winning potential. And Citroën Racing is only too happy to be joining him for the ride

TEXT: BEN BARRY



Clockwise from top left: Citroën Racing team boss Yves Matton; Loeb tops the WTCC podium at round one in Morocco; with team-mate and reigning champion Yvan Muller; Loeb continued his strong run of form at the Salzburgring in Austria to lie third in the championship points behind his team-mates.

On the start grid of Citroën's first race in the FIA World Touring Car Championship, factory driver José María López was on pole after a stunning qualifying lap in Marrakech. Yvan Muller, four-time series champion and key sounding board in the Citroën WTCC team's development, had been dropped from third to fourth after cutting a chicane. Even without a third driver, Citroën's marketing machine would've been in overdrive: the young Argentinian to tap the Latin American market; the renowned French world champion who was at last driving for a domestic brand.

But between Lopez and Muller, nine-time World Rally Champion Sébastien Loeb had qualified second on his WTCC debut. Tellingly, it was his C-Elysée race car that Citroën boss Frédéric Banzet stood watch over on the grid the next day. The media, too, swarmed around it. It confirmed what many suspected: without Loeb, there would probably be no Citroën WTCC campaign.

"There were two reasons to go into the WTCC," says Banzet. "One was to promote the C-Elysée, which is a very important car in our international development. The second was to keep capitalising on the image of Sébastien Loeb; we grew together in motor sports. To be perfectly honest, Sébastien was the first person mentioning the WTCC, probably more than two years ago."

That debut in Morocco – the second step of the podium for race one, a commanding win from a reverse grid in race two – got Loeb's WTCC career off to a stellar start against his team-mates and the Lada Grantas, Chevrolet Cruzes and Honda Civics of the opposition. Subsequent results have proved the weekend was no fluke. It's what the world expects. "The non-specialist people in France, they think I am the quickest driver in the world," says Loeb, "so I should win everything. They don't understand that this is a new discipline."

Yet even Muller concurs with those 'non-specialists'. "I have not been surprised or impressed with Seb," says the reigning WTCC champion, "I was expecting it. He is a nine-time world champion and almost did Formula One; he's one of the best drivers in the world."

With nothing left to prove, Loeb could have hung up his overalls and dabbled in motor sport to blow off steam. But the 40-year-old Frenchman is no *dilettante*: he's now working harder than ever – similar media commitments to the WRC but additional testing and simulator work more than offset the shorter race weekends – and says his motivation is higher for the WTCC than it would have been had he stayed in the WRC. Insiders describe Loeb variously as reinvigorated, happier and not so bored.

"I wanted to retire from rallying," he says, "but I knew that I am not able to stay at home and stop driving. I had some experience in racing with GT cars and I always enjoyed it, so I said it could be nice to drive in racing after rallying. I grew up with Citroën since I started in rallying, so it was a nice challenge to continue with them, and in a world championship. It was the best choice."

Despite finishing second at Le Mans in 2006, and his eponymous racing team contesting the LMP2 class this year, Loeb says he never seriously considered a return to La Sarthe and the World Endurance Championship.

"I enjoyed Le Mans, the cars are very fast, but the fight isn't the same [as in sprint races]," he explains. "You just need to have the best rhythm and to be consistent. You

don't push so hard to overtake, because you know the car behind is faster, so you let him past. It wasn't this kind of intense fight that I discovered with the Porsche Supercup and FIA GT Series, where the adrenaline is very high."

Loeb has been making the switch to front-wheel-drive touring cars look easy, but his nonchalant demeanour belies the endless hours of preparation and the difficulties he's faced.

"In rally you never drive 100 per cent of the car's performance," says Citroën Racing technical director Xavier Mestelan-Pinon. "It's too dangerous, there could be mud on a corner, but on the circuit it's 100 per cent all the time. During our Abu Dhabi test I saw Seb brake in the middle of the track. He was not close to the wall, he still wants a margin, but on a circuit you must not have a margin. We work on this, with the engineer, the data engineer, and with video, to understand how to drive."

"I HAVE NOT BEEN SURPRISED OR IMPRESSED WITH SEB – I WAS EXPECTING IT."

YVAN MULLER

The fundamental driving style required for the WTCC, too, was different. Loeb might have started his career in front-wheel-drive rally cars and is known as a Tarmac specialist, but the technique of driving a front-wheel-drive car on a narrow, twisting rally stage is a world away from the space and speed of a race track. What's more, the WTCC cars are far removed from the powerful rear-wheel-drive machinery Loeb sampled last year in the Porsche Supercup and FIA GT Series, adding a further layer of confusion.

"I begin to feel better with front-wheel drive now, but when I started it was disturbing," says Loeb. "I was making a lot of mistakes. It's not natural to accelerate sometimes in the entry of the corner – normally you always brake until later in the corner and accelerate later. And with this car, so as not to understeer in the slow corners, you have a balance that is quite light on the rear, and so in the slow it's good but in the fast sometimes it's very light and you have to play with the throttle just to keep the balance of the car. It's a bit special in the beginning."

Citroën Racing has faced a similarly involved transition from rallying. The team remains committed to the WRC until the end of 2015, and still offers the DS3 R3 entry-level rally car, but has scaled back its WRC involvement. The customer WRC division that supported Robert Kubica has been wound up, as has the Citroën Junior WRC team that both Kimi Räikkönen and current World Rally Champion Sébastien Ogier drove for. ►



Loeb undertook development work on Citroën's WTCC car while still driving part-time in the WRC. Left: there's no need for a co-driver any more...

Hence Citroën Racing's Versailles headquarters has not been expanded, the workforce remains 200-strong, and 95 per cent of personnel now work on the WTCC programme, many across both disciplines or just on the WTCC after being transferred from customer projects. There was no recruitment campaign for circuit specialists – although some engineers had previously worked in F1 and endurance racing – so the team essentially started from scratch. They attended touring car and DTM races and took photographs in the pits to painstakingly examine later, learning vicariously. Others got hands-on experience working with Loeb in the FIA GT Series.

"It's really different," says team boss Yves Matton. "In rally, you see the driver three times for 30 minutes in the day, and there's more improvisation. In WTCC you need the perfect lap, perfect corner, perfect car... There are more demands on analysing data, and maybe we have more time in rally where you can rest for five minutes, but here you're busy from the start of the day to the end."

On the flipside, coming into the championship just as the WTCC's new TC1 rules took hold helped to level the playing field. It allowed Citroën to get to grips with the new technical regulations – upping power from 320 to 380bhp, the wheels from 17 to 18 inches, the bodywork becoming wider, the aerodynamics far more aggressive – while existing teams battled to the end of last season. Even before the first race, the French debutants were championship favourites; in the first qualifying sessions, they were as much as a second a lap ahead.

"THE CHALLENGE IS EXCITING. I LIKE TO DO THINGS CORRECTLY; I DO NOT LIKE LOSING."

SÉBASTIEN LOEB

"You can't compare the cars with what we had before," says Muller. "They are completely different, but we needed this step – the previous cars weren't sexy enough. The Citroën is nice to drive – more powerful, a bit more grippy – but I am surprised by the gap between us and the rest. I believe the Chevy and even the Lada won't stay there, they have to progress, so the gap will be reduced. The season is long and we must stay focused."

The genesis of Citroën's WTCC programme harks back to the genesis of its WRC programme over a decade ago: namely, the Xsara 'Kit Car' that competed in the WRC's second tier in the days before Super 2000. It has front-wheel drive, similar dimensions to

the C-Elysée and produces 280bhp from its naturally aspirated engine. The Kit Cars could sometimes beat WRC cars on Tarmac. In early tests, Citroën used the Xsara to assess the durability of such components as the suspension wishbones when jumping race-circuit kerbs.

But it was with today's DS3 rally car that development really hit its stride. The C-Elysée is based on the same platform and the regulations call for a similar 1.6-litre turbo engine – though equipped with a larger air restrictor and turbocharger – so the guts of a DS3 rally car took preparations to the next level. The team made it wider, increased the wheelbase, added a splitter, a bigger rear wing, increased the power and began to experiment.

"WTCC is so different to what we knew," says Mestelan-Pinon. "Here, it's important to adjust the proper aero balance, but in a rally car it's fixed. With the rally car we worked with CFD [Computational Fluid Dynamics] and in the wind tunnel with a model, so we did the job in the past, but we didn't put so much energy into it. Now downforce is crucial. It's also important to work at tyre management, the balance of the car... But in rally you work a lot on suspension, here you don't, maybe except with Morocco because of the kerbs."

Loeb started the C-Elysée's development programme while driving part-time in the WRC, with Muller and López contributing when they later signed to the team. In fact, Muller was signed on the understanding that all telemetry and engineering data would be shared between the three drivers. It begs an interesting question as to who

has the most to lose. I suggest it's Muller; there looks to be a high possibility that Loeb the rookie could topple Muller the incumbent champion. Matton disagrees.

"It was more natural in rally," says Matton. "Seb was coming from his motorcycle and learning step-by-step and growing. This is completely different: here it's a guy who was nine-times world champion and who needs to prove very fast that he's at the level. Maybe he is working harder now because the time is short to get to the level."

"Yvan has experience from the discipline and all the good tips from the races, and Seb does not have the experience of door-to-door racing, except from a little in the Porsche Supercup and FIA GTs. Yvan knows when he can try something and when it is better to wait a bit."

For now, Matton declares himself delighted with the team dynamic, and with how Muller has helped both López and Loeb flourish. But as Loeb learns, his racecraft improves, and as the season plays out it'll be fascinating to see if he can get the upper hand over his wily countryman – and how Muller responds if he does.

"I hope I will have some good results," says Loeb, "but I don't do it for my reputation, I wanted to do something like this. I don't have the same pressure to win that I had in rally, because I was praying all my career on this. Now a big part of my career is behind me. But I have the motivation to win – the challenge is exciting for me, I like to do things correctly and I don't like to lose."

No doubt about it, Muller will need to be on his game to win that fifth championship in 2014. ■

PHOTOGRAPHY: DPPI

BAGS OF POTENTIAL

Widely featured as a safety device since the 1980s, it would be easy to imagine that airbag development has peaked. In fact the contrary is true, and as new safety systems evolve, so too does airbag technology

TEXT: MATT YOUSON

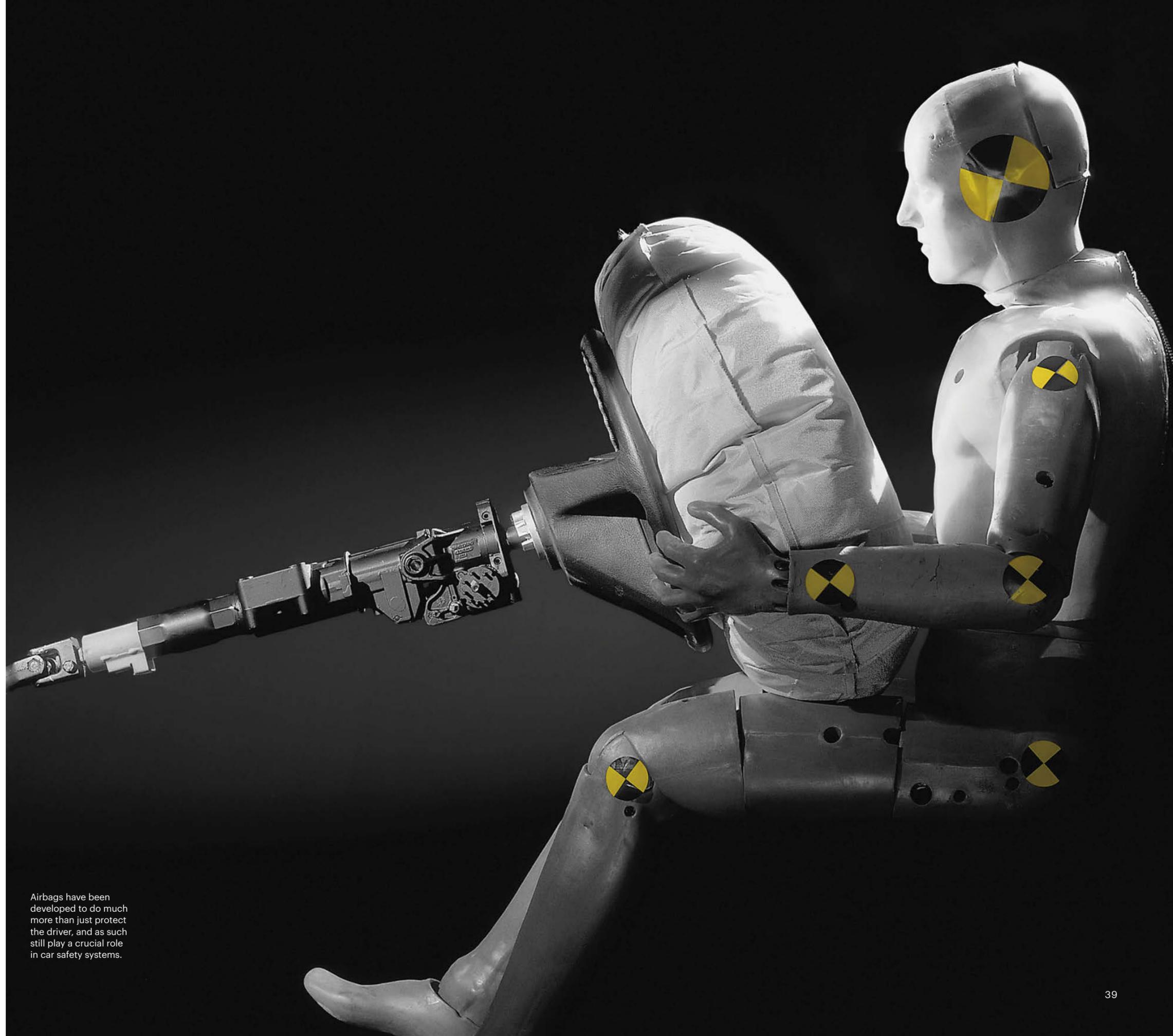
These are interesting times in the area of car safety. Hesitantly at first, but with growing belief, several nations are starting to discuss the path to achieving zero road deaths within their borders. The key, it seems, lies in sensors, communications and algorithms: cars capable of making decisions faster and better than their drivers. But what of established safety systems? Does the development of automated collision-avoidance technology reduce the value of seatbelts, deformation structures and airbags? The experts say no. In fact, these technologies have never been more relevant.

Airbags in particular are part of the revolution, albeit now as the final – rather than front – line of defence. The smart systems tasked with crash avoidance also aid in the next-stage development of existing systems: while the need for airbags may be reduced, their effectiveness is also being increased, working in combination with other systems to better cocoon drivers and passengers in worst-case scenarios. Of course, those scenarios are many and varied, and so airbag capability is evolving to cater for the different eventualities in which their deployment is necessary.

This may seem a new facet of the technology's development but in truth such evolution goes back to the early days of general industry uptake of airbag technology, as Phillip Sproston, safety integration programme manager at automotive research agency MIRA, explains.

“There has been a great deal of progress in those 20 or more years,” he says. “We have gone from the single-driver airbag to a car with lots of airbags, some of which are really quite unusual. The standard types today are the driver and passenger airbags, the curtain airbags and thorax modules that cover the head and pelvis. Then we have the more exotic variants: airbags that go under seats, in between the seats and even, for some small cars, behind the seats.”

While manufacturers are keen to grab attention with their systems, the impetus behind the increased sophistication of airbag provision has been a mix of higher-quality empirical data and more stringent legislation. As tests such as those carried out by NCAPs worldwide become harder to pass, so vehicle designers need to blend structural developments with improved restraint technology. ▶



Airbags have been developed to do much more than just protect the driver, and as such still play a crucial role in car safety systems. ▶

AIR TIME

1940s

First airbag-like devices – air filled rubber bladders – are envisaged.

1950s

In the US John W Hetrick, a retired industrial engineer, receives a patent in 1953 for what he called a “safety cushion assembly for automotive vehicles”.

At the same time, German inventor Walter Linderer develops a similar system.

Early systems are rudimentary, with one 1955 patent describing a system similar to today’s, but with the significant exception that the driver himself had to deploy the bag by pressing a button. Another early debate focused on the use of a pyrotechnic charge to inflate the airbag with gas.

1960s

In 1967, Mercedes-Benz begins developing airbags.

Also in ‘67, US inventor Allen K Breed designs a simple electromechanical sensor allowing for the inflation of an airbag inside a 30-millisecond timeframe.

1970s

Oldsmobile’s Toronado (below) becomes the first car with a passenger airbag.

Ford and GM start to install airbags in some vehicles.



1980s

In the US, a controversial bill in 1984 speeds up airbag development. Focusing on the dangers of not using a

safety belt, the bill stipulates that within three years new cars must be equipped with protective safety devices that do not have to be activated by the occupants.

Mercedes-Benz re-introduces the airbag in Germany as an option on its W126 model. In 1988, the company introduces the front passenger airbag in its 1988 S-class saloon.

The 1987 Porsche Turbo is the first car to equip both front seats with airbags.



1990s

In 1994, Volvo launches side-impact airbags and follows it in ‘97 with the launch of inflatable side-impact curtains.

In 1998 the US federal government mandates dual frontal airbags on all passenger vehicles.



2000s

Volvo introduces dual-stage inflation airbags in 2000. In ‘07 the company debuts extended inflatable curtains for enhanced child safety.

In 2006, Honda introduces the first airbag systems for motorcycles.

2010s

World’s first pedestrian airbag introduced on Volvo’s V40 model.

“It’s driven by legals and consumer testing,” says Sproston. “The tests have become more difficult to pass as new tests have been introduced, so we’ve needed to find new restraint system solutions. The introduction of things like curtain and knee airbags are the result of the requirement to get a good EuroNCAP rating. However, in the background is the driver of real-world accident data and a better understanding of what is killing people.”

The nature of the industry and the way in which data is collected make a strong argument for the evolution of airbag technology being, in essence, a logical progression. “Essentially, you look for trends,” says Sproston. “As you introduce airbags, ABS, ESP etc, so you see a change in the type of injuries people are sustaining.”

With data naturally following behind the industry standard, there’s a typical lag of around five years between the mainstream introduction of a system and meaningful data being accrued out on the road. That’s been a factor in the frequency of introduction for new airbag technology since the 1980s.

“The industry started off with the hard-to-do stuff like frontal impact work,” says Sproston. “Then we found out that side impacts are responsible for a lot of injuries, so side airbags were developed. Then attention turned to the number of lower leg injuries, leading to EuroNCAP introducing lower leg measurements which, in turn, led to knee airbags, dual pretensioners and redesigned fascias.”

Jan Ivarsson, senior manager of safety strategy and requirements at Volvo Cars, takes a few moments to decide which of its models contains the highest number of airbags. It is, he decides, the V40, which features eight, including the revolutionary pedestrian airbag. Other marques feature more, but no brand is quite so closely associated with the introduction of restraint technology.

“We started to make really safe cars in the 1970s and introduced high levels of performance in frontal collisions then,” he says. “We did a lot of experimental work with new structures but also with different types of head restraint, and at that point we started to see that there were good possibilities to increase performance by including an airbag, particularly on the driver’s side.

“We introduced our first driver’s airbag in the ‘80s, soon followed by the passenger airbag. Then our first airbags for side-impact came along in the early ‘90s followed by the curtain airbag system in 1998 that added protection for rear-seat passengers. That system was an enabler for introducing rollover protection, which we added in 2002. Before that we had introduced dual-stage

“THERE ARE DEFINITELY MORE CHALLENGES FOR AIRBAGS AND LOTS OF CHANGE COMING.”

PHILLIP SPROSTON, MIRA

airbags in 2000. We added door-mounted inflatable curtains for convertibles in 2004, extended inflatable curtains to enhance child safety in 2007 and, most recently, the pedestrian airbag on the V40 in 2012.”

The early airbag systems frequently used the word ‘cushion’ – for instance the GM system introduced for US Government vehicles in the ‘70s used the acronym ACRS, for Air Cushion Restraint System. It isn’t wrong to describe the function of an airbag in this way but it does perhaps undersell the various tasks the airbag now performs. Obviously it manages the dissipation of kinetic energy, increasing the ‘ride down’ time (i.e. the time taken for the body to cease motion), but part of this increase is caused not by the gradual deflation of the bag but by holding the occupant firmly in position. The ride-down effect is enhanced by the occupant having a better connection with the restraining structure of the vehicle and its deformation zones.

Head and thorax side-impact bags, and curtain systems, fulfil the same function when the vehicle is hit from the side, but also have the added benefit of preventing the occupant from being ejected or partially ejected from the vehicle. And all the airbags fulfil the function of spreading loads across the body, diminishing the chance of injuries to the neck and chest but also aiding the prevention of internal injuries. The most effective systems in this regard see the airbags functioning as part of a larger energy management system tailoring a ride-down scenario, working in conjunction with seatbelts featuring pretensioners (to take up slack) and load limiters (to release it gradually). “From our perspective at Volvo we have always held to the belief that the seatbelt is the primary restraint and the airbag is supplementary to that,” says Ivarsson.

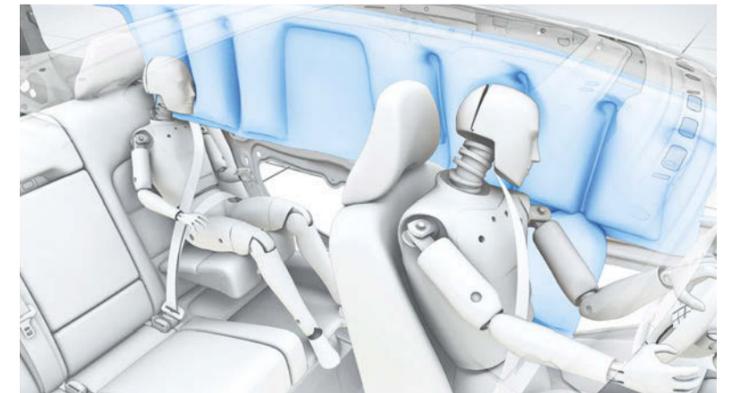
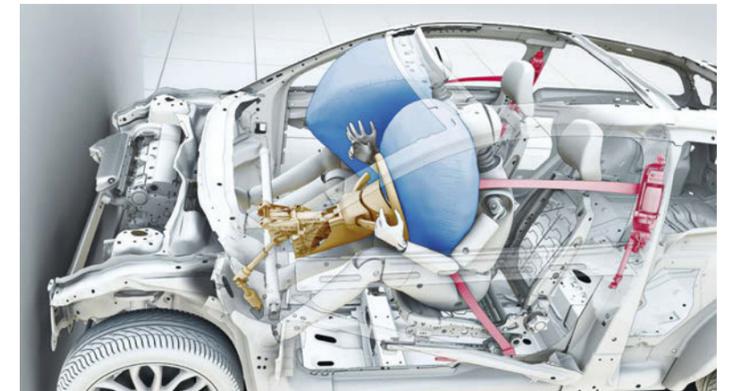
“They have to work together,” adds Sproston. “The restraint system as a whole is managing energy in the occupant as they go from 35mph to 0mph in 0.5 metres. That’s a difficult task. The introduction of the load limiter has been very beneficial because it allows the car to start absorbing energy early in the crash. Then, when the airbag takes over, it can limit the amount of energy going into the seatbelt and prevent some severe situations.

“Otherwise you have force going in from the airbag and from the seatbelt, and the two systems will cause injuries. There is a much higher rate of survivability with a load-limiting system – but you have to match the level of the load limiting to the stiffness of the airbag and the crash performance of the vehicle. They have to work together to achieve a big step change in the injury criteria.”

One of the latest developments in the world of airbag technology is the above-mentioned pedestrian airbag, fitted as standard to Volvo’s latest V40 hatchback. It encapsulates many of the modern drivers for airbags: it is heavily integrated with sensor technology, is a response to stringent new testing criteria and deals with a genuine risk of serious injury highlighted by real-world data.

“Looking at the V40, you can see it has fairly short overhangs so, from an exposure perspective, a pedestrian’s head and torso are at risk of coming into contact with the wipers and A-pillars,” explains Ivarsson. “This was the reason we introduced the pedestrian airbag: it protects the head from having a stiff contact with these areas.”

Pedestrian-impact research has been a big issue since the turn of the century with a great deal of time



Top: Today’s airbags work in conjunction with seatbelts to lessen the impact of a collision, and also provide extra protection in the event of a side impact, below.

devoted to better understanding impacts. The front ends of vehicles have been softened and greater separation between bonnet and engine blocks encouraged – but relatively little can be done to protect a pedestrian from the hard points of wiper fixtures and necessarily-strong A-pillars. MIRA’s pedestrian protection lab has been at the forefront of the research, developing specialist head-forms and leg-forms to use in testing criteria for a number of car companies.

“There was quite a push recently from EuroNCAP to get pedestrian protection into the marketplace,” says Sproston. “It’s not an easy task because it has to involve the design of the front end of the car. There are specific guidelines about sharp points, radius and materials used on the front of the car, which are not easy to develop unless you do it right from the concept stage of car design, and it’s taken quite a few years for design-cycles to synchronise with those.

“The main issue with airbags and pedestrian safety is the sensing: fitting an airbag or an activator under a bonnet is relatively easy, but determining when that system should fire is difficult. A human leg is only six inches in diameter and is quite soft. The sensing system needs to be very precise to assess that contact. Volvo’s solutions are a sophisticated example of work that’s occupying a lot of design time within the industry.”

In the pedestrian airbag system seven sensors embedded in the front of the car transmit signals to a control unit. When the car comes into contact with an object, the control unit evaluates the signals and if it registers a human-like leg form, the airbag is deployed. ▶

The bonnet hinges are equipped with pyrotechnical release mechanisms that, when the system is activated, pull out a pin and release the rear of the bonnet. At the same time, the airbag is inflated. During the inflation sequence, the airbag raises the bonnet. It is lifted 10 centimetres and stays in the raised position.

The added gap between the bonnet and the hard components in the engine compartment gives space for the bonnet to deform, absorbing energy and dampening the impact of the pedestrian's head and chest.

"The purpose is to help protect these vulnerable road users in certain situations when they impact the bonnet and the area around the windscreen," explains Professor Lotta Jakobsson, a senior safety specialist at Volvo. "It has a dual function. It raises the bonnet to create distance but it also it helps to cushion the impact by covering the hard parts around the windscreen."

History suggests airbag technology swiftly spreads through a fleet of cars after its initial introduction - but in this case Volvo, from the outset, has insisted that its pedestrian airbag is a solution engineered specifically for the V40 and may not feature on subsequent new models - particularly those that don't share the V40's front-end geometry.

"We continue to look at active energy absorption technology such as pedestrian airbags or deployable hoods - but if you look at cars with a longer overhang, we'd definitely prefer to go for pedestrian detection and auto-braking," says Ivarsson. "The car that can detect a pedestrian and use an auto-braking function to avoid a collision is a more efficient way forward. That is the main track of our future research - it has the potential to avoid some collisions altogether but also, where a collision can't be avoided, it can greatly reduce the energy involved."

Auto-braking and auto-steering are both huge areas of contemporary interest as the automotive industry switches its focus to collision avoidance rather than mitigation. If Volvo is less than convinced about the future of its pedestrian airbag, doesn't that imply airbag development in general is going to drift off the radar?

"You'd expect that, but what we've seen is quite the opposite," argues Sproston. "What's really happening is that industry standards are becoming more difficult to reach and authorities insist legal requirements are met as if these other avoidance systems didn't work. The NCAP bodies will continue to move the goalposts, changing the protocol every two years to give the restraint systems engineers harder targets to reach, so there are definitely more challenges for airbags and lots of change coming."

"I think for the future we will continue to work on all areas of restraint," adds Ivarsson. "As we move forward we will add in more advanced sensor technologies that support automatic braking and steering. They'll also support restraint sequences starting before physical contact between cars. That does mean there is more potential performance to get out of airbags. Yes, some collisions will be avoided, but there will still be collisions. The next development step is having these sensors work together with the structures, the seatbelts and the airbags to reduce the effect of impacts as much as possible."

And this, essentially, is the key message. Technology will make collisions less common but will not eradicate them. The restraint systems become the last line of defence - but this does not diminish their value. ■

Volvo's V40 includes the pioneering pedestrian airbag, which lifts the bonnet and covers part of the windscreen in a bid to limit serious head injuries.



NO AIRBAG, NO SAFETY

NCAP testing has revealed a dire need for airbag safety in some parts of the world

Airbags have become an integral part of modern car safety systems and yet some new cars are still manufactured without airbags as standard.

Global NCAP recently released data on new cars crash-tested in India and South America with shocking results.

In India, all the cars selected by Global NCAP for testing in a frontal impact at 64km/h received zero-star adult protection ratings. They included India's best-selling car, the Suzuki-Maruti Alto 800, as well as the Tata Nano, Ford Figo, Hyundai i10 and Volkswagen Polo.

Global NCAP chose the entry-level version of each model and none were fitted with airbags as standard. VW is withdrawing the non-airbag version of the Polo from sale in India.

It is a similar situation in South America where nine new models tested, including those sold by major manufacturers such as VW, Peugeot, Fiat, Renault and Ford, did not offer airbags as standard.

Formula E

BLUEPRINT FOR SUCCESS

With 10 top teams, an array of world-class drivers, glamorous locations and ground-breaking technology, does the all-electric Formula E have what it takes to spark a true racing revolution?

TEXT: TONY THOMAS ILLUSTRATION: GRAHAM MURDOCH



A

s revolutions go, this one's going to be pretty quiet. Almost silent, in fact. For in ditching more than a century of motoring and motor sport heritage and abandoning the internal combustion engine in favour of battery-powered electric motors, Formula E has taken the most radical technical step in motor sport, ever.

Too bold a claim? Not really. For since the earliest motor races of the very late 19th century, contests have taken place almost uniquely between cars powered by internal combustion engines running on some kind of fossil fuel. Yes, by the second decade of the 21st century these motors have become supremely sophisticated and efficient. Yet their carbon-consuming innards are in essence no different from those heavy-metal lumps that powered motor sport's pioneers.

But maybe not for much longer. The marquee world motor sport categories, Formula One and the World Endurance Championship, are committed to using a range of hybrid and alternative energy power units that are hastening the 'greening' of motor sport. Formula E, meanwhile, which hosts its inaugural race this September in Beijing, is truly pioneering, in that its cars will not rely on fossil fuel *at all* as its means of propulsion.

The category was created by the FIA in 2012 as a visionary look at a possible motor sport future and since then developments have moved on apace, driven by the series' charismatic promoter Alejandro Agag.

POWER PLAYER: THE ENTREPRENEUR

"We saw the potential immediately," enthuses Agag, casting his mind back 18 or so months to the moment when he put forward his bid to become, in effect, 'Mr Formula E'. With a successful background in motor sport through the Addax GP2 team and political connectedness arising from a two-year spell in the European parliament, multi-lingual Spaniard Agag was well placed to seize the opportunity offered by the creation of a championship with sustainability as its central ethos. But still he and his backers (notably prime investor Enrique Banuelos, a Spanish property developer who committed £60 million to the series) had to *believe* that an eco-championship might work and then have the conviction to drive its development forward.

The key to his certainty, he says, was a growing awareness that motor sport sponsors were becoming increasingly animated about the need for the sport to ►





“THESE CARS ARE FAR FROM TOY RACERS, WITH UP TO 270BHP VIA A PUSH-TO-PASS SYSTEM THAT’S AVAILABLE THROUGHOUT PRACTICE AND QUALIFYING.”



Formula E promoter Agag (above) has spent time in GP2 and the European parliament

demonstrate its commitment to sustainability, and in doing so help attract a younger, eco-savvy fan base. “People love motor sport as it’s such a great way to associate your brand with values like technology, competition, speed, efficiency and so on. But at the same time to bring motor sport and sustainability together we thought was an absolute winner. And this is why we really believed in the project from the start.”

Overcoming scepticism was a challenge, he admits, with some dismissing an all-electric race series as a “completely crazy” money-loser. But “slowly, slowly people have been getting it”.

They’re also, Agag seeks to reassure, attracted by the unique Formula E business model. Rather than rely on traditional arrangements of charging high hosting fees to a race circuit or promoter, who will then recoup their outlay through ticket sales and sponsorship, Formula E asks a host city for no cash, but lots of help with a prime street circuit location and infrastructural support.

“This was very important for us,” says fast-talking Agag. “Our philosophy was that if we ask for hosting fees we probably would not get the best locations nor the best cities. But we wanted to be in symbolic cities,

like Beijing and London. It was a gamble, but it has paid off.” Those premium locations have attracted sponsorship – enough, it is planned, to compensate for the lack of hosting fees. “Sponsors are attracted because we’re electric, so sustainable and green,” says Agag, “but secondly because the racing is inside the cities, so more appreciated by sponsors. Hospitality-wise, city races are a big draw.”

BRIGHT SPARKS: THE TECHNICIANS

Before Formula E, there was Spark Racing Technology, an ambitious French engineering company that had developed an electric race car in search of a series. Headed by Frédéric Vasseur, a GP2 rival of Agag, Spark had created the Formulec demonstration electric single-seater, and this vehicle forms the basis of the SRT_01E that will be the sole machine racing in the first Formula E championship.

It has been constructed via a classic out-sourced expert supplier model, common throughout the racing industry: chassis from Dallara; batteries from Williams Advanced Engineering; motors, transmission and electronics from McLaren Electronic Systems; safety and systems integration by Renault; tyres from Michelin. Clearly, there’s no lack of industry firepower behind the series, even if, says Vasseur, co-ordinating these motor sport titans has presented challenges of its own. “But this was the only way to do it,” he says, “as it’s impossible to build everything yourself, especially when you are trying to get something off the ground. We have some very high-level partners and they’ve all been very fair in putting their resources on the table.”

Common purpose was found in the excitement generated by a bold, all-electric vision. Because while these cars are battery powered, they’re far from toy racers, thanks to around 133kw/180bhp in ‘standard’ mode and up to 200kW/270bhp via a push-to-pass system that’s also available throughout practice and qualifying. That should equate to roughly Formula 3 performance levels, even if, with control tyres and a standardised aero package, they’re a degree less extreme than their out-and-out circuit racing cousins. That’s all part of the Formula E plan, however: the aim, after year one, is to have competition through powertrain and battery development, rather than extreme chassis rivalry. The series is not, though, intended to be a one-make formula, and by year two it’s hoped other chassis manufacturers will join Dallara. And if the series encourages intense rivalry between motor makers, keen to showcase the excellence of their battery and electrical tech – in line with their road car developments – then, says Agag, Formula E will truly have delivered on its vision. “It’s an open championship,” he confirms, “so as long as the car meets the FIA regulations, it can race. The technical regulations are drafted in such a way that they discourage chassis competition. Instead, they encourage battery and electrical competition.”

McLaren, Williams and Renault have a head start, having drawn directly from their F1 and road car programmes to supply advanced yet proven systems (such as an electric motor taken directly from the McLaren P1 road car). Should Formula E prove as popular as hoped, how long before other major motor

Below: The battery, which produces 180bhp in standard mode, is from Williams Advanced Engineering. Far right: Formula E technical director Carlos Nunes.

manufacturers are queuing up to plug in?

POSITIVE ENERGY: THE TEAMS

With its mantra of clean efficiency and an emotional pull to the gamer generation, Formula E has all the credentials of a sports championship in tune with its zeitgeist. A playground for bloated corporations, demanding hundreds of millions of dollars per season to compete at the top level, it is not. Rather, it is cleaner, lighter on its feet, younger and – if the view of Virgin’s Alex Tai is anything to go by – a lot more attractive to would-be entrants.

Tai, team principal and CEO of Virgin Racing, which will enter the first Formula E season, has an acute perspective on the appeals of the new series, having been involved with Virgin’s entry in 2010 as title sponsor to the F1 team now known as Marussia: “Budgets are capped at £3m in Formula E, which is less than five per cent of an F1 entry. £80m is only just enough to keep you racing in Formula One, so it becomes a competition of who can spend the most, not who’s the smartest.”

The thrifter approach of Formula E is, Tai reckons, highly appealing to a number of brands that have been put off from involvement with the premier category of motor sport, in part because of excessive costs, but also on account of a perception that it’s out of touch with ordinary consumers.

“When we came to F1, we tried to make a difference by being more reliant on CFD technology rather than having the traditional reliance on wind tunnels for

aerodynamic development,” he says. “As a brand we’ve always tried to make a difference, whether that’s through the Virgin GlobalFlyer or the Virgin Galactic programme, and Formula E is exciting in this respect. It’s brand-new technology for the man in the street.”

These facets are likely to be just as attractive to other future entrants, particularly as in a cost-capped formula it should be relatively straightforward to earn enough through sponsorship to offset the cost of participation. “It should cost less than income,” says Tai, “which is where any business should be. And if that happens, you don’t have to charge huge amounts to sponsors, nor do you have to charge drivers to race. So you end up with an altogether healthier market.”

The low start-up costs associated with what will be, in year one, a single-make series are further appealing, as are Formula E’s underlying green principles – likely in time to prove attractive to a new generation of sponsors.

“Electric street racing is the future,” Tai affirms. “It’s a sporting spectacle that celebrates environmental concerns and we want to be part of it.”

LIVEWIRES: THE DRIVERS

With a vast range of competing race series in the echelons beneath motor sport’s premier categories, how can a new championship possibly find a niche in which to thrive? Where can it sit in the bustle of Formula 3, GP2, Renault World Series and the US racing scene?

It can find breathing space, its advocates ►

SAFE AND NO SOUND

There has never before been a fully-electric championship on the scale of Formula E. With quiet cars, powerful batteries and all-street circuits, the championship brings with it a unique set of safety considerations. Carlos Nunes, Formula E technical director, has answers for them all



How do safety considerations differ in Formula E compared to other single-seater championships?

Given Formula E is a new, fully-electric championship, the safety considerations are on the whole much higher. This is not because the series is potentially more dangerous but because it has never been done before. Therefore safety – not just in the cars but for the drivers, teams and track personnel – is one of the most important aspects of the series and something Formula E and the FIA take very seriously.

What extra precautions are you taking for the batteries?

The car’s battery is no more dangerous than a regular combustion engine. Nevertheless, Formula E and the FIA have taken steps to ensure it is protected upon impact – be it at the track or in transit. The battery is made up of many individual lithium-ion batteries, each separately packed in a special protective casing so that should one short, the rest remain protected. The battery has also undergone rigorous crash testing to know how it responds upon impact, as well as completing tests – to UN standards – for its safety during transportation.

Are you worried about fire hazards?

Motor sport by its nature can be dangerous. All championships are concerned by fire hazards and do everything they can to reduce the risk. Formula E is no exception. The risk of fire remains very low, but even so any personnel involved in the car will be given specialist training on what to do should the worst happen.

Everyone involved in the series must first gain a special licence – how does that work?

All drivers taking part must earn an eLicence. This means they have completed a safety briefing on the car and what to do in the event of an issue. Team personnel also undergo a similar briefing – lasting around seven hours – as will marshals and medical teams before any test or race. The FIA medical delegate plays a crucial role in developing the safety procedures.

Who homologates the circuits?

This rests with the FIA together with the race director, local ASN and clerk of the course. All the Formula E circuits go through an initial homologation procedure to check they comply with the FIA’s strict requirements – in Formula E’s case that’s FIA Grade III. The tracks can only be fully homologated the day before the race after various inspections have been carried out.

Has the car passed all the crash tests now?

It has been crash tested to the latest FIA safety standards – the same used in F1. This features tests such as carbon fibre front and rear impact structures; front, side, rear and steering column impact tests together with front and rear roll-hoop impact structure and monocoque push tests. I’m pleased to say the car has successfully passed them.

Are you working in conjunction with the FIA on safety?

Yes, of course. Safety remains of paramount importance to both Formula E and the FIA, and we are working closely with all those involved. We’re also promoting the FIA’s Action for Road Safety programme.

CALENDAR

Round One
Beijing, China
13 September 2014

Round Two
Putrajaya, Malaysia
18 October 2014

Round Three
Punta Del Este, Uruguay
13 December 2014

Round Four
Buenos Aires, Argentina
10 January 2015

Round Five
TBC
TBC

Round Six
Miami, USA
14 March 2015

Round Seven
Los Angeles, USA
4 April 2015

Round Eight
Monte Carlo, Monaco
9 May 2015

Round Nine
Berlin, Germany
30 May 2015

Round Ten
London, United Kingdom
27 June 2015



argue, by appealing solely on its own merits and not presenting itself explicitly as a stepping stone to a bigger championship. And already that pitch has proven attractive to a number of pilots who form the Formula E Drivers Club – thereby expressing their interest in the first season without yet inking the dotted line. Sportscar driver and ex-F1 racer Karun Chandhok is one such, and he has been encouraged by what he has learned so far. “Alejandro was smart because he realised that having a reasonable level of drivers associated with the series would help its credibility from the start,” says Chandhok, who has been confirmed as a Formula E driver for Mahindra Racing. “We’re also going to have input into the car’s development, so that when it starts racing it hasn’t been developed around a single test driver.”

The scheduling of the Formula E calendar makes it attractive to would-be racers, too, with around half the events happening in the motor sport ‘off-season’ from late autumn to March, thus making it possible to attract high-calibre drivers from, say, the WEC.

“The cars will be challenging, too,” reckons Chandhok. “Not necessarily in terms of their outright speed, as a lot of drivers will have experienced more powerful machinery. But it will be a different style of driving and racing: how to manage the torque and the energy delivery; how to use the energy... If you look at the way all other motor sport is going, it’s hybrid or battery operated and that makes it an interesting thing to do. It will be completely new and different and that’s attractive in itself.”

CIRCUIT BOARD: HOST CITIES

As a country that’s home to 1.3 billion people, and as the world’s second-largest economy, China doesn’t really do small. So, as a statement of intent, naming Beijing as host city for the first Formula E race, on September 20, is nothing if not ambitious.

“The circuit will be at the Olympic Park,” notes promoter Steven Lu, “so no, space will not be an issue – it’s huge!”

The race will need more than just Sino-scale to impress, however: a credible, entertaining circuit is vital to generate enthusiasm with local race fans and abroad, via the internet and TV. And on this score, Lu, former head of the Team China A1GP squad, has few concerns. “There are some new-circuit teething troubles,” he admits, “but we have done street racing in Beijing twice before, with A1GP and Superleague, so we have some good experience. And to some extent we have a ready-made audience for our race, as up to half a million people come through the Olympic Park every day anyway, so we can provide perfect extra entertainment for them.”

All well and good, but what’s in it for Beijing – a mega-city that hardly needs promotion? Well, that’s not strictly true, argues Lu, who reveals that Formula E will help fill a nagging post-Olympic void. “One of the concerns after the Games was that there was no sport left to fill the vacuum, but this helps a lot and the city government has been very supportive,” he says. “They understand that it’s the perfect concept for bringing racing and environmental concerns together, and that can really help with a message on pollution.”

Motor sport with a social conscience? There’s an engine for change... ■

STEERING WHEEL

Featuring an LCD display on which drivers can monitor numerous systems including brake regeneration and battery supply levels, the steering wheel also has a paddle-shift, five-speed gearbox. Numerous buttons allow the driver to cycle through menu screens, engage the pitlane speed limiter, communicate on the car-to-pit radio and deliver a power boost using the push-to-pass system.

REAR WING

A sleeker and lower design than many conventional single-seaters, the rear wing doesn’t need to produce as much downforce as other formula cars due to the unique weight distribution of the Formula E. With the transmission, motor and battery pack further back on the car, less work is required from the wing to increase the contact patch for the rear tyres.

SUSPENSION

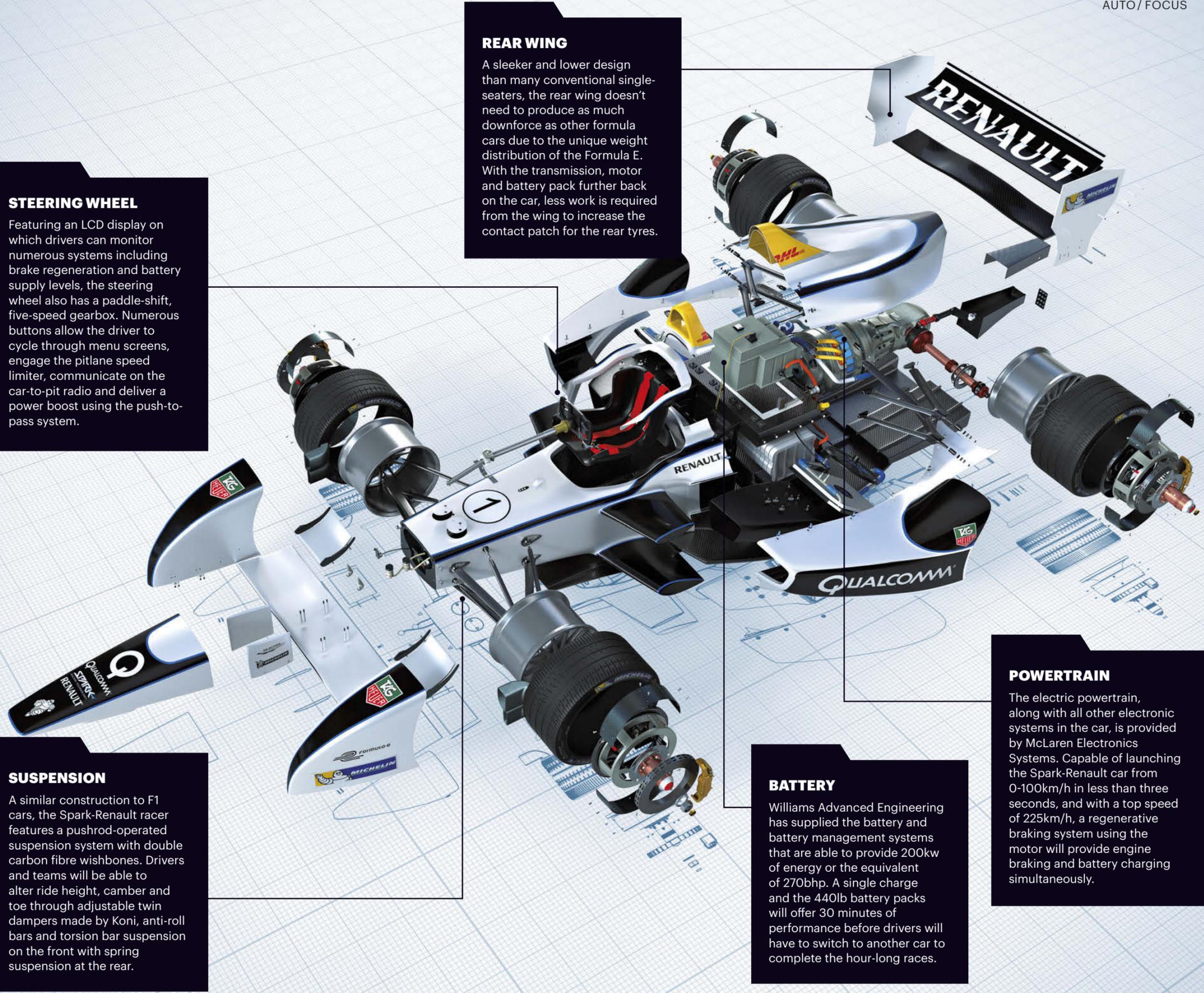
A similar construction to F1 cars, the Spark-Renault racer features a pushrod-operated suspension system with double carbon fibre wishbones. Drivers and teams will be able to alter ride height, camber and toe through adjustable twin dampers made by Koni, anti-roll bars and torsion bar suspension on the front with spring suspension at the rear.

BATTERY

Williams Advanced Engineering has supplied the battery and battery management systems that are able to provide 200kw of energy or the equivalent of 270bhp. A single charge and the 440lb battery packs will offer 30 minutes of performance before drivers will have to switch to another car to complete the hour-long races.

POWERTRAIN

The electric powertrain, along with all other electronic systems in the car, is provided by McLaren Electronics Systems. Capable of launching the Spark-Renault car from 0-100km/h in less than three seconds, and with a top speed of 225km/h, a regenerative braking system using the motor will provide engine braking and battery charging simultaneously.





AN ELECTRIC LINE-UP

From an Oscar-nominated actor, to a renowned entrepreneur and men already famous for their motor sport achievements, the Formula E Championship is not short of impressive and serious backers

ANDRETTI AUTOSPORT

Key People: Michael Andretti (CEO), JF Thormann (COO), Kyle Moyer (director of racing operations), Marco Andretti (IndyCar driver)
Pedigree: With four IndyCar series titles to go along with two Indy 500 victories, Andretti Autosport is a true powerhouse of US racing.
Drivers: Franck Montagny.

AUDI SPORT ABT

Key people: Hans-Jürgen Abt (team principal)
Pedigree: DTM specialists with five championship titles, Audi's involvement in Formula E marks a return to open-wheel racing for the first time since the 1990s.
Drivers: Daniel Abt, Lucas Di Grassi.

CHINA RACING

Key people: Steven Lu (CEO), Yu Liu (chairman)
Pedigree: First appearing in the short-lived AIGP series, China Racing has gone on to compete in various other categories such as Superleague Formula, and has experience organising street races across China.

DRAGON RACING

Key people: Jay Penske (owner and president), Paul Woolnough (vice-president)
Pedigree: Owner Jay Penske, son of legendary US motor sport figure Roger, formed Dragon Racing to compete in the IndyCar series. Following its acceptance into Formula E, Dragon Racing has scaled back its other involvements to focus on the all-electric series.

[Y\ SSPNW

Key people: Jarno Trulli (Co-Founder and Driver), Lucio Cavuto (Team Principal), Francesco Guarnieri (Chairman and CEO)
Pedigree: Taking over the entry of Drayson Racing, ex-Formula One driver Jarno Trulli leads a brand new team into the series. The outfit will continue to work with Drayson, which will remain as the squad's principal technology partner and carry on with the development of wireless charging technology.

E.DAMS

Key people: Alain Prost (co-founder), Jean-Paul Driot (co-founder)
Pedigree: A joint venture between the ever-successful DAMS team and four-time Formula One world champion Alain Prost, e.dams combines two of the most recognisable names in French motor sport.

MAHINDRA RACING

Key people: Anand Mahindra (chairman and MD of Mahindra Group), SP Shukla (chairman, Mahindra Racing), Dilbagh Gill (team principal, Mahindra Racing)
Pedigree: A multinational conglomerate from India, Mahindra Group has already established itself as a leading producer of electric vehicles. Through Mahindra Racing, Formula E represents its second step into motor sport following a successful venture into motorcycle racing.
Drivers: Karun Chandhok and Bruno Senna.

SUPER AGURI

Key people: Aguri Suzuki (executive chairman), Mark Preston (team principal), Peter McCool (technical director), Ferry Spijkerman (commercial director)
Pedigree: Best known for a foray into F1 in the mid-2000s, the Super Aguri team has been reformed to compete in the Formula E Championship. Based in Tokyo, Japan, the team is run by former F1 driver Aguri Suzuki.

VENTURI GRAND PRIX

Key people: Leonardo DiCaprio (founder), Gildo Pallanca Pastor (founder), Bert Hedaya (founder), Francesco Costa (founder)
Pedigree: Formed by Oscar-nominated actor Leonardo DiCaprio and Monegasque company Venturi Automobiles, the team has garnered major media attention for the Formula E series. With experience in producing high-performance electric vehicles, however, Venturi holds the World Land Speed Record for an electric vehicle. This is no PR stunt.

VIRGIN RACING

Key people: Richard Branson (founder and chairman of Virgin Group), Alex Tai (team principal)
Pedigree: A business associated with aviation, technology and even space travel, Virgin re-enters motor sport following an unsuccessful attempt at Formula One in 2010 and 2011.
Drivers: Jaime Alguersuari and Sam Bird.



"ELECTRIC STREET RACING IS THE FUTURE. IT'S A SPORTING SPECTACLE THAT CELEBRATES ENVIRONMENTAL CONCERNS AND WE WANT TO BE PART OF IT."
 ALEX TAI, VIRGIN RACING

School bus safety has been a major issue in Uruguay, where the Fundación Gonzalo Rodríguez has campaigned hard for improvements.



Road safety

SCHOOLING SOCIETY

Nani Rodríguez has channelled the fighting spirit of her late racing-driver brother in taking on the government of Uruguay to improve school bus safety across the country

TEXT: PABLO FERNANDEZ

School transport in Uruguay, South America, was for decades characterised by a lack of safety regulations. The only thing that prevented slaughter was the small number of cars on the road. But, as in other Latin American countries, the number of vehicles on the streets multiplied and so did accidents and deaths.

Fortunately for school children across the country, the Fundación Gonzalo Rodríguez (FGR), which works closely with the FIA Foundation on improving road safety in the region, identified the problem early on. It designed a targeted campaign to improve child road safety, and after a long journey – that included confronting the government and the school transport union – managed to change the way Uruguayan children travel.

In the 1980s, children would travel in school vans without any safety devices. The usual vehicle was a VW Kombi van, fitted with long benches on which they would sit without any seatbelts or child seats, happily bouncing around at every turn or sudden stop.

When there were fewer cars on the roads this went unremarked, but in the last 10 years the number of cars has increased by 60 per cent and the number of

motorbikes by 300 per cent, according to the National Road Safety Agency (UNASEV). To make matters worse, most drivers ignore traffic regulations and there is a lack of enforcement by the authorities. Accident rates have increased accordingly.

“We analysed the situation,” says Nani Rodríguez, president of the foundation named after her brother Gonzalo, a racer who died in an accident during practice for the 1999 CART race at Laguna Seca Raceway in California. “Child seats were hardly used and those in the market complied with no regulations. Children would travel unrestrained, and drivers of school transport didn’t have companions. We realised it was fundamental to reverse that situation.”

To achieve that, the Fundación Gonzalo Rodríguez launched its EDU-CAR Programme promoting the mandatory use of child restraint systems. Also, after evaluating the van fleet used in school transport, the foundation concluded new vehicles were needed, since the majority of them were not suitable for the safe transport of children and could not be modified.

“The investment required was massive, and the ►



IN THE NAME OF THE BROTHER

Youth work honours the memory of promising racer Gonzalo Rodríguez

Gonzalo Rodríguez was a young Uruguayan racing driver with a bright future. In 1999 he was flying high in second place in the FIA F3000 Championship and was being courted by teams from the US Champ Car series. Two weeks later he was dead, killed in an accident at Laguna Seca, in California, while practising for a Champ Car race.

He died before his potential had been fulfilled, but more than a decade later his legacy lives on and its influence grows ever stronger. In the aftermath of his passing, Gonzalo's sister, Nani – his constant travelling companion in Europe (above) – established the Fundación Gonzalo Rodríguez to perpetuate her brother's memory. Her initial objective was to help underprivileged children in her homeland by using sport as a social tool to keep them off the streets and teach them the importance of respect. But she was soon

alerted to other problems facing the young – including a high casualty rate in traffic accidents.

Meanwhile, several of Gonzalo's former track rivals were by now established in Formula One and Nani continued to visit the paddock from time to time to keep up with old friends. FIA race director Charlie Whiting was one of those friends and she asked him whether he knew anybody who might be interested in developing a road safety programme for Latin America. Whiting introduced her to the FIA Foundation.

With the help of the foundation, Rodríguez drew up the EDU-CAR proposal, a road safety plan for children in Latin America and the Caribbean. Gonzalo's legacy is the number of children's lives that have been saved in Uruguay and across the Americas due to this proposal and the indomitable will of his sister to do good in his name.

confrontation started – telephone calls asking us to leave everything as it was. And the government would give no answers," explains Rodríguez. "But our message was very clear, and thanks to support from our international partners – the FIA Foundation and the World Bank – we kept working without giving in to the pressure."

In the middle of the debate, there was an accident that forced the government to react. "In April 2010, 11-year-old Julieta Estefan died. She was travelling unrestrained and the accident was shocking. The media reacted strongly to our recommendations, and the government and the school transport union felt great pressure from society. The government reacted with unprecedented speed, and in two months there was a regulation for school transport – currently a reference for many countries."

The main points of these new regulations, which have been in force since July 2010, were: all school transport vehicles should have three-point, height-adjustable seatbelts; all children under three years old should travel in a Child Restraint System, and there should be a passenger in charge of children; the number of children per trip is also limited.

This was a radical change that improved safety conditions. No deaths or serious injuries in school transport have been recorded since the implementation of the new act, explains Pablo Inthamousu, UNASEV's secretary general.

"The evaluation in terms of children's safety is very positive, the figures are very clear," he says. "The new regulation was tested in practice: we had a paradigmatic case, a van rolled over and none of the nine children inside were injured. At UNASEV we have a very favourable opinion of the role played by social organisations. They are strategic allies to us. In the case of FGR, they work on child safety with independence and autonomy, being free to report what needs to be improved. That's of great help to us."

Nani Rodríguez explains how they managed to get Uruguayan society to sit up and take notice of this issue. "We got the issue on the social agenda even though there is minimum enforcement," she says. "We designed communication strategies. We focused on the media creating agreements with private companies to promote the change from a different perspective. For example, a health insurance company gives a Child Restraint System to its pregnant members if they attempt a safety talk with our technicians."

Javier Echenique is the owner of a school van that was involved in a major accident in May 2013. "I was one of the sceptics, I thought the investment required for the new regulation was excessive, that there was no reason for so much safety," he says. "Today, I can't be grateful enough. Thank God we implemented those changes, thank God we invested. Had it not been for that, we would have ended up having some fatal victims among the children, no doubt about it."



Above: Seatbelts are now mandatory on Uruguayan school vans thanks to the efforts of the Fundación Gonzalo Rodríguez and its founder, Nani Rodríguez (right).



"CHILD SEATS WERE HARDLY USED AND CHILDREN WOULD TRAVEL UNRESTRAINED."

NANI RODRÍGUEZ



"The new van – a Mercedes Benz 313 – responded. Seat anchorage was strong, windows didn't break. Children were hanging from seatbelts, many of them considered it an adventure. They didn't realise the dimension of what could have happened."

Now, the foundation is sharing its experience with other Latin American countries. "Our asset is having gone through the learning process," says Rodríguez. "Since each country has a different reality, tools should be adapted. We are working closely with governments and NGOs from Argentina, Brazil, Chile, Colombia, Mexico and Paraguay. We are training technicians, teaching them what are the best child restraint systems and assisting in the drafting of new regulations."

To achieve this, the foundation depends on several international organisations. "In order to generate such a cultural change in my country and the region, it's crucial to have the technical, economical and institutional support of organisations such as the FIA Foundation or the World Bank," adds Rodríguez. "Generating a change takes 10 years. Without their support we wouldn't have made any progress at all." ■



Sebastián Merchán puts the Italian championship Formula 4 car through its paces at Adria Raceway in testing last month.



Junior Racing

FORMULA FUTURE

For junior drivers, the leap from karting to single-seater racing can be a costly, make-or-break moment. The FIA, however, is seeking to smooth the path to future glory with a new concept, Formula 4, and the first championship is already proving to be a major success in Italy

TEXT: JUSTIN HYNES

On the face of it, climbing the racing ladder seems a straightforward process: apprenticeship in junior karting leads to switch to single-seater cars, the power of the series contested increases as results and titles are accrued, and top-level racing across assorted saloon, sports and open-wheel championships beckons.

The reality, however, is whole lot more daunting. Having successfully navigated the world of junior karting, young racers, typically aged 15 or 16, are faced with a frighteningly complex junior formula ecosystem populated by a bewildering array of competing series, all with wildly differing costs and, by virtue of budget, make-or-break levels of competitiveness. Choosing the right series to race in at the right point in a series' life cycle can be a pivotal moment in a young racer's career.

There is, however, a growing alternative. Re-shaping the single-seater ecosystem has been the FIA's goal for the past five years, and under the auspices of the federation's Single-Seater Commission president, Gerhard Berger, the first steps were taken with the launch of a substantially remodelled FIA Formula 3 European Championship last year.

That series aims to prepare racers in their late teens for the jump to levels one step or more below Formula One, but it was clear that the next area to focus on – and perhaps the most crucial – was to give those migrating from karting a first, controlled, competitive and, most of all, affordable taste of single-seater racing. The result is the FIA's nationally-focused Formula 4 championship, the first example of which kicked off in Italy this month.

"We saw with Formula 3 that the level of skill is quite demanding and, while there are always exceptions, for most young drivers it's not really possible to go from karting to F3," says Frédéric Bertrand, director of the FIA's Single-Seater Department. "So we started to think of a concept of a car and of championships where we can offer drivers a platform in which they can compare themselves in similar, safe cars."

The result is Formula 4. Unlike the FIA's F3 project, this more junior series is focused on single territories and regions, with national sporting authorities organising a championship via a number of models including working with a promoter and with teams dealing directly with manufacturers, working with a central owner of a stable of cars, or managing the series itself if funds or a sponsorship deal allow.

The regulations have been designed in such a way that the specification of the cars is defined, using a carbon fibre monocoque chassis built to current F3 safety standards and an engine outputting 140-160bhp.

"The configuration of the car is up to each manufacturer, as long as they maintain the power in a range we accept and the cost is in a range we also determine," explains Bertrand. "For the engine and chassis we have a registration process where the manufacturers have to fulfil a lot of criteria, and once those are fulfilled we provide a registration agreement and submit them for homologation. Once that is done, they're ready to race."

A target price of €40,000 per car has been set, resulting in a likely seasonal budget of €100,000 for drivers – a figure Bertrand says compares favourably with others in the marketplace. "The cost is similar for the lowest-priced series or much cheaper if you compare it to

something like Formula Renault 2.0 litre. Maybe as much as 2.5 or three times cheaper."

The first country to embrace the new formula is Italy, where under the auspices of the Commissione Sportiva Automobilistica Italiana (CSAI), in partnership with promoter WSK, the first F4 championship got underway at the Adria Circuit on June 8, following a test session at the same track in late May. Spread across seven rounds at circuits such as Imola, Mugello, Vallelunga and Monza, the championship will feature upwards of 20 young racers driving for 10 teams using a chassis by Tatuus, an engine from Abarth and tyres provided by Pirelli.

According to Luca De Donno, president of championship promoter WSK, the series is off to a good start. "My hope is that this is a new era for junior racing, and I hope that it will become a reference point for young drivers in the future," he says. "The attraction obviously is the cost, plus you have the security of the FIA brand and

"FORMULA 4 WILL OFFER A NEW BREEDING GROUND FOR F1 DRIVERS."

GERHARD BERGER

an excellent car. We are putting the focus on reliability, professional organisation, good promotion and a strong link to the world of karting [WSK is the promoter of the European and World Karting Championships]."

With the first series up and running, the next step is to spread the formula globally. "Australia is at the tender stage and will launch in 2015," says Bertrand. "We will have a championship in Germany, where the Allgemeiner Deutscher Automobil-Club e.V. (ADAC) and the Deutscher Motor Sport Bund (DMSB) are currently running tenders for 2015. Japan is doing the same, most likely with a chassis by Dome, and the UK will also have a championship in 2015, with a Ford engine and a chassis from [French manufacturer] Mygale.

"There are plans for a championship on the west coast of South America, again for 2015. This will be in the FIA's NACAM zone (North America and Central America). We will also have a regional championship in the North European zone, and lastly, China is coming on board, with an engine from local manufacturer Geely and a Mygale chassis."

For Berger, it all adds up to a bright future for the F4 concept. "We are entering a very interesting phase for FIA Formula 4," he says. "The Italian championship is an important first step. We are conducting a long-term project, the objective being to make FIA Formula 4 the first, indisputable step for single-seater racing drivers, by offering an optimum level of safety while at the same time keeping costs down. Formula 4 will re-launch single-seater racing on the national level and thus offer a new breeding ground for F1 drivers and for other top-level disciplines." ■



Clockwise from top left: Italian F4 drivers make their way out of the pits at Adria Raceway; Andrea Russo of DieGi Motorsport; Dorian Bocolacci of Cram Motorsport and Leonardo Pulcini of Euronova Racing.

PHOTOGRAPHY: PRESSNET IMAGES; PHOTO 4.

The Ferrari 158 with which he won the 1964 world championship sits proudly in a barn at Surtees' home.

Legends

THE ELDEST STATESMAN

It's 50 years since John Surtees became the only man to win world titles on two and four wheels - and he's now F1's oldest surviving champion. But the memories of his switch to grand prix racing remain as fresh as ever

TEXT: JUSTIN HYNES PHOTOGRAPHY: RICK PUSHINSKY

Surtees came to F1 in 1964 with a world championship-winning pedigree from motorcycle racing, but with little knowledge of his new track rivals.



“W”

e can take some photographs in the barn if you like,” says John Surtees as he tramps out of the kitchen of the Kentish manor house he’s called home for more than 40 years. “There’s some cars up there you might want to see.”

At 80 years old, Formula One’s oldest living champion (following the death of Sir Jack Brabham last month) still moves with surprising pace. He opens the front door and bounds up the hill towards the large barn that overlooks the house.

The doors are already open, and in the gloom the familiar shape of a rare and beautiful BMW 507 becomes clear. To its left is an equally desirable crimson Gullwing Mercedes 300SL. Between them, though, is the rarest of them all, the Ferrari 158 Surtees drove to the 1964 Formula One World Championship.

“Initially it wasn’t great,” Surtees says of the car and the year. “There were problems in the early part of the season. At Spa, I think we holed a piston because the injection at the top end hadn’t been right. In Austria, I had the race potentially in my hands and a joint on the suspension broke. Mind you, it was a very rough circuit, the airfield. So that lost me points...”

The recollection is a snapshot of Surtees’ view of the past, taking in background, cause and effect, long-term repercussions, but always it’s with a level of conviction that gives you some clue as to how he approached his racing career – in black and white, shaped by what he believed to be racing certainties. With a wry smile, however, he admits that occasionally his inability to see the shades of grey in between led to turbulent and defining waypoints.

The end of his first season of F1 competition is a prime example. To get there, however, first the tale of Surtees’ involvement in car racing bears re-telling.

In 1959 Surtees wrapped up the 350cc and 500cc world motorcycle championships (his fifth and sixth titles) for the second consecutive year. With little left to achieve on two wheels a change was in the offing.

“It all started in 1959,” says Surtees. “My ambitions were still with motorcycles, but the idea of driving a car had been planted by Mike Hawthorn only days before he was killed [in January 1959]. We were all together at

a dinner, a Sportsman of the Year dinner or something like that. And out the blue Reg Parnell came up and said, ‘come to Goodwood, test the car’. As it happened I was free. That was the Aston Martin DBR1.

“It was all by accident really,” he says. “After that I went to see John Cooper because I’d decided that when I wasn’t motorcycle racing, I would do extra racing in a car. We felt that our commitments to [motorcycle manufacturer] Agusta had to come first, obviously, so we said we’d buy a car. So I went to buy a Formula Two Cooper Climax but John Cooper had arranged for Ken Tyrrell to be there and he came up to me and said, ‘I’ve entered you in Goodwood. I’ve spoken to the RAC, they’ll watch you in practice etc, and if you’re any good they’ll issue you with a licence.’ That was it really.”

So in March 1960, Surtees journeyed to the south coast of the UK and competed in a Formula Junior race at the circuit, finishing second to another soon-to-be star, Jim Clark. It was the turning point.

“I thought I’d do a few car races privately. Ken Tyrrell said ‘do it’, which was encouraging. It all changed after I went to Oulton Park and did a Formula Two race. My father was number one mechanic, I was number two mechanic, and we were second behind the works Lotus of Innes Ireland and in front of the other works cars.

Then we went to Aintree for the international event with all the Porsches, which were dominating 1.5-litre F2. I was the first British car in front of the other works teams and set the fastest lap. Colin Chapman came up and said, ‘Try a Formula One’. So I said, ‘I’m a motorcycle racer’, but he kept at it: ‘try a Formula One, come to Silverstone, we’re going to Silverstone’. So I went and he said he wanted me in his team. I kept saying I was a motorcycle racer, so the compromise was him saying, ‘when you’re not racing motorcycles, race for me’. So we shook hands and that was it, I was a Lotus F1 grand prix driver.”

Surtees made his F1 world championship debut at Monaco in May 1960. However, for a multiple world champion motorcyclist it wasn’t the daunting prospect it might have been.

“It was incredible but at the same time the whole environment there, well, you’ve got to remember that we had some prestigious motorcycle races and I was pretty used to the world championship scene on two wheels.

“The world championship scene on four wheels was very different because I knew no one,” he adds. “I had never been to a car race apart from when one was taking place in Spain, a GT race or something. I didn’t know anybody. I went into it knowing Reg Parnell, Tony Vandervell, and then Ken Tyrrell and John Cooper, but no one else. So the big problem was I hadn’t served any form of apprenticeship to know the people off or on track. From a racing driver’s point of view that’s where the biggest problems lie. As a driver or rider you need to have instant assessments of how you deal with someone.

“You haven’t got time to wait and think it out. I didn’t know the ones that had weaknesses, the ones you could take liberties with, the ones you had to be careful with and the ones you could trust. That was a learning curve.”

If Surtees was unsure of his rivals, they were equally mystified and in some cases resentful of him – an unproven, inexperienced rookie thrown in at the highest level.

“Generally, it was fine. They were top people actually – Graham [Hill] and a few others had a bit of a soft spot ▶

for motorcycles. They were very receptive. There was the odd person, though. I fell foul of Jo Bonnier. A bit of frustration came in the race in Belgium where I ran into the back of him. Of course, some people who weren't at the top of the grid didn't like this new boy coming in and racing at the top end. They didn't like me being quick."

Resentment, from one quarter in particular, came to a head at the end of the campaign, in an episode where Surtees admits emotion perhaps got the better of him.

"At the end of the season, after the Tasman Series, Colin [Chapman] said, 'John, I've decided I want you to lead the team' and he told me I had my choice of team-mate. I didn't have to think too long. I respected [Lotus team-mate] Innes Ireland as a driver, but I wanted Jimmy [Clark]. I'd fallen foul of Innes when I first came into the team because he resented this new boy being given the same car as him and them competing with him. Otherwise, though, we got on quite well, but Jimmy [Clark] and me gelled a little better."

On the face of it, the suggestion appeared straightforward, but Surtees hadn't reckoned on the reaction of Ireland, who insisted he had a contract with Chapman. Crucially, Ireland also had strong support from the motor sport media.

"Innes was quite a popular character," says Surtees. "In those days you had a few national journalists who always went to grands prix and a few motoring journalists as well. Some of the drivers were closely connected to some of these journalists and there'd been a bit of resentment of this new boy. So I'd come in for some stick."

"I had this call from Paris I think and Innes said, 'You've stolen my drive. I've got a contract, which is firm, and you've done this and that.' I told him, 'Look, just come back and see Colin and everything will be fine.' We went back and Colin told him, 'It's all set Innes, you're fixed up to drive the same cars with BRP [British Racing Partnership]', but Innes wasn't having it."

The wrangling and adverse publicity were too much for Surtees, who walked away from the deal.

"I loved my racing, the coming together between man and machine," he says. "I liked Colin very much but I'd come in for some stick and it was taking away that pleasure. I thought, 'I'm just starting a new career and I can't stand it, I don't want this', so I walked away. Did I regret it? Later, yes, I did. I made one or two decisions emotionally which... Maybe I should have been a bit more like Ayrton Senna in regard to which car I sat in."

Walking away from Lotus almost took the 26-year-old Surtees straight into the arms of Ferrari, but again he turned away. "There was a call from Ferrari; I thought about it but then I saw the list of things they were going to do and I thought, 'No, this isn't right for a new boy; too many drivers already'."

Whether it would have been Surtees, armed with the 156 'Sharknose' Ferrari, who would have lifted the 1961 title instead of the Scuderia's American driver Phil Hill is a moot point, but the decision to bide his time saw Surtees spend two years if not in the F1 wilderness, then certainly at its fringes, racing for privateer Reg Parnell. And then, in an uncharacteristic move, Ferrari came knocking again ahead of the 1963 season.

"I went to see Enzo in his office. There was the picture of his son, Dino, on the wall and [Ferrari's right-hand man] Franco Gozzi was there and [Ferrari's secretary] Valerio [Stradi], and they said it was a new beginning. [Designer Carlo] Chiti had gone and they wanted to start afresh. They wanted me to come there, be number one driver and do the testing of all the cars."

"I had no idea if it was right, how the organisation was at that time. I didn't have a clue!" he laughs. "The only thing I thought was it was good Chiti had gone, and that was reinforced when I worked with him a few years later when he asked me to drive an Alfa Romeo sports car at Sebring. We went out and did testing and made changes to the car to make it, in my mind, better (and it did better lap times) only to find when we got to the race he'd changed it back because they were his settings."

"So it was a new team at Ferrari. [Designer] Mauro Foghieri was there, Franco Rocchi was sort of the chief project engineer, responsible largely for the engines. There was some depth there."

It wasn't enough, however. Ferrari's strategy of running sports car and F1 programmes stretched resources to breaking point, and while the team's 250P sports car was a huge success, the tweaked 156 with which the team raced in F1 struggled. At the season-opener in Monaco, Surtees raced to fourth and claimed fastest lap, but at the next round in Spa he failed to finish. The Dutch Grand Prix yielded a podium finish but again momentum ebbed, and in France the fuel pump failed.

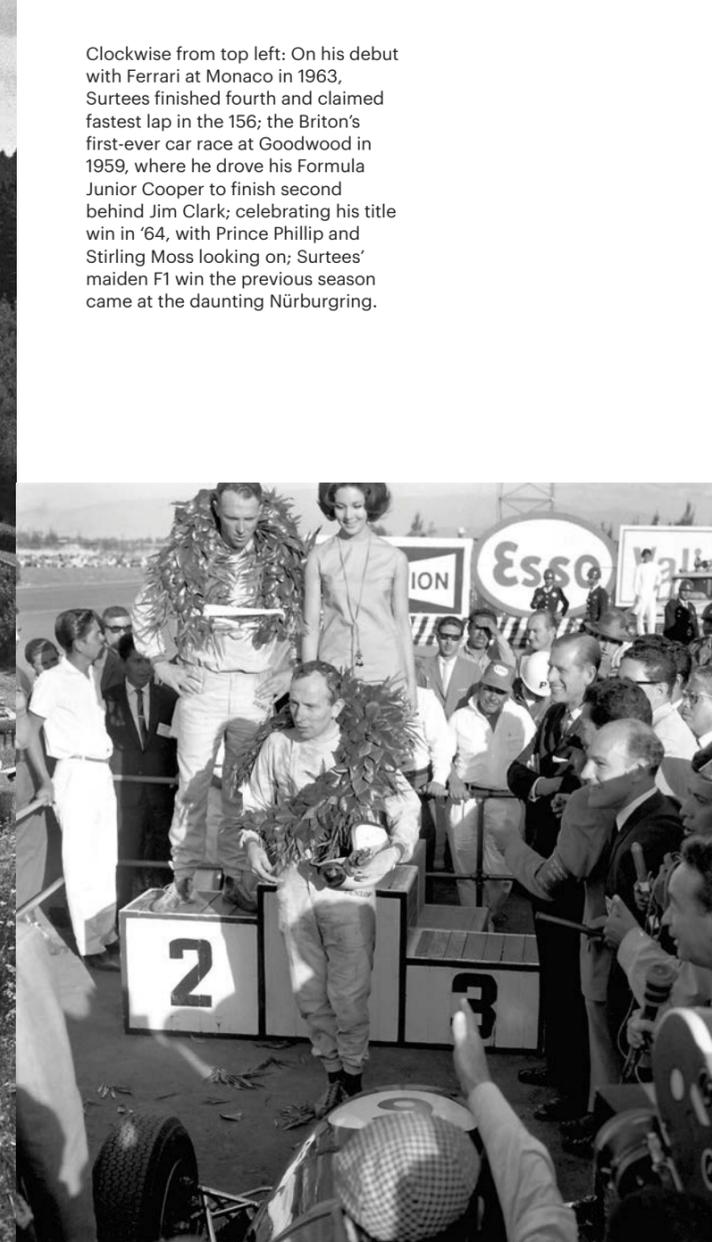
"The V6 in that car was a good little engine," says Surtees. "Probably to get its maximum potential you needed to rev it a little higher but that wasn't safe. It had direct injection but it was difficult to meter it. However, before the German Grand Prix we did some development work, largely because Le Mans was over. They finally gave their attention to F1."

Surtees took the improved car out on the daunting Nürburgring circuit and despite its deficiencies qualified a close second to Jim Clark's Lotus 25. When Clark's car developed a misfire Surtees saw his chance. He seized the lead and gradually powered away to score his maiden F1 win and Ferrari's first since 1961.

"It was very satisfying. When you're in Italian teams, there's the emotion as well. They hadn't won since 1961, so it was a big moment for them," he says. "I don't remember if there was a big celebration, though. That kind of thing usually happened in the pits. And then we would go over to the Sport Hotel, nowhere fancy, that sort of thing. We'd all eat together but apart from that no special celebration really." ▶

"MAYBE I SHOULD HAVE BEEN MORE LIKE SENNA IN REGARD TO WHICH CAR I SAT IN."

JOHN SURTEES



Clockwise from top left: On his debut with Ferrari at Monaco in 1963, Surtees finished fourth and claimed fastest lap in the 156; the Briton's first-ever car race at Goodwood in 1959, where he drove his Formula Junior Cooper to finish second behind Jim Clark; celebrating his title win in '64, with Prince Phillip and Stirling Moss looking on; Surtees' maiden F1 win the previous season came at the daunting Nürburgring.



“FERRARI COULD HAVE WON TWO OR THREE TITLES, BUT WE CHUCKED THEM AWAY...”

JOHN SURTEES

For 1964, Surtees was given a new machine – the V8-powered, 1.5-litre 158. Once again, though, there were teething problems, with the sports car programme impacting on the F1 results. From the season’s first four races Surtees managed just one finish – a second place at Zandvoort. Instead, it was Clark, Hill and American Dan Gurney who took the spoils, with Clark taking three wins from the first five events.

“The season was typically topsy-turvy Ferrari,” says Surtees. “[Enzo] Ferrari had some major things on his mind. There had been a potential takeover by Ford and he turned it down. It didn’t go down well and Ford basically said, ‘If we can’t buy you, we’ll beat you’. They started throwing money at building sports cars and the Le Mans cars [the legendary GT40]. Then there was a FIAT deal happening on the side.

“At the time I didn’t really appreciate how difficult it must have been,” he adds. “When someone has started something and it’s their company... Well, it wasn’t until I had my own team that I understood some of the stresses the Old Man must have been under.”

Development of the new 158 only began in earnest after Le Mans but by the time the championship reached the final round, in Mexico, Surtees was embroiled in a three-way fight for the title. Hill led with 39 points, while Surtees was on 34, two clear of Clark. With only a competitor’s six best results counting towards the title the mathematics of how each could win were complex, but Surtees went into the race knowing that he could only be sure of the title if he finished second or better. He also went to Mexico City knowing that the 158’s V8 engine might suffer in the high-altitude surrounds of the circuit, the Magdalena Mixhuca, later to be rechristened the Hermanos Rodriguez.

“I was really worried about it,” he says. “We’d had trouble getting the metering of the fuel injection right at a number of races. We thought the 12-cylinder engine would be better. But there was a problem with oil surge, particularly on the long, banked corner – the Peraltada. So there was a big question about whether or not the thing would actually last, even though it was quicker. We said, ‘it’s got to be the eight’.”

Fourth on the grid Surtees, hampered by a misfire, dropped back to a distant 13th after the start and was forced to watch as pole winner Clark powered away into a solid lead. Hill, meanwhile, recovered from an early problem to battle Surtees’ team-mate Lorenzo Bandini (using the 12-cylinder engine) for third.

The race began to come back to Surtees on lap 31 when Bandini collided with Hill, damaging the BRM’s exhaust. Down on power, Hill faded from the picture.

“I saw the whole thing with Lorenzo and Graham; I think I was the reason it happened,” says Surtees. “My engine hadn’t fired on eight cylinders for the first couple of laps or so because we’d changed the engine and put a different mixture on it to try and make it work better, but it was too lean. However, when it got hot it started to work. I was able to catch up and I think Graham saw me in his mirrors and reacted.”

Clark, in the lead, was still in control of the title, however – until the penultimate lap.

“I’d had a lot of bad luck in the previous races but this time it was Jimmy’s turn. He had a problem with his engine and he dropped back.”

Surtees, in third, still needed to finish second. Frantic instructions from the pitwall to Bandini saw the Italian let Surtees past to finish behind the winner Gurney and as champion – the first and still the only man to do so on two and four wheels.

Half a century later, Surtees is matter-of-fact about the achievement. “It was very satisfying,” he says. “It would have been nice to win the race, but if anybody was going to beat me I was happy for Dan, because I rated him very highly. He had his ups and downs, in life as well as racing, but he was a damn good driver.”

Surtees would go on to more wins, but just one would come with the team he’d taken to victory in one of the sport’s tightest championship finales. Within two years his relationship with Ferrari had soured: a life-threatening accident midway through 1965 led to a long lay-off and when he returned to the fray, political machinations within the Italian squad saw Surtees quit in dramatic style following a controversial 1966 Le Mans outing.

He went on to give Honda the final victory of its brief 1960s F1 tenure before eventually founding his own intermittently successful team, but never again would he challenge for a title.

“For a long time I felt real anger about the way it ended with Ferrari,” he says. “Not with the Old Man because I thought he had been heavily manipulated, but with the situation and about what we’d lost, because we had potentially two or three titles there. We had them, but we chucked them away... Chucked them away.”

In the barn where his title-winning 158 rests, and surrounded by his own team’s racing machinery, Surtees can still smile when asked to sum up his grand prix years and what he learned about himself through them.

“I think the biggest thing is the competitive spirit which exists both on and off the track with me,” he says. “At times it perhaps caused me to make one or two decisions that were not as calculated as they should have been, but I’ve been lucky to work with and compete against some really fantastic people.

“I’ve said this many times but it all goes back to the very first race I won. The day when, having built up the Vincent motorcycle – the Grey Flash – I went to that circuit in Aberdare in Wales and struck up a communication with the bike and we became as one. It talked to me and I talked to it and from then on I was on a winning streak, purely because of that relationship with a piece of machinery that I’d created. Now that’s important.” ■

TIME IN MOTION

Watchmaker Richard Mille has brought his love for the technology of motor sport into the high-end pieces he creates - which are strong enough to last a lifetime

TEXT: JUSTIN HYNES

The marriage between timekeeping and motor sport is almost as old as the sport itself. Tales of the earliest days of race timing tell of rudimentary tripwires strung across the brickwork of the Indianapolis Motor Speedway at the inaugural 500 race in 1911 and linked to rolls of thin paper, springs, hammers and typewriter ribbon.

Fifty years later timing was the preserve of drivers' wives and girlfriends, who perched on pitwalls around the world, gripping an analogue stopwatch in either hand in order to clock the split times of their partners as they hurtled across the start/finish line.

The dovetailing goes beyond the need from separating the fastest from the also-rans, however. The atomic-level obsession with precision, the exploration of exotic materials and, even in these days of laser-guided machining and 3D printing, the exquisite handcrafting required to edge towards perfection have made motor sport a fertile area for watchmakers to show their skills.

So, given the plethora of brands vying for attention in a vast array of championships at every level of global motor sport, what is there left to gain for a watch brand from racing, particularly a relatively young brand occupying an extraordinarily rarefied market segment?

For Richard Mille, who launched his ultra-high-end watchmaking company in 2001, the answer is simple.

"Because racing is in my blood," he says. "I have a collection of race cars. Since I was young, I dreamt about racing cars. For me, it's natural. Also, I have the same approach you have with racing cars. Our legitimacy comes from extreme techniques without compromise."

Mille's road to watches as boundary-free feats of supreme engineering began with a post as export manager at watchmaking firm, Finhor, in the mid-1970s. When it was taken over by Matra in the early '80s he

became director of the company's watch brands. In the 1990s he joined jewellery firm Mauboussin as CEO of the watchmaking division and head of jewellery. All the while, though, he was harbouring visions of launching his own uncompromising brand of cost-no-object timepieces, free from any restrictions on R&D time.

"I'd always said that one day I would launch my brand. Not for reasons of ego, but to do what marketing today doesn't allow us to do," he explains. "Motor sport is a prime example of this. Formula One, sport prototypes, everything linked to racing cars is appealing to me because it's the same process by which you have thousands of hours of development, studies, tests and at the end of the process you release only a few pieces.

"I loved this idea; in France we say the mountain is giving birth to a mouse. I am not in the volume business. It's not an industry, but you need a lot of technical and financial means to develop your products, and at the end you will only release a few pieces.

"It's a non-marketing approach," he adds. "It's based on efficiency and technical results. It's a sharp approach and not like the usual approach of today. In the luxury business, everybody starts from a final public price acceptance point and from that they develop the product. I said no, my development has no limit. The only limit is a technical one, and you can push technical domains."

The synergies between his methodology and that of racing constructors made involvement in motor racing a natural fit for Mille as he sought to broaden the visibility of his fledgling brand. However, his first choice for partnership, the bi-annual Le Mans Classic race, seems at odds with the future-focused techniques and materials he was employing in his watches.

Mille admits that from a marketing viewpoint the choice was strange, but that his passion for classic racing cars prompted him to start sponsoring the event in 2002. ▶

Richard Mille wanted his eponymous watch company to reflect the same values of technical excellence and exclusivity seen in motor sport.

“It’s a total paradox,” he laughs. “But I found no problem with this because it comes from passion. Le Mans was always a dream for me. When I was young, I was always watching it on TV. When my friend Patrick Peter [of event promoter Peter Auto] proposed that I be the main sponsor of the Le Mans Classic, I was totally enthusiastic because of the pure pleasure it gave me.”

“It was also about a time where the cars were art pieces. They came from engineers, but many of them were artists. There are nearly 500 entries with every conceivable style, shape, colour and sound of racing machinery – it’s a legend. For me, it’s also a fantastic opportunity to invite clients. A lot of my clients are mad about cars, so for them to come to Le Mans is fantastic.”

The bonus for Mille is that he’s also a racer, with a mind-boggling collection of classic sports cars.

“I race with a Lola T70 but I have a few more, quite a few more,” he smiles. “A Lotus 33, a 49, a 72, a 63 four-wheel drive, a McLaren M2, an M7, an M9 four-wheel drive, a Ferrari 312B, a V12 Matra. I have a lot of Porsches: 910, 907, 908, 917, a 935... You can see I love cars.”

The passion for racing inevitably put Mille on the path to F1, but his involvement in motor racing’s top single-seater category was again atypical, borne out of a desire to fully test his watches in an extreme environment.

“For the sports people we are involved with it’s compulsory to race, to drive or to play with a watch,” he says. “They are my test drivers, so to speak. I was against all the marketing concepts that say you use the watch for the pictures. I am not afraid to go to the battlefield.”

And the combatant Mille chose for his F1 battle in 2004 was Brazilian Felipe Massa, then racing for Sauber.

“I put the first *tourbillon* watch on the wrist of Felipe and everybody told me I was mad – they felt the watch would not last more than one or two laps because F1 is a killer for mechanical watches,” explains Mille. “Between the G-forces, the vibration, the shocks inside the cockpit, you have everything to kill a watch. I remember this *tourbillon* lasted two complete seasons without any need for maintenance because the watch was built for that.”

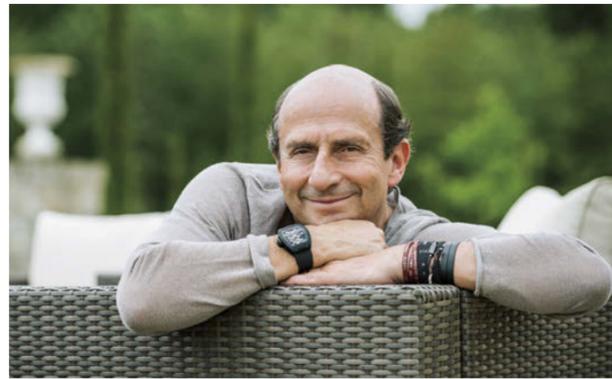
The watch, the RM006, was not only constructed with the intense forces of F1 in mind but also taking into account the sport’s obsessions with saving weight.

“You cannot imagine how much, at this level, everything is important, such as the weight, the comfort and the shock resistance. It’s not a toy.”

“The *tourbillon* device on the watch is a fragile part, made of 77 components with a total weight of 0.34 grams. I used a lot of new materials. In the watch business the tradition is to use brass or gold baseplates, not very stiff materials. I was the first person – and I’m still the only one – to use titanium or carbon fibre because it’s very stable, stiff and a long-lasting material. The RM006 had a carbon nano-fibre baseplate. So everything that has to be rigid is very rigid, everything that has to be flexible is flexible. It’s like a car. The chassis is rigid and the suspension is efficient. For example, the watch can absorb 800G.”

Massa’s relationship with Mille and the company continues to this day. “With Felipe it’s a pure love story because he’s a fantastic guy,” says Mille. “He’s intelligent, sensible, sensitive and passionate about the technical side of things. He loves watches, too.”

The partnership has been through tough times, however. In 2009, while driving for Ferrari during the



Mille has sponsored the bi-annual Le Mans Classic race since 2002. Left: He has a vast car collection and races a Lola T70 Mk3. Below: Mille has F1 ties with Lotus and Romain Grosjean, and a long-standing relationship with Felipe Massa, right.

“MY CLIENTS ARE MAD ABOUT CARS, SO FOR THEM TO COME TO LE MANS IS FANTASTIC.”

RICHARD MILLE

Hungarian Grand Prix weekend, Massa was struck in the head by a spring that detached from the car of compatriot Rubens Barrichello and suffered life-threatening injuries.

“We didn’t know if he would live or whether he would drive an F1 car again. But he recovered and is enjoying a resurgence now. These last seasons were not very happy for Felipe, but you cannot imagine the support he’s had from my clients. They are happy that we keep this relationship because of what Felipe has been through.”

The familial nature of the partnership Mille developed with Massa has informed all the personal sponsorships he has embarked on since.

“We feel the same about Rafael Nadal,” he says.

“We’re with him through his ups and downs. Otherwise, we shouldn’t be sponsoring sports, particularly extreme sports. It’s the same with Lotus [a partner since last year] and Romain Grosjean. Last year was a fantastic season for the team and this year it’s a bit more complex. But that’s life and that’s sport. People say it’s not the same because Eric Boullier left and James Allison, but it’s not about one person. There is a fantastic team at Lotus. The results are not the results of one or two people, but of a team.”

These relationships have also informed the products Mille makes, with motor sport playing a key role in the development of technical elements of the watches.

“There is all the time [a crossover] because you’re talking about carbon, titanium, aluminium, lithium; in terms of materials, it’s the same approach. Traditionally in the watch business, the cases are made separately from the movement. So you can have the wrong movement in the case but then you manage to feed them together. This isn’t possible in F1. You cannot develop an engine without integrating the chassis, etc. So when my watches are made, the case is studied at the same time as the movement – or engine – and they fit exactly in the case, with tolerances that are sometimes that of a micron.”

And so Mille once again returns to the compatibility of his brand philosophy with that of racing manufacturers – intensely technical, specialist and rare.

“I don’t want to go into volume. I have a public price that is around €150,000 on average. This year there will be a production of over 3,000 units. The dream is to do in terms of volume what, for example, Ferrari is doing.”

“It does become expensive, but hopefully I have many clients for that and the demand is higher than what I can produce. That’s good though,” he laughs. “My father was always saying better create envy than pity.” ■





Freeze frame

PRIDE OF SIR JACK

The death of Sir Jack Brabham last month not only robbed motor sport of a great champion, but also the only man to race to a title in a car built by his own team

When double champion Jack Brabham arrived in Monaco for the 1966 season-opener, he was 40 years old, had last won in 1960 and had spent the previous year contemplating retirement to run the team he had launched four years earlier.

To onlookers 'Black Jack' must have seemed in the twilight of his career. And when the Aussie qualified 11th and exited the race after 17 laps with a gearbox problem, the suspicion that he was headed for another season on the fringes seemed confirmed. In fact, this was a new dawn.

When the 1966 regulations doubled engine capacity to 3.0 litres, Brabham, ever the engineer, bucked the trend for V12 powerplants.

He approached Australian manufacturer Repco with a bold plan – take an Oldsmobile engine abandoned by GM in 1963, modify it and slot the V8 into the back of his new BT19 car.

The 154kg engine put out 300bhp compared with the 330-360bhp of its rivals but significantly it was lighter, less thirsty and more reliable. It powered Brabham to fourth at the next round in Belgium. At Reims (left) the champagne flowed as the BT19's reliability allowed him to cruise past Lorenzo Bandini's stricken Ferrari to take victory.

It kick-started an astonishing run as the BT19, nicknamed 'Old Nail' by its driver, won at Silverstone, Zandvoort and the Nürburgring. Brabham could even afford some levity, and at Zandvoort he played up to his veteran status by sporting a long beard and a cane on the grid.

Brabham went to Monza with a commanding title lead and despite a non-finish the retirement of his main rivals, John Surtees and Jackie Stewart, handed the championship to the old man and the Old Nail – the first and only time a driver had raced a car built by his own team to title glory.

Brabham reckoned the '66 season his greatest achievement, not just because of his own efforts but because it truly represented his homeland.

"The team had an Australian designer in Ron Tauranac, Australian mechanics and an Australian-built engine," he said. "To win with that package and group of people was a huge thrill. And to do it all in a car bearing my own name is a record that will never be broken."

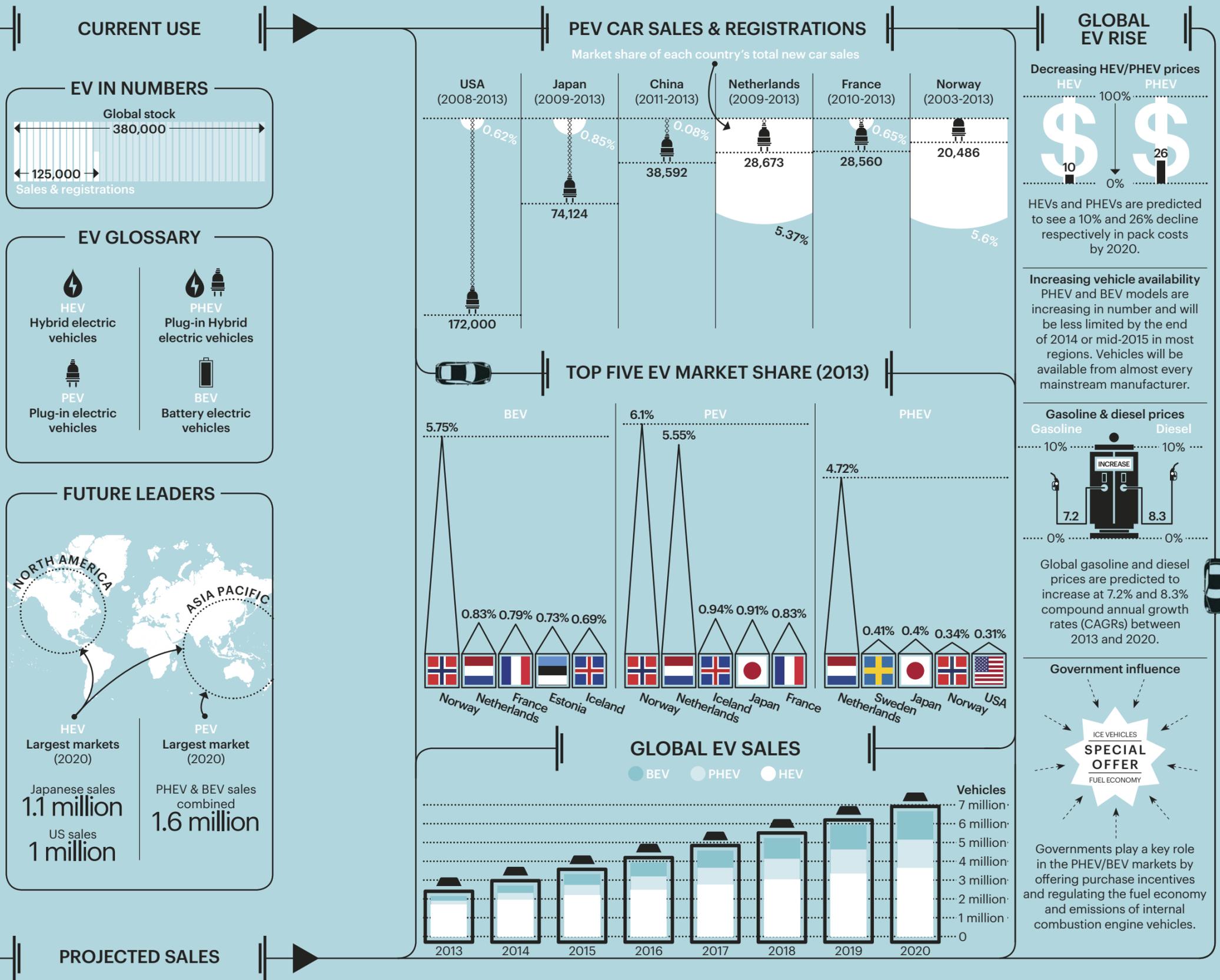
ELECTRIC VEHICLES

The take-up of electric vehicles (EVs) - including hybrids, plug-in hybrids and battery electric vehicles - is on rise

Sales of electric vehicles have been slower than expected so far, but all that is about to change with forecasts on the rise. The growth in sales is being driven not only by the appeal of new types of electric cars but also by factors such as lower operating costs, government incentives and a rebounding economy.

This increase is set to gather pace over the next few years, with global EV sales at just over two million in 2013 rising up to predicted sales of almost seven million in 2020, according to a report by clean technology consultancy Navigant Research.

However, this growth is being led by intense activity in a few markets and others are still playing catch-up. While new car sales of EVs account for a significant market share in countries such as Norway and the Netherlands (over five per cent) they are still under one per cent of major markets such as the US and UK. All that may change as the appeal of EVs increases, with huge growth expected in North America and South East Asia.



FIA Academy graduate

YOUNG GUN

Since 20-year-old Colombian Gabby Chaves graduated from the FIA Institute Young Driver Excellence Academy in 2012 his career has accelerated. He recently took his third Indy Lights win of the year at Indianapolis, and has led a road safety campaign at home in Florida

Q Since your time in the Academy, how have things progressed for you?

A It's been going great; I had a great year in 2013 in my rookie season in the Indy Lights series, finishing second in the championship.

On the side, I've been able to keep working on road safety with the Don't Text and Drive campaign. That has been progressing well, getting a lot more followers and a lot more attention. It is now statewide across Florida whereas before it was just local. It has been expanding slowly but surely.

Q Do you think that this campaign has had an impact?

A We started a petition from our campaign and because of this the state voted on a law against texting and driving, all from something we have initiated. I don't know a specific number that we've reached but we are making an impact - it's reaching

everyone now that it's illegal to text and drive in the state of Florida.

Q What other aspects of the Academy have helped with your career?

A Being taught different driving techniques by [Academy performance manager] Alex Wurz and the other instructors was really helpful. Obviously at the beginning it's not natural to change techniques and incorporate it into your racing right away, so it has been a long process and sometimes a little bit hard. But I'm at the stage now where I'm applying everything I learned and it doesn't feel forced. It has definitely been working out for me - I think we are the fastest guys on track every time.

In addition, I've been able to do a little bit of coaching for other drivers and have worked on driving academies for regular people. I was able to use what I learned

from my instructors back in the Academy and incorporate that into my days as a track instructor, so that's been a lot of fun. We had one workshop specific to that in the Academy and I was able to go over my notes and use what I learned to help other people improve their driving abilities.

Q What are you hoping to go on and achieve next?

A Well, at the moment the short-term goal is to reach IndyCar by becoming Indy Lights champion this year [with the new Belardi team] and use the scholarship to get a full-time ride in IndyCar next year. That would be great. But I'm young and there are still many things that could happen with my career.

Q Do you have any advice for drivers who might be considering applying for the next Academy?

A Oh, go for it! It was one of the best things that could have happened to my career. In 2012, when I was in the Academy, I was trying to get a ride in Europe and it didn't happen, so I had to use the resources I could to find a last-minute deal in America. It ended up being fine, I finished second in the Indy Lights championship with a couple of wins, but I felt I had taken a step backwards in my career. Being with the Academy helped me get through that period and showed me that I could get back on the road, take the next step and keep following my goals.

Victory at the famous Indianapolis Motor Speedway helped keep Gabby Chaves on track in his bid to win the 2014 Indy Lights series.



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