

# AUTO

INTERNATIONAL JOURNAL OF THE FIA



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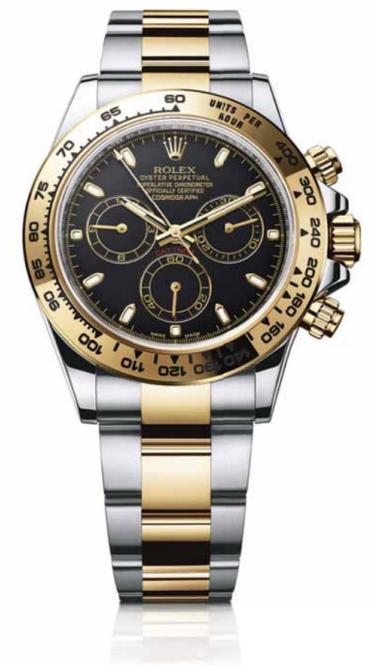
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#### THE FIA

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 more than 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 GLOBAL INSTITUTE

The Global Institute for Motor Sport Safety is an international organisation based in Switzerland that undertakes research to improve motor sport safety worldwide. As the safety research partner of the FIA, it conducts practical research at all levels of motor sport, from professional categories to grassroots racing. It aims to provide motor sport with the means to operate as safely as possible, and to use safety research for the benefit of public roads and society in general.

*Dear reader,*

The end-of-year edition of AUTO is always special because its publication coincides with the period in which the FIA holds its ANNUAL GENERAL ASSEMBLY and its PRIZE GIVING ceremony, where all the FIA champions receive their awards and, as you can see, this is the occasion referenced on the cover of the magazine.

This time, its appearance is even more propitious as it coincides with the end of a four-year period of governance and the time to choose a President to lead our organisation for the next cycle. I am honoured and proud that this great family of ours has chosen me to serve a third consecutive term. I want to once again thank all the members of the FIA's Member Clubs for their support. I see this as a validation of the direction the FIA has taken under my leadership, and as encouragement to continue the programme we have pursued over the past eight years.

AUTO's series of in-depth interviews with major players in the automotive world continues in this issue as we talk to two people who have taken their company to the very top of this industry: LI SHUFU has turned Geely into the symbol of the Chinese auto industry, while ALBERTO BOMBASSEI has placed Italian brake company Brembo at the technological cutting edge in motor sport and in the world of road cars.

Over the past two years, diesel power has been a very tricky topic, causing confusion and concern among motorists. But what exactly is the future of a technology that, for 20 years, had grown so relentlessly? AUTO asks several experts in the field to clear up one of motoring's biggest debates.

The past and the future are woven together through the pages of this magazine. You can read an interview with ALEJANDRO AGAG, the promotor of the FIA Formula E Championship, and with talented young racing driver LANDO NORRIS, while also finding a retrospective look at one of the legends of rallying, WALTER RÖHRL. There is also a feature on one of the most storied race tracks in the USA, namely SEBRING. As for the section dedicated to our clubs, this time we look at NORWAY. There's plenty more besides. I hope you like it and, as usual, if you have any ideas or suggestions on how we can improve the magazine, we would love to hear from you.

*Enjoy the read and happy 2018!*



JEAN TODT,  
FIA President

# WINTER HAS ITS CHAMPIONS

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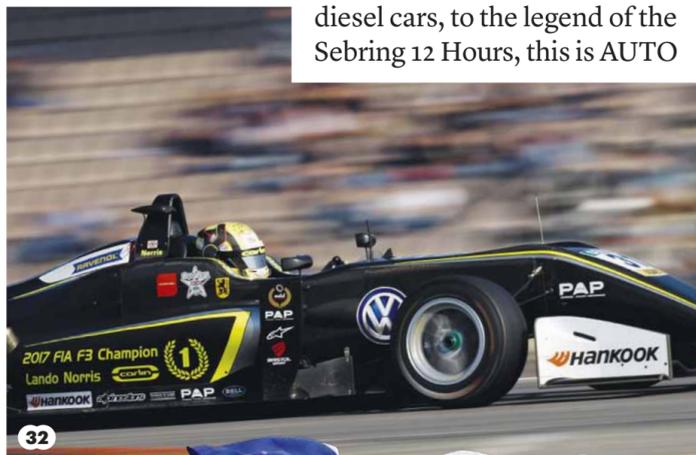
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POWER IS NOTHING WITHOUT CONTROL

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## FIA ELECTIONS A NEW MANDATE

Jean Todt was re-elected President of the FIA on December 8 in Paris. Standing unopposed, he was returned for a third term unanimously and by acclamation. Mr Todt first took office in 2009 and this final term will take him through to the end of 2021. The vote came during the federation's Annual General Assembly at the end of the organisation's week-long series of

meetings. President Todt's third term will see Graham Stoker retain his post as Deputy President for Sport. Former Deputy President for Mobility, Brian Gibbons, takes on a new role as President of the FIA Senate in place of Nick Craw, who steps down. Former FIA Region I President Thierry Willemarck becomes Deputy President for Mobility.

### LEADING THE FIA TOWARDS A NEW ERA...

FIA President Jean Todt speaks after being re-elected for a third term at the federation's AGA in December. "I see this as a validation of the direction the FIA has taken under my leadership, and as encouragement to continue the programme we have pursued over the past eight years," he said.

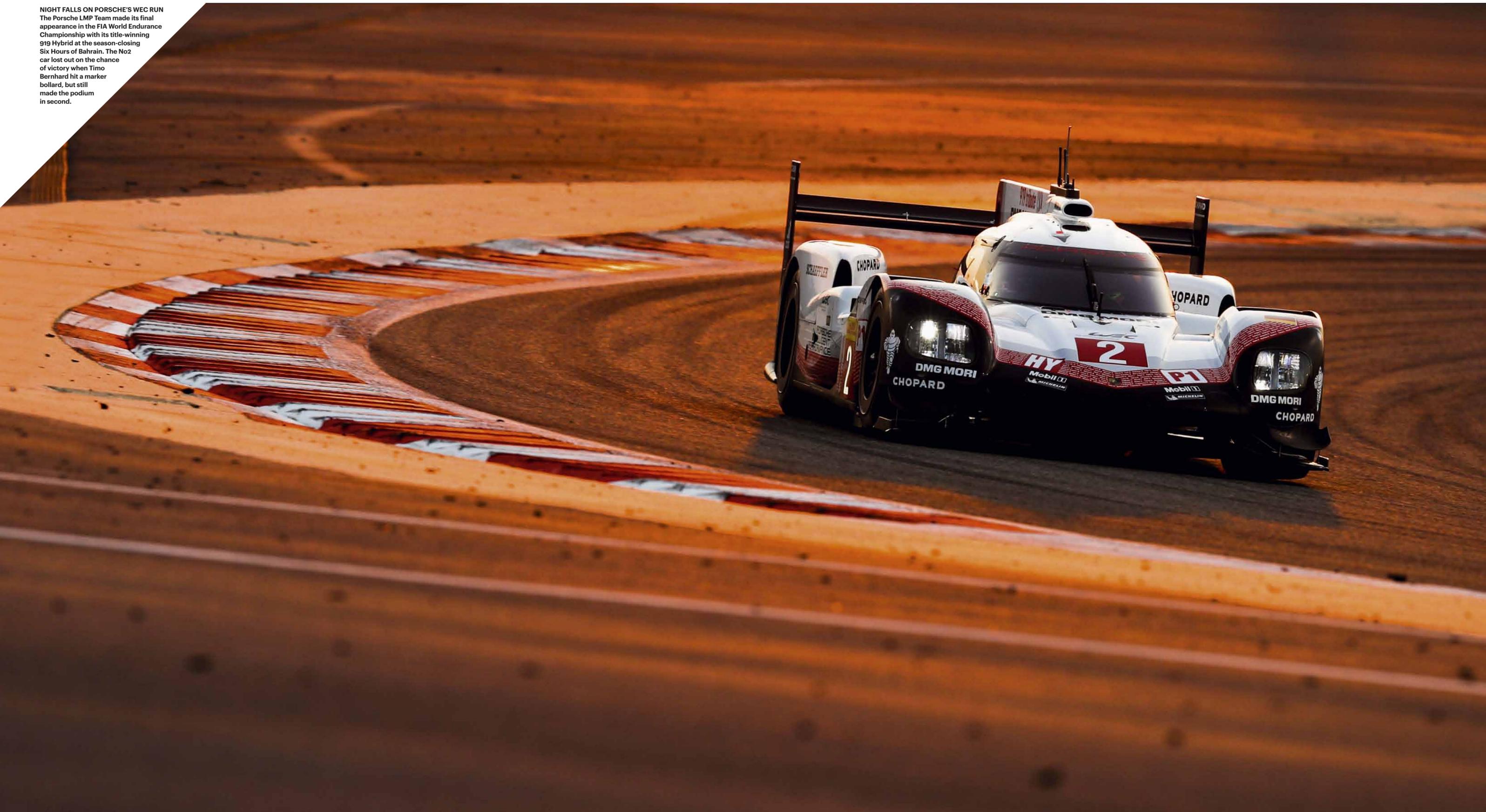


## WEC, SIX HOURS OF BAHRAIN PORSCHE'S LAST HURRAH

The sun has set on Porsche's FIA World Endurance Championship adventure after almost half a decade of successful competition, with the German manufacturer claiming second and third places in the final race of the 2017 season, the Six Hours of Bahrain. The championship-winning No2 Porsche 919 Hybrid of Timo Bernhard, Brendon Hartley

and Earl Bamber came second to the Toyota Gazoo Racing hybrid of Sébastien Buemi, Anthony Davidson and Kazuki Nakajima, with the No1 Porsche driven by Neel Jani, André Lotterer and Nick Tandy rounding out the podium. Team Principal Andreas Seidl said he was sad but grateful to have been "part of this chapter of Porsche motor sport history".

**NIGHT FALLS ON PORSCHE'S WEC RUN**  
The Porsche LMP Team made its final appearance in the FIA World Endurance Championship with its title-winning 919 Hybrid at the season-closing Six Hours of Bahrain. The No2 car lost out on the chance of victory when Timo Bernhard hit a marker bollard, but still made the podium in second.



F1 TECHNOLOGY TRANSFER  
**MERCEDES'  
No1 PROJECT**

All eyes were on the Mercedes-AMG Project ONE when it received its public unveiling at the International Motor Show in Frankfurt in September. The two-seater supersports show car is the first to boast fully-fledged Formula One hybrid technology transferred from the race track to the road. The 1000bhp hybrid, developed by Mercedes-AMG in conjunction with the

group's High Performance Powertrains in Brixworth, UK, and the F1 team in nearby Brackley, can reach top speeds beyond 350km/h (217mph). "We are drawing from our experiences and successes to bring F1 technology to the road for the first time," said Dr Dieter Zetsche, Chairman of the Board of Management of Daimler AG and Head of Mercedes-Benz Cars.

**FROM THE RACE TRACK TO THE ROAD...**  
AMG has celebrated its 50th anniversary with the first public showing of the Mercedes-AMG Project ONE supersports show car at Germany's Frankfurt Motor Show. The car boasts one hybrid, turbocharged combustion engine with a total of four electric motors, producing an eye-watering 1000bhp.





The FIA family pictured at the close of the federation's AGA in Paris in December.

01

# Jean Todt elected to third term as FIA President

After receiving unanimous backing, President Todt outlines his aims for a final four years in office, during which he wants to focus on innovation, advocacy and developing a strong network of clubs

Jean Todt was re-elected as President of the Fédération Internationale de l'Automobile (FIA) at the organisation's General Assembly in Paris in early December. Standing unopposed, Mr Todt was handed a third term in office unanimously by acclamation and by a show of hands. The new mandate will see him continue to develop the global federation of motor sport and mobility organisations until the end of 2021.

Speaking after accepting the President's role, Mr Todt said: "It is gratifying to have such universal support. I would like to thank all of the Member Clubs of the FIA for their support. I see this as a validation of the direction the FIA has taken under my leadership, and as encouragement to continue the programme we have pursued over the past eight years."

Looking back at his first two terms in office, President Todt added: "When I was first elected, the goal I set myself was to oversee continual improvement within the federation. ▶

## Reshaping the administration /

The FIA's Annual General Assembly was not just about electing a president for the next four years. The federation also voted on the membership of both its World Councils – Automobile Mobility and Tourism and Sport – and the make-up of its Sporting Commissions. Below is a list of some of the key appointments made:

### FIA PRESIDENT AND PRESIDENTIAL LIST

FIA President Jean Todt was unanimously elected for a third four-year term by the Members of the General Assembly. The positions of President of the Senate, Deputy President for Mobility, Deputy President and Vice-Presidents for Sport were also adopted as part of the Presidential List:

**President of the Senate**  
Brian Gibbons (NZAA, New Zealand)  
**Deputy President, Sport**  
Graham Stoker (MSA, United Kingdom)  
**Deputy President, Mobility**  
Thierry Willemarck (TCB, Belgium)

### VICE-PRESIDENTS FOR SPORT

**Middle East**  
Mohammed Ben Sulayem (ACT, UAE)  
**Africa**  
Surinder Thatthi (FISA, Ivory Coast)  
**North America**  
José Abed (OMDAI, Mexico)  
**South America**  
Carlos Garcia Remohi (ACA, Argentina)  
**Asia-Pacific**  
Heping Wan (CAMF, China)  
**Europe**  
Angelo Sticchi Damiani (ACI, Italy)  
**Europe**  
Hermann Tomczyk (DMSB, Germany)

### FIA SENATE

Brian GIBBONS (NZL) President of the Senate  
Jean TODT (FRA) President of the FIA  
Graham STOKER (GBR) Deputy President of the FIA (Sport)  
Thierry WILLEMARCK (BEL) Deputy President of the FIA (Mobility)  
**MEMBERS**  
HRH Prince Faisal AL HUSSEIN (JOR) (S)  
Irina BOKOVA (BGR) (M)  
August MARKL (DEU) (M)  
Jorge ROSALES (ARG) (M)  
Timothy SHEARMAN (CAN) (M)  
Carlos SLIM DOMIT (MEX) (S)  
Maria Angela ZAPPÀ (ITA) (S)  
Heping Wan (CAMF, China)  
Gerardo BRAGGIOTTI (ITA)  
Jean-Michel DARROIS (FRA)  
Jacques AUDIBERT (FRA)  
William E. CONNOR (USA)

### WORLD COUNCIL FOR AUTOMOBILE MOBILITY AND TOURISM

**Region I President**  
Thomas Møller Thomsen (FDM, Denmark)  
**Region II President**  
Mike Noon (NZAA, New Zealand)  
**Region III President**  
Tim Shearman (CAA, Canada)  
**Region IV President**  
Jorge Tomasi Crisci (ACU, Uruguay)

### The following members were elected to the World Council for Automobile Mobility and Tourism (WCAMT) by the General Assembly:

Gottfried Wantitschek – ÖAMTC, Austria (Region I)  
Oldrich Vanicek – UAMK, Czech Republic (Region I)  
August Markl – ADAC, Germany (Region I)  
Giuseppe Redaelli – ACI, Italy (Region I)  
Frits van Bruggen – ANWB, Netherlands (Region I)  
Mirko Butulija – AMSS, Serbia (Region I)  
Jorge F. Delgado Mendoza – RACE, Spain (Region I)  
Peter Goetschi – TCS, Switzerland (Region I)  
Nigel Alexander – AAA, Australia (Region II)  
Afsar Hossain – AAB, Bangladesh (Region II)  
Takayoshi Yashiro – JAF, Japan (Region II)  
Bernard Tay – AAS, Singapore (Region II)  
Dhammika Attygalle – ACC, Sri Lanka (Region II)  
Julien José Abed – ANA, Mexico (Region III)  
Earl Jarrett – JAA, Jamaica (Region III)  
Alejandro Quintana Hurtado – ACCHI, Chile (Region IV)  
Ricardo Morales Rubio – ACC, Colombia (Region IV)  
Gorki Obando – ANETA, Mexico (Region IV)

### WORLD MOTOR SPORT COUNCIL

#### The following members were elected to the World Motor Sport Council (WMSC) by the General Assembly, joining the Deputy President and seven Vice-Presidents for Sport:

Manuel Avino – RFEDA, Spain  
Garry Connelly – CAMS, Australia  
François Cornelis – RACB, Belgium  
Dennis Dean – ACCUS, United States of America  
Nicolas Deschaux – FFSA, France  
Michel Ferry – ACM, Monaco  
Zrinko Gregurek – CCCF, Croatia  
Victor Kiryanov – RAF, Russia  
Hugo Mersan – TACP, Paraguay  
Koichi Murata – JAF, Japan  
Juhani Pakari – AKK-Motorsport, Finland  
Gautam Singhania – FMSCI, India  
Vincenzo Spano – TACV, Venezuela  
Serkan Yazici – TOSFED, Turkey

### SPORTING COMMISSIONS

The composition of the Sporting Commissions was approved as follows:

	President	Vice-President
<b>World Rally Championship Commission</b>	C. Barbosa (PRT)	J. Mahonen (FIN)
<b>Rally Commission</b>	W. Christie (NZL)	U-M. Schmidt (DEU)
<b>Cross-Country Rally Commission</b>	R. Schilling (ZAF)	F. Gallagher (GBR)
<b>GT Commission</b>	C. Schacht (DEU)	S. Hogson (USA)
<b>Touring Car Commission</b>	A. Gow (GBR)	TBC
<b>Hill-Climb Commission</b>	I. Lahoud (LBN)	D. Grace (GBR)
<b>Historic Motor Sport Commission</b>	P. Cantarella (ITA)	HRH Prince Joachim (DNK)
<b>Off-Road Commission</b>	G. Olah (HUN)	W. Szaniawski (POL)
<b>Drag Racing Commission</b>	L. Pettersson (SWE)	TBC
<b>Truck Racing Commission</b>	M. Vidal (ESP)	L. Gallucci (BEL)
<b>Electric &amp; New Energy Championships Commission</b>	B. Goeschel (DEU)	TBC
<b>Circuits Commission</b>	T. Schenken (AUS)	D. Allingham (CAN)
<b>Homologation Regulations Commission</b>	D. Fausel (CHE)	TBC
<b>Medical Commission</b>	Prof. G. Saillant (FRA)	D. Altmann (BRA)
<b>Land Speed Records Commission</b>	G. Light (USA)	TBC
<b>Safety Commission</b>	P. Wright (GBR)	M. Guenther (DEU)
<b>Women in Motorsport Commission</b>	M. Mouton (FRA)	R. Nabulsi (JOR)
<b>Volunteers &amp; Officials Commission</b>	C. Syn (SGP)	A. Papadopoulos (AUS)
<b>Single-Seater Commission</b>	S. Domenicali (ITA)	J. Ryan (GBR)
<b>Endurance Commission</b>	R. Mille (FRA)	TBC
<b>Drivers' Commission</b>	T. Kristensen (DNK)	D. Warwick (GBR)
<b>Closed Road Commission</b>	R. Reid (GBR)	J. Bartos (POL)
<b>CIK/International Karting Commission</b>	F. Massa (BRA)	K. Van De Grint (NDL)

**MANUFACTURERS' COMMISSION**  
President  
François Fillon, France

**ENVIRONMENT AND SUSTAINABILITY COMMISSION**  
President  
Felipe Calderón, Mexico

**DISABILITY AND ACCESSIBILITY COMMISSION**  
President  
Nathalie McGloin, United Kingdom

**'Our federation must strive to be the best it can – stronger, smarter, more secure, more professional and globally respected'**



President Todt will continue to campaign for improvements in international road safety during his third term. Below: speaking at the AGA.

Over President Todt's first two terms advocacy across a range of issues, including road safety and sustainable mobility, has become a key area of endeavour for both the FIA and its Member Clubs, and following the vote he emphasised the need to further strengthen the federation's efforts to reduce road fatalities, and help shape the future of clean and accessible mobility for all.

"The FIA has made significant progress globally and is now recognised by world bodies, governments and fellow NGOs as a reliable and relevant voice on the international stage," he said.

"Road safety continues to be a major focus through the work of the FIA High-Level Panel for Road Safety, the support of the FIA Foundation and its Chairman, Lord Robertson, and through the #3500Lives campaign launched worldwide earlier this year. I am pleased to confirm that this campaign will continue to have a global presence in 2018 in order to help achieve the goal of reducing road trauma. Additionally, during this term a new set of FIA Road Safety Awards will be instigated to recognise outstanding contributions to achieving real progress in international road safety outcomes."

**NEXT GENERATION MOBILITY**

Turning to the future of mobility, President Todt stressed the need for the federation to foster the growth and influence of its Member Clubs in defining the next generation of transportation systems.

"To be a truly successful global organisation, the FIA needs a skilled worldwide network of sport and mobility clubs that are strong, influential and respected in their individual countries.

"Our clubs are the largest consumer organisations in their country and their 80 million road-user members make the FIA one of the largest global consumer bodies. This is important because while the future of mobility is exciting, it also holds many challenges, and it is our duty to help shape it.

"We will have to deal with increased congestion in all our major cities, with the introduction of autonomous vehicles, the growing cost of mobility and with the development of new technologies in developed countries. We need to influence the direction these developments take in order to ensure acceptable outcomes for all.

"My ambition remains for our federation to continue to strive to be the best it possibly can – stronger, smarter, more secure, more professional and globally respected."

**NEW STRUCTURE**

President Todt's re-election also confirms a restructured team at the helm of the FIA. After eight years as President of the FIA Senate – the body with oversight of the management and finances of the federation – America's Nick Craw steps down from the role. He will be replaced by New Zealand's Brian Gibbons, who has acted as FIA Deputy President for Mobility since 2009. That role will now be filled by Belgium's Thierry Willemarck, who moves from his position as President of Region I of the FIA. Graham Stoker continues as Deputy President for Sport, a post he has held since 2009.

"I have encouraged the selection of a leadership team that is a mixture of the experienced and the new," said President Todt. "The experienced will ensure we continue to respect our heritage, uphold our values and avoid the pitfalls of the past. The new faces will bring fresh, innovative thinking to our federation. I am particularly pleased that a number of talented women have been nominated by our clubs for important positions. I hope it will lead the FIA to embrace greater diversity and recognise and reward talent wherever it exists." ◀



New Deputy President for Mobility, Thierry Willemarck, addresses FIA members at their annual meeting.

It is the same motivation that gave me success for many years in motor sport with Peugeot and then Ferrari. Continually demanding that we and those around us do things better creates a platform for ongoing growth and success.

"Our governance and administration, motor sport at all levels, our approach to mobility, our commitment to a safer, more sustainable future and a determination to improve services to our members have all been part of this ethos."

**AMBITIOUS PROGRAMME**

President Todt then went on to outline an ambitious programme for what will be his final term in office, focusing on three key areas: innovation, advocacy and the development of a strong network of mobility and sport clubs.

Reaffirming the FIA's role as the governing body of motor sport worldwide, he said: "From time to time there are some who challenge this role, and I remind them that motor sport will always need a regulator, it will always need fair play, it will always require ethics and it will always need an independent referee. This is the vital role the FIA plays and one it will continue to play in the future."

Expanding on the theme of innovation, he added: "Innovation is essential if the FIA is to continue to improve and take its rightful place in the world as the leader in mobility and motor sport development. To encourage this, we propose to establish an FIA Innovation Fund."



Getting down to business: the meeting of the World Council for Automobile Mobility and Tourism.

Felipe Massa and Michelle Yeoh look on as Jean Todt presents Jean Charles Decaux with the 2017 President's Award, Mobility.



**Taking action and crowning champions**

The week of the FIA's Annual General Assembly encompasses two very different activities – defining future plans for the federation and then celebrating the competitive year just past by awarding champions from across the motor sport landscape.

The business end of the week saw not only Jean Todt elected for a third term as president but also meetings of the FIA's World Councils – in Sport to reframe rules governing top-level sports car and touring car racing, and in Mobility to adopt a new strategy for the coming years. The week was closed by the FIA's glittering Prize Giving ceremony at which motor sport's champions, including four-time F1 winner Lewis Hamilton and five-time rally champion Sébastien Ogier, were crowned in the suitably regal surrounds of Paris' incredible Palais de Versailles.



FIA winners: Sébastien Ogier, his wife Andrea Kaiser, Lewis Hamilton, and Susie and Toto Wolff.



WEC LMP1 champions (l-r) Timo Bernhard, Brendon Hartley, and Earl Bamber.



Lord Robertson of Port Ellen speaks at the Annual General Meeting of the FIA Foundation in Paris.

01

# NEWS

In this issue: Lamborghini reveals plans for first electric 'self-healing' hypercar; Formula One unveils new brand logo; FIA honours F1 champions in new Hall of Fame; FIA and member clubs' tribute to road traffic victims; campaign targets safer new cars for Africa; FIA president hails advances at ADAC Technical Centre

Lamborghini has set its sights on an electric future with the Terzo Millennio concept.

NEWS

## Lamborghini plans electric future with 'self-healing' hypercar

Lamborghini has unveiled details of a collaborative project for its first all-electric, autonomous and 'self-healing' hypercar.

Working in conjunction with the Massachusetts Institute of Technology (MIT) in the US, the Italian car maker – best-known for its high-octane sports cars – has christened the new concept the Lamborghini Terzo Millennio, meaning third millennium.

"Exactly one year ago we signed an agreement with the MIT-Italy Program at the Massachusetts Institute of Technology, which marked the start of a collaboration between two outstanding entities for the creation of a project that intends to write an important page in the future of super sports cars for the third millennium," said Stefano Domenicali, Chairman and Chief Executive Officer of Automobili Lamborghini.

"Collaborating with MIT for our R&D department is an exceptional opportunity to do what Lamborghini has always been very good at: rewriting the rules on super sports cars."

The concept hypercar would feature supercapacitors for energy storage and an electric engine in each wheel. A carbonfibre bodyshell would act as an accumulator for energy storage and enable the complete body of the car to be used as a storage system.

The project also aims to combine technology to continuously monitor the carbonfibre structure with the concept of 'self-healing': the target is to provide the Terzo Millennio with the ability to conduct its own health monitoring to detect cracks and damages in its substructure derived from accidents. A self-repairing process would then start via micro-channels filled with healing chemistries, eliminating the risk of small cracks propagating further into the structure.



Anywhere  
there's  
motorsport.



Lamborghini Design



**NEWS** F1 reveals new logo

The FIA Formula One World Championship has unveiled a new logo as part of its first brand redesign for 23 years.

Strongly inspired by feedback from thousands of fans worldwide, the logo was launched in a live end-of-season spectacle at the close of the Abu Dhabi Grand Prix.

The redesign, which has been led by F1's first Director of Marketing Ellie Norman, aimed to create a brand that speaks to the core of why people love the sport.

She said: "It was clear we had to address some fundamentals of our brand if we were to realise our ambition to make F1 a major entertainment player and claim our right to be a global media brand. What we say and do now is so important for our future, but it must always be driven by our fans."

Created by advertising agency Wieden+Kennedy, the logo aims to echo the shape of an F1 car: flat, low to the ground

and with a suggestion of speed. It has a modern-retro feel that reflects the extreme and dynamic nature of F1 and is designed to work across a variety of platforms.

Sean Bratches, F1's Managing Director of Commercial Operations, said: "Our new brand identity symbolises the wider transformation taking place in F1 as we aim to broaden the sport's appeal, attract new audiences and build stronger connections with existing fans. We set out to create a logo that captures the speed and excitement of the pinnacle of motor sport; this is the beginning of a new era for F1."

Several significant changes have been made since the Liberty Media takeover at the start of 2017. All aim to expand Formula One's reach. New broadcast and digital deals have been signed, with Grand Prix weekends made more entertaining by establishing dedicated FanZones.

F1's new logo adorned the bottle of fizz sprayed by Abu Dhabi Grand Prix winner Valtteri Bottas.



F1's new logo was created by advertising agency Wieden+Kennedy.

**NEWS** FIVA launches guide to conserving historic vehicles

FIVA (the Fédération Internationale des Véhicules Anciens, or international federation of historic vehicles) has produced a guide for all those who choose to purchase, preserve and use a historic vehicle.

Titled the 'Charter of Turin Handbook', the guide looks at historic vehicles as cultural artefacts, arguing that they are part of our cultural patrimony and saying that historic vehicles should "no longer be seen just as a hobby, a toy for grown-up boys, but as part of the cultural heritage of our civilization."

The handbook also offers practical advice on the restoration and maintenance of historic machines, suggesting how owners and enthusiasts might stay true to the principles of the 'Charter of Turin' – a document recognised worldwide by UNESCO, the EU and the FIA – which presents a voluntary protocol on the preservation and use of historic vehicles.

"It's important to point out that the Charter of Turin is intended only as a guideline and as helpful advice on good practice," explained President of FIVA Patrick Rollet. "FIVA's intention is to protect and promote a correct and historically respectful way of looking at the past, and we hope the new handbook will prove both fascinating and useful to those who choose to apply the principles of the Charter to their own vehicles – as well as prompting further discussion and debate on the cultural role of historic vehicles."

The handbook was distributed to attendees at the FIVA General Assembly in Bucharest in November and is intended for wider public distribution in the future.



FIVA's new 'Charter of Turin' handbook.

**NEWS** FIA launches Hall of Fame



Right: FIA President Jean Todt joined the F1 champions honoured in the first FIA Hall of Fame. Below: Alain Prost and Mario Andretti attended the ceremony at the ACF in Paris.



Four-time champion Sebastian Vettel greets legendary American racer Andretti.

The evening culminated in the induction of the sport's most successful competitor, seven-time champion Michael Schumacher, with long-time manager Sabine Kehm on hand to accept his award.

"We all know Michael should be here and I am totally sure he would love to be here," she said. "He always had the highest respect for everyone in this room and he would be very honoured. What made Michael so special, what made him so successful was, as with everybody in this room, a love and passion for this sport."

Going forward, the Hall of Fame project will expand to include other championships. President Todt said: "The FIA Hall of Fame will soon expand to the FIA headquarters in Geneva, and other champions and disciplines will be in the spotlight in the coming years. In this way we will celebrate all the FIA champions who have made, and who still make, the history of motor sport so incredibly rich and inspiring."

The FIA has launched a new Hall of Fame, initially honouring the 33 winners of the Formula One World Championship since it began.

The inauguration ceremony took place at the headquarters of the Automobile Club de France (ACF) in Paris, with numerous champions in attendance including Jackie Stewart, Mario Andretti, Alain Prost, Nigel Mansell, Fernando Alonso and Sebastian Vettel.

FIA President Jean Todt said: "The FIA Hall of Fame has been created to highlight the values that run through motor sport, and the champions who have been and who still are the exemplars of the FIA's values of commitment, integrity, respect and sportsmanship."

The ceremony, held in the library of the ACF where Formula One's regulations were first drafted in the 1940s, initially inducted the 17 champions with single titles to their name before calling up the multiple-championship winners.

Two-time champion Fernando Alonso said: "I'm very honoured to be here with these great champions. All of them inspired me to become a Formula One driver, they inspired all the kids of my generation, so I feel very proud."

The Renault R25 driven to title glory by Alonso in 2005 was displayed outside the FIA headquarters alongside the Ferrari 156 of Phil Hill, the Lotus 25 of Jim Clark and the McLaren MP4/5 of Ayrton Senna.

## Global NCAP and AA South Africa launch test programme

Some of South Africa's most popular new cars do not provide basic protection for passengers - that was the finding of the first independent African crash tests revealed at the Global NCAP and AA South Africa launch of #SaferCarsforAfrica.

Co-funded by the FIA Foundation, the tests revealed a wide range of safety capabilities. The lowest-ranking car received a 'zero stars' rating, indicating a high probability of life-threatening injury in an accident for both adult and child, while others received ratings of up to four stars. Combined sales of the five cars tested account for 65 per cent of all new cars sold in South Africa during 2016.

The results are set against a 10-year high of road fatalities in South Africa, with 14,071 people killed in 2016. Sub-Saharan Africa has the highest road injury rate in the world despite relatively low motorisation, while globally road traffic injuries are the leading cause of death among young people aged 15-29 years.

Saul Billingsley, Executive Director of the FIA Foundation, said: "These first car crash tests in Africa are a safety milestone, which the FIA Foundation is proud to support. The results show that consumers have a real choice and with access to the right information they can use purchasing power to reward car makers who put safety first. If we are to achieve the UN development goal to halve global road deaths, safer cars for Africa must be a priority."

Tested cars at the November launch of Global NCAP and AA South Africa's #SaferCarsforAfrica initiative in Cape Town.



## FIA community joins forces to honour world's road traffic victims



Drivers from the FIA World Endurance Championship showed their support for WDR at the final round of the 2017 season in Bahrain.

The FIA and its 245 member clubs supported the World Day of Remembrance for Road Traffic Victims (WDR) in November along the theme of '2020 target: reduce road fatalities and serious injuries by 50 per cent'.

Created in 1995 by the European Federation of Road Traffic Victims and endorsed by the United

Nations in 2005, WDR honours the millions of people who have been killed or injured on the world's roads. It also pays tribute to the emergency crews, police and medical professionals who deal with the aftermath of road death and injury.

FIA President Jean Todt, who serves as the UN Secretary-General's Special Envoy for Road Safety, said: "On the occasion of WDR, I'd like you to think about the 1.25 million lives lost on the world's roads every year. I strongly encourage governments, the private sector and citizens to make road safety a priority if we want to reach the UN Sustainable Development Goals."

FIA series including the World Rally Championship, World Endurance Championship, World Touring Car Championship, FIA GT and F3 World Cups supported WDR by organising family pictures with their drivers in Australia, Bahrain and Macau.

## Declaration calls for action on child health and safety

Global action is required to protect children from toxic air and unsafe streets, according to participants at the Every Journey, Every Child conference held recently at London City Hall.

Mayor of London Sadiq Khan and the Mayor of Accra Mohammed Adjei Sowah joined with international agencies and experts in agreeing that more must be done to prevent the needless deaths of thousands of children worldwide.

As a result, the Child Health Initiative (CHI), convened by the FIA Foundation, issued the 'Declaration of Every Child's Right to Safe and Healthy Streets'. The declaration calls for global leaders to commit to ensuring children are not breathing polluted air, and to providing a safe and healthy journey to school for every child.

Mayor Khan commended the FIA Foundation for organising the event and added: "Air pollution and climate change transcend national borders and city boundaries. In this interconnected world, the fates of cities like London and Accra are intertwined and the only way to respond to these global problems is with global solutions."

Lord Robertson, Chairman of the FIA Foundation, said: "We are facing a global public health emergency for our children. It's taking place right in front of us, on our streets. The FIA Foundation urges every city to take action to tackle the twin epidemics of road traffic injury and air pollution."

The FIA Foundation has also revealed that



Zoleka Mandela, Sadiq Khan and The Rt Hon. Lord Robertson of Port Ellen with pupils from Townsend Primary School in Southwark, London.

in London the city's most deprived children attend schools that are most affected by poor air quality. A report by air quality analyst Aether shows that these children are more likely to walk and less likely to use a car, and are thus more exposed to pollutants. More than 85 per cent of the schools affected most by poor air quality have pupils from the most deprived catchments, and children at the schools with the poorest air quality were found to be walking to school more than the London average.

Saul Billingsley, FIA Foundation Executive Director, said: "In funding this research and raising awareness of these issues in London, we hope to stimulate action here and in other cities to help tackle air pollution for the two billion children who live in areas where outdoor pollution exceeds international limits. Every child has the right to a safe and healthy journey to school."

## ADAC technical centre sets highest test standards

FIA President Jean Todt has visited the Technical Centre of the Allgemeiner Deutscher Automobil-Club (ADAC) in Landsberg, Germany, in order to discuss a number of issues related to consumer protection.

With him on the recent trip were UNECE Executive Secretary Olga Algayerova, ADAC President August Markl and actor, producer and UNDP Goodwill Ambassador Michelle Yeoh.

ADAC, the second largest automobile club in the world, established its Technical Centre in order to help ensure road users' safety and today acts as one of the main test centres for European member clubs of the FIA.

The centre is also an accredited test lab for Euro NCAP, and the main facility for crash tests organised in the framework of the Global NCAP and the Latin NCAP programmes, all of which assess the safety of new cars. Committed to improving consumer protection and with a focus on product improvement, the ADAC has no commercial interest in tested products and so ensures the neutrality of its publications.

During their visit to the centre President Todt, Ms Algayerova, Mr Markl and Ms Yeoh had the opportunity to assist with some of the tests and evaluations performed at the facility. These include crash tests and car reviews or product tests, the results of which aim to help consumers make informed purchasing decisions and to better ensure their safety.

ADAC engineers have been testing and evaluating cars, components, accessories, motorcycles and bicycles as well as camping vehicles in specially developed procedures since 1997. Every year, 70 crash tests are performed and 150 cars evaluated on the basis of more than 300 criteria - with the aim of assisting consumers in their purchase decisions.

A second important area of testing looks at vehicle emissions. Compliance with stricter emission requirements and growing consumer interest in 'green' cars have become the greatest challenge for manufacturers and suppliers as well as for ADAC as a consumer advocate. In Landsberg, ADAC has been testing cars for their emissions and fuel efficiency in order to raise consumer awareness of the most eco-friendly vehicles on the market.

Similar programmes quantify the difference between the stated results from standard laboratory testing and the actual emissions that



ADAC President August Markl, UNECE Executive Secretary Olga Algayerova, actor and UNDP Goodwill Ambassador Michelle Yeoh and FIA President Jean Todt at the ADAC Technical Centre in Landsberg, Germany.

a vehicle produces in the real world. ADAC testing has shown this is a gap that is growing: this is because as regulations have become more stringent, car makers have optimised vehicle performance to pass laboratory tests with no requirement for this to translate into real-world driving. As a result, rather than driving down emissions and fuel bills, more stringent emissions laws appear not to deliver their promised environmental benefits. Therefore ADAC has aided in the development of a Green NCAP initiative by which existing vehicle ratings on safety will be completed with a stringent environmental rating.

"With its long-standing expertise in testing, ADAC supports the Green NCAP consumer rights initiative aimed at determining real exhaust gas emissions and fuel consumption levels," said Dr Reinhard Kolke, head of the ADAC Technical Centre. "With its independent and high-quality assessments, this ecological initiative will provide excellent support in the development of new alternative drive technologies."

Acknowledging the leading role of the ADAC in the field of car testing and consumer protection, President Todt said: "ADAC is a key partner for the FIA. It is one of the largest individual member organisations in our federation with more than 20 million members. The ADAC Technical Centre is a world-class safety and emissions testing facility that supports stronger advocacy in the interests of consumers, not only in Germany but throughout Europe."

Ms Algayerova added: "Measuring vehicle safety performance demonstrates once more the importance of introducing common safety standards across the globe. Thousands of deaths and hundreds of thousands of injuries could be avoided each year if all countries applied the safety standards outlined in the UN Regulations, developed by the World Forum for Harmonization of Vehicle Regulations and hosted by the UNECE."

"These legal instruments and regulations have a proven track record of reducing mortality and serious injury wherever they are applied," she concluded. "All new motor vehicles should meet minimum regulations for occupant and other road user protection, with seat belts, air bags and active safety systems fitted as standard."

ADAC's Dr Markl said: "The independent consumer rights activities of ADAC are exceptionally well-suited to establish the bases for the further development of UNECE regulations. We are very proud of the fact that the Executive Secretary of the UNECE and the FIA President have seized the opportunity of the exchange at the ADAC Technik Zentrum to gain their own insights into consumer protection work in the area of ecology and road safety."



Dr Reinhard Kolke, head of the ADAC Technical Centre.

ADAC has helped develop a Green NCAP test that will be added to safety ratings.

# ROAD SAFETY STARTS WITH GOOD VISION

CHECK  
YOUR VISION



PROTECT  
YOUR EYES



**VISION IS THE MOST IMPORTANT ON THE ROAD.**

THE FIA AND ESSILOR SIGNED A 3 GOOD VISION AS A KEY PILLAR OF

**WEAR APPROPRIATE GLASSES ON**

**SENSE TO MAKE DECISIONS**

YEAR PARTNERSHIP TO PROMOTE ROAD SAFETY.

**THE ROAD.**



QUESTION:

# WHERE DOES THE FUTURE OF ENDURANCE RACING LIE?

With the FIA World Endurance Championship down to one manufacturer in its top LMP1 category, is the series in crisis, or, as costs rise, is this the adjustment sports car racing needs? Three experts give us their opinion on where the FIA WEC heads next

02

## ANDRÉ LOTTERER THREE-TIME LE MANS WINNER

I think there will always be a future for the FIA World Endurance Championship because it's endurance racing, and the teams and manufacturers will always push the limits to drive for as long and fast as possible over a certain period of time. This will continue to be the case, especially with the Le Mans 24 Hours, which defines this category and where you can create milestones.

At the moment there is a bit of a shift with manufacturers going into Formula E and the automobile industry going electric, but it will always have quite an important place in the car industry and in motor sport most of all, and it will be interesting to see how the future goes.

It would be a shame if that changed but the promoters of WEC are talking about hyper-cars and I believe that would be an interesting, road-relevant plan for the race to combine both worlds and keep this category with impressive and prestigious cars, like it always has been.

Next season could be a transitional year to build something stronger for the future. But I don't think it's something that has gone wrong. It's just the decisions of Audi and Porsche to go somewhere else and do other stuff.

You can argue that it's expensive, but they wanted all that technology. Porsche, Toyota and Audi always got together, their working groups: they want this, this and this technology.

It was really special with three manufacturers putting in so much budget and enthusiasm in those cars and building them from A to Z.

It requires a lot of resources and people, because most teams have between 250 and 350 people working on it so it's a beautiful operation when you think about the sport and all of the engineers enjoying themselves. Everything was

André Lotterer

great, and on top of that the cars were super-fast and the battles were great.

I think it's going to be a racing era that we will always speak about, a bit like Group C back in the day, that everyone loved. That will always remain and I'm pretty proud that I was there from the beginning.

But we all know that things change a bit in the automotive industry and things are going electric.

The championship's ability to continue to attract the world's best drivers will depend on the level of the teams and amount of manufacturers involved in the series, as with any racing category. However, there are of course exceptions like Le Mans, which will always attract top drivers regardless of what happens elsewhere.

I think the championship is good and I'm sure they will have a good plan for the future.

## BRENDON HARTLEY TWO-TIME WORLD ENDURANCE CHAMPION

I'm sure there are more qualified people than a driver to talk about the future of the World Endurance Championship, but I personally think the series will prosper again and that sometimes change is good, that it can bring something new and exciting.

I had an incredible four years at Porsche and more broadly than that there were some golden years with Audi, Toyota and Porsche, and we had some amazing battles at Le Mans and in the WEC in some amazing cars. The technology, the speed, was wonderful and I feel privileged to have driven in that era of the championship.

It's sad that this era has come to an end but at the same time I don't see that it is the end of the WEC by any stretch of the imagination. First of all, Le Mans has so much history, it's such a big event and it has so much attraction for people.

For the championship, GT is super-strong with manufacturers, there's BMW coming next year and there are other manufacturers lining up. Yes, the LMP1 category as we know it is coming to an end, and while I'm not in the circles to know the answers I know from experience in the US that sports car racing there is thriving. We talk about LMP1, the budgets were very high and the cars were complicated and Audi pulling out started this chain of events, but actually sports car racing and prototype racing in general is very healthy, and I don't see any reason why that won't be the case whatever LMP1 becomes.

With regard to the idea that non-hybrid LMP1 cars will have a balance of performance advantage to make them competitive with existing LMP1 cars, it's working in IMSA but I want to be careful here as I'm not sure what's on the horizon. When you have to cut costs then you have to do something.

I do think that the idea of having Le Mans at the end of the season is interesting. It's double points, it's a grand finale and it has been spoken

about for a long time. We all agree that to have Le Mans at the season's end as a big spectacle is interesting and would attract the public.

But it's hard for me to look that far ahead. At the end of the day, I'm just the carbon-based space behind the wheel! However, I am 100 per cent sure that despite the setbacks endurance racing is strong enough to bounce back. I know the passion for Le Mans. There is huge support from GT manufacturers and if they adjust the rules in the right way I'm sure it will succeed. Sports car racing is thriving, so despite the manufacturers leaving LMP1, it will bounce back.

## JOHN BOOTH TEAM PRINCIPAL, MANOR WEC TEAM

The future for the World Endurance Championship is very bright. The reason for my confidence is that the two key success factors that lie at the heart of the series are not diminishing, but instead are growing from strength to strength. They are the passion of the fans and the quality of the racing.

You only have to go to Le Mans in June to see the passion and dedication of the hundreds of thousands of fans who attend the race. They are fanatical and they love their racing. It has always struck me how WEC has focused on the fans and rightly so, with initiatives like fan zones, open paddocks, pit walks, grid walks and so on.

A championship that forgets the fans is a championship that will go into decline and I am happy to say that we race in front of a growing number of fans who really enjoy the whole show.

The second key attribute is the quality of the racing. After some 72 hours of racing this year, the LMP2 championship was decided by a handful of seconds. Each six-hour race contained 4,000-5,000 overtaking manoeuvres, not always for

Brendon Hartley

John Booth

position but always requiring the skill of both drivers involved. The series offers very close racing with drivers of exceptional talent and car crews that present themselves for the ultimate challenge in motor sport. It truly is a test for any group of professional racers.

Much has been said of manufacturers leaving the WEC, firstly Audi and then more recently Porsche (although in reality, Porsche are still there in GT PRO as are Ferrari, Aston Martin and now BMW). This is nothing new. It's important to realise that car manufacturers make cars, that is their core business, and racing teams go and race, that is our core business.

Manufacturers will always come and go, we have seen it so many times, and it's not a reflection on the championship but rather on the marketing values of the car manufacturer themselves at that point in time, no more and no less. Manufacturers can bring a lot to a championship in terms of marketing resources, but they can never bring loyalty because it is not their core business. They have shareholders to answer to and they expect them to stick to their core business.

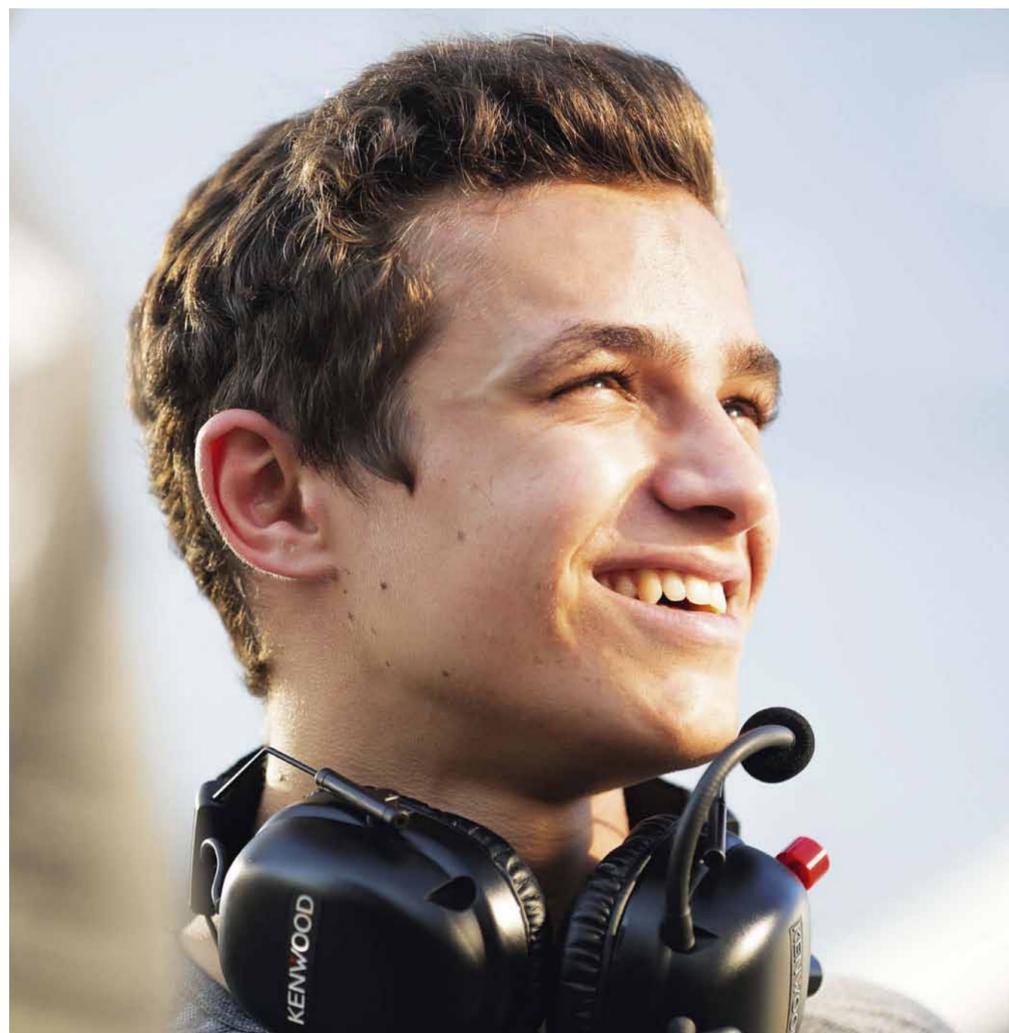
We on the other hand have different priorities. Our business exists solely to race. I believe that the loss of some manufacturers in LMP is not necessarily a bad thing - it allows independent teams to strengthen their fan base and that adds to the rich history of the sport. Over the years, teams like Ecurie Ecosse and Pescarolo Sport have provided fans with exciting racing and a die-hard commitment to compete. I hope that we continue to do the same and I can't wait to see our cars racing again in front of some of the most knowledgeable, fanatical and dedicated motor racing fans in the world.

03

# On the fast track

TEXT

JUSTIN HYNES



Fresh from becoming the youngest FIA Formula 3 European champion of all time, 18-year-old *Lando Norris*' already accelerated trajectory to the top is about to go into overdrive as he prepares for a frontline role with McLaren in F1, a season of Formula 2 and, first, a drive alongside two-time F1 champion Fernando Alonso at the famed Daytona 24 Hours race

**Tell us where your passion for racing came from?**

My dad was into motor sport. He tried racing when he was younger, but couldn't afford to do it, so he did cycling. So maybe I had a vision of motor sport when I was young, but nothing serious.

I used to watch MotoGP and some Formula One, but I wasn't really brought up around racing. When I was about six I got a motocross bike, because I was quite into motorbikes watching MotoGP and my hero at the time was Valentino Rossi. That's my first memory of racing. For my seventh birthday I got a Bambino go-kart and drove around at home and that's where the four-wheel hobby started.

**You had solid success in junior karting but in 2013 it all began to click. You won almost everything you entered and the following season became the youngest-ever World Karting champion. Was there something that happened during that year?**

The biggest change for 2013 was I made the move to Europe and racing there, and we joined the top team in European racing and it suited me much more. In the colder conditions in England, sometimes I found it a bit harder being a smaller driver. But moving to Europe I had a much better feeling for the tyre grip and everything just clicked. There was a point where I could really learn for myself, try and get the most out of what I could do and, yes, it obviously paid off in the results I got that season. It was just a few things put together and I really felt confident going into that year.

**After you won the World Karting title you attended that year's FIA prize-giving in Qatar. Did being in the company of drivers such as Lewis Hamilton make it feel like the dream was within touching distance?**

When you're young it's obviously really cool to see some of the F1 drivers. Yeah, you do feel like you're kind of on the ladder. It's hard to say whether I really felt connected to F1 at that point because I was coming from karting, and the cars are very different. I felt more connected when I did British F4 and went to the FIA prize-giving for winning that. That really gave me a confidence boost, the realisation that not a lot of people that can win that championship. Then seeing F1 drivers when you're also racing single-seaters does give you confidence that you can make it.

**You mention the British F4 Championship. You arrived in the first year of competition. How good a series was that for making the transition from karting to single-seaters?**

It was very good. Before I did British F4 in 2014, I did the Ginetta Junior Championship as well, on top of karting, and that was almost like a transition from karting to F4. That was a very good car for learning racecraft. It was good preparation to go into British F4. Formula 4 went very well, of course, and I

ended up winning the title. It was a big step up from what I was used to. It's kind of the first year in which you're really working with the engineers, going through data, learning about the car and everything like that. It was a big year in terms of learning about car racing, and one that would help me in the future.

**This year you scored your biggest success to date becoming the youngest winner of the FIA Formula 3 European Championship in your rookie season. Was it your toughest season yet?**

Yeah, firstly in terms of competitiveness, going up against guys who've been doing it for two or three years. And secondly, doing it with Carlin, a team that hadn't had the best time in F3. Basically, it was a gamble: should we go with Carlin? It wasn't clear-cut, but I was with Carlin in F4, I knew what they could do and what they could achieve. I had two very good team-mates, we always pressed each other, and that was crucial in terms of developing the car – especially being up against Prema, who dominated for the previous two years. In terms of most of the other championships I had done, where I'd gone in with the best team, this was different. We went with a team that didn't even complete the whole year in 2016. We had to work extra hard and play catch-up. In terms of work ethic from everyone it was a huge step up, but in the end it paid off.

**Why did you decide to go with Carlin if you had been with the top team in each previous series?**

Basically because Prema didn't want me! We did a test, it went pretty well, but we just didn't sign the contract with them. I did some other tests but I was confident with Carlin. I did Macau and Hockenheim, the final two races of the season in 2016 with them, and there were a few changes. We knew we could push the team if we signed with them. We knew we had good team-mates and if we worked hard it would be possible to win races and compete against the best teams. So, it was all about confidence. I knew everyone and felt very much at home, especially with them being based in England. It was a gamble, but we knew it would be possible.

**Does it feel sweeter, in that regard, that you made that choice?**

Yeah, they've done well in the past – though 2016 was just really bad for them – but even in the previous years of Formula 3 they haven't been bad, they'd just missed that final bit. It was good to be part of their championship win.

**Was it good for you in terms of your own development, working with a team that probably isn't at the top of the table?**

Yes, especially at the start of the season. We structured everything well to get through as much testing as we could, to be really efficient. And having Ferdinand Habsburg and Jake Dennis trying to push everyone was good.

**Norris gambled on European F3 success with British team Carlin despite its struggles of the previous season...**



It wasn't just ourselves, we pushed the engineers, we pushed the whole team to try and find a bit more and a bit more, and we knew that eventually it would pay off.

...And the Briton's faith was rewarded when he became the youngest-ever winner of the FIA F3 European Championship.

**So how does it feel now, having done it?**

I'm really happy. Happy for the team as well, they've done an awesome job. For me to do it in my rookie season, very few people have done that. So yeah, it's a lot of pressure off my shoulders and an incredible feeling to have won it in my first year with Carlin.

**How important was it for you to do your first F1 test in Hungary in August with McLaren?**

The test in Budapest was very important, my first real feeling for an F1 car, especially the 2017 one, and to see what I'm able to do in a car that I want to drive in the future. It went very well, better than I expected, and they gave me a lot of confidence to look forward to it in the future.

**'The F1 test in Budapest was very important, to see what I'm able to do in a car that I want to drive in the future'**

**How exciting was it?**

It was awesome. It was a huge step up, even from F3. Not just in terms of the car, but mentally there was so much more going on – all those buttons and dials on the steering wheel. It took me a couple of runs to have a good feeling for the car, because just speed-wise the braking ability, the downforce, the power, it's a huge step up. But to look back on it and know how it went, it was just awesome.

**Lance Stroll and Max Verstappen made the step straight from F3 to F1. If the option had been available would you have taken it?**

Well, McLaren have two really good drivers who they're happy to roll with into 2018, so I'll be doing F2, which will be a year to look forward to. We get to go to a lot more of the grand prix circuits alongside F1, it's another step up, which again will be tough, but I think it's good preparation to go onto Pirelli tyres and learn a bit more about that.

**You will be one of the first to experience a new generation of F2 cars. Is that something you're looking forward to?**

It's always cool to drive a new car. Sometimes it's more of a level playing field, but it's also a chance for teams to find something that can help much more. It's always good to be part of something new and to drive a new car.

**It's looking like a busy year: you've been confirmed as 2018 reserve driver at McLaren and you're also going to be doing some sportscar racing alongside Fernando Alonso at the Daytona 24 Hours in January...**

I've never done an endurance event so I'm looking forward to it a lot. I'm gonna have two very good team-mates as well. It's something different to what I'm used to.

**So far, you've won every series you've raced in, usually at the first go – can you do that in F2?**

We'll see. It's a little bit hard to say until we decide on a team, but of course at the end of the day I want to be winning races and hopefully the championship, so I'll do the best I can to achieve that. ♦

From the introduction of the new Halo head protection device, to forward-thinking work with hybrid and electric race cars, and cutting-edge research into brain function, the FIA's quest for greater safety involves a range of experts from across the motor sport and medicine landscapes

04

# The Global Pursuit of Safety

TEXT

MARC CUTLER

If you thought that motor sport safety research was carried out by a couple of people with a computer in a dark office, you would be wide of the mark.

These days, safety is very much a global group effort, and this is why the FIA enlists the help of an array of engineering and scientific talent to ensure that research is rigorous and worthwhile for every level of motor sport.

It all starts with the Scientific Advisory Panel (SAC), which, as the name suggests, is a body that gives advice and makes proposals on the strategic direction of safety research. This feeds into the Research Working Group (RWG), which studies the feasibility, technical aspects and practical applications of every project. Each group is made up of leading engineers, scientists, doctors and drivers from across racing.

The RWG is administered by the Global Institute for Motor Sport Safety, the safety research partner of the FIA, which carries out the tests that provide the hard data to make important safety decisions.

It is this collaborative approach that oils the wheels of the safety effort.

Professor Gerard Saillant, Chairman of the SAC and RWG, says: "It enables a multi-disciplinary approach, thanks to the competences and origins of the members (engineers, drivers, managers, doctors). The role of people from teams and manufacturers is very important as they have an external 'eye' and a different culture. Improvement comes from sharing."

Those external eyes include Prodrive's Technical Director David Lapworth, a stalwart of FIA safety research groups for

More streamlined work on safety has resulted in the swift introduction of the Halo head protection device to motor sport's top categories.



many years, and recently appointed ART GP Technical Director Frédéric Guyot, who attended his first meeting earlier this year. Both give their time freely alongside representatives from IndyCar, Nascar, Supercars Australia, the Global Institute and the FIA to help improve the safety of motor sport worldwide.

"By involving manufacturers, championships and teams you gain access to a lot of expertise and experience," says Lapworth. "You can dream up some safety ideas, but it's good to have that perspective from the guys who are putting the drivers in the seats, doing their belts up and designing their roll cages."

This approach is certainly something that surprised Guyot – in a good way – after his first RWG meeting in April.

"I didn't expect that so much research goes into safety before coming here," he says. "We know that some things are coming but I didn't realise that there are people working on safety every day. When you are on the outside you don't know how it is working, you think it is just coming like that, like somebody has an idea and they just put it on F1, F2, F3... But I can see there is detailed research and there are senior engineers who are working hard on all kinds of problems."

Guyot also believes that having representatives from trackside is essential for feedback and development.

He says: "We are working directly on the car with the driver, we know the problems we can have, so we know what is needed. It is important to have several people like this who can give direct feedback from the track."

The RWG meets three times a year and involves presentations and discussions on a range of topics. The November meeting alone examined subjects as diverse as the development of new side-impact structures in F1; the creation of a new debris fence specification; kart body protection; precise car positioning technology and even new research on balaclavas. Every area of motor sport safety is open for discussion.

## CHANGING LANDSCAPE

This coordinated safety effort has come a long way over the last 30 years. It is fair to say that the modern era of motor sport safety began with the death of Ayrton Senna in 1994. The loss of one of motor racing's greatest drivers was a wake-up call for the Formula One community and a new safety push was led by the FIA alongside the late Professor Sid Watkins MD, F1's doctor.

After Senna's accident, the FIA formed the Expert Advisory Safety Committee with Watkins as Chairman and members including FIA Technical Adviser Peter Wright, F1 Race Director Charlie Whiting, driver representative Gerhard Berger and designer representative Harvey Postlethwaite. The group combined their huge amount of experience and knowledge to find solutions for the major safety issues in F1.

It researched and introduced the collapsible steering column, protective foam around the top of the cockpit, new crash tests for front, rear and side impacts, and the Head And Neck Support (HANS) device now worn obligatorily by every driver. This group became the Open Wheel Research Group and then similar groups were soon formed for closed cars and karting. They were all brought together under the FIA Institute in 2004, which continued to make great strides in safety over the next decade.

In 2015, the FIA Institute handed over the research mantle to the Global Institute, which has consolidated the safety effort even further.

Lapworth has been involved with the various research groups throughout this time and believes that the safety focus has never been stronger. ▶

The Global Institute for Motor Sport Safety is responsible for testing new safety ideas.

## 'Every time you remove a weak link, you expose the next one, and there's almost no end to that journey. You keep raising the safety level'

"It has streamlined things and brought more perspective to the different discussions," he says. "With the different disciplines, each bring some expertise and experience. It has brought a bit more structure to the process as well. The two things have happened together and it has improved the whole."

Another area that has progressed is the take-up of new safety technology by teams and manufacturers. But Lapworth would like to see this develop even further.

"By involving people from the championships earlier in the research, you can accelerate the rate of adoption. If there's an area where we're getting better, but we can get even better, it would be in reducing the time from the seed of the idea to the implementation. And not just the implementation in F1, but in all the disciplines.

"Things like the HANS device, which we now take for granted 12 years on, probably took 10 years to get from the first tests to widespread adoption in motor sport disciplines in every country."

The new Halo frontal protection device is a demonstration of this accelerated deployment. Already set for introduction into F1 next year, it will now be on cars in F2 and the new US F3 championship in 2018. And by the end of the year it will be on all Formula E cars for the 2018/19 season. Most open-wheel championships will have adopted it by 2020.

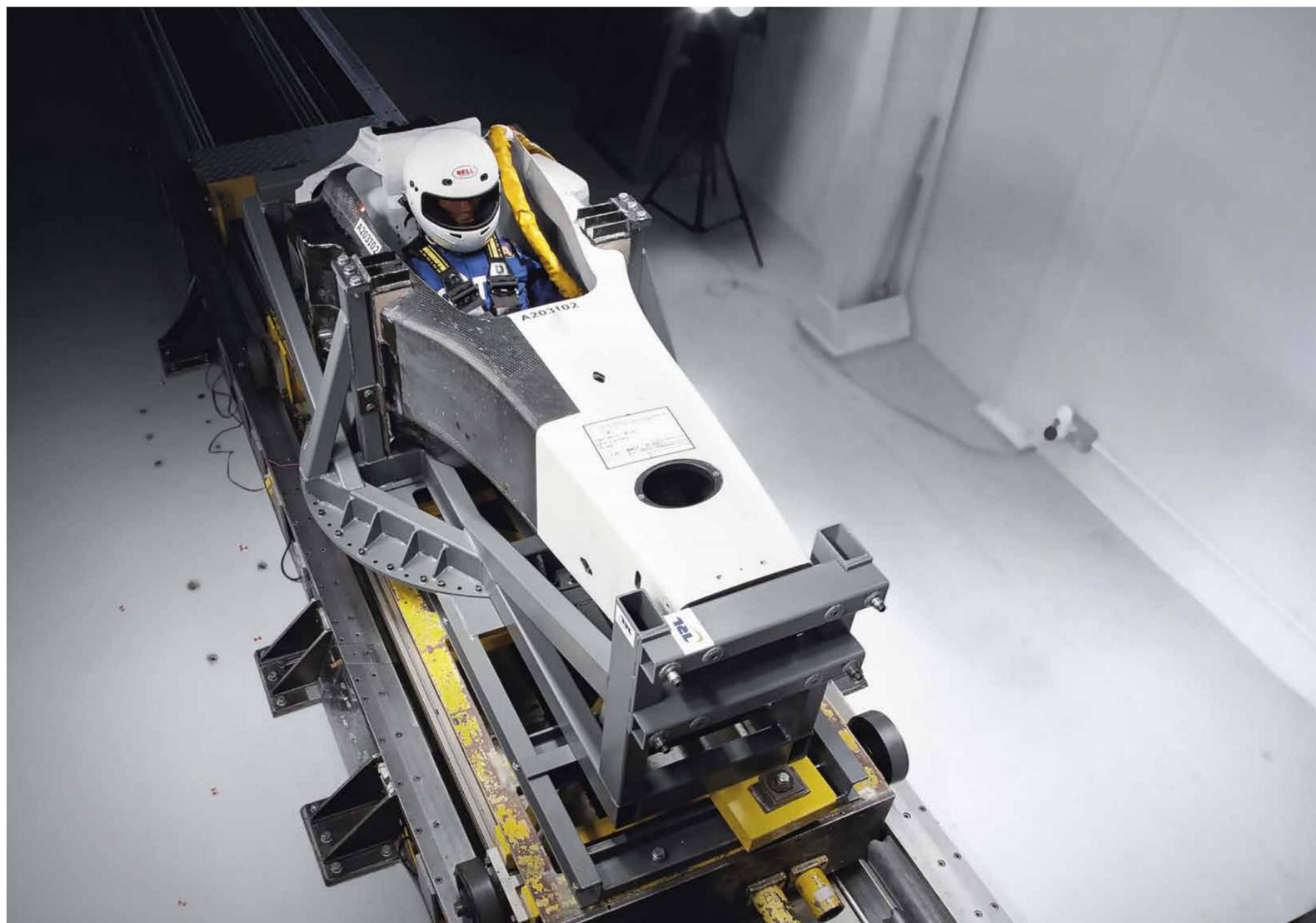
The pace of this deployment has much to do with the collaborative safety effort across motor sport, according to Lapworth. He believes the fact that Halo is being introduced into F1 is a great breakthrough for safety.

"If we can get things like the Halo to be adopted, even in the very focused area of Formula One, that is an achievement. Involving people from the different disciplines in the process can only help. The more people help spread the word and convince the doubters about the science and the work that has gone into it, the better."

Guyot, whose ART team competes in Formula 2 and GP3, agrees and believes it is a victory for science over aesthetics. "For me, it's fine [to have Halo in F2]. I know there are many people saying it doesn't look good and the driver will be less of a hero because of that, but everything that can be done for safety is good."

There is no doubt that Halo has its critics, but Lapworth has experience of similar doubters in the World Rally Championship when changes were implemented for safety.

"The side-impact protection in rally cars is a classic example," he explains. "It's not easy to convey to people the physics and mathematics that drive the decisions that were made, but time has shown that it was the right approach.



Having people from across the disciplines more involved can make that process a lot easier."

### FORWARD THINKING

Lapworth is confident that the right structure is in place to make great strides in safety going forward.

"The structure is there and my impression is that the rigour and the kind of discipline has grown over the years. We've all worked to make it more efficient and it is working better. The momentum and direction has improved in the years that I've been involved. The rate in which things get developed has got faster."

He points to biometric technology and concussion diagnosis as two major areas of focus for safety research teams. For instance, biometric gloves that send potentially life-saving data from driver to medical crew will be introduced into F1 next season, while concussion detection devices are being developed.

"The work that's going on with concussion, the biometric gloves, the next level of measuring brain activity through

## Scientific Advisory Panel

### CHAIRMAN

Prof. Gérard SAILLANT President, FIA Medical Commission

### MEMBERS

François CHATRIOT, President, Oxygene PSA / former rally driver  
Lionel CHEVALIER, Technical Director, Signatech Automobiles  
David LAPWORTH, Technical Director, Prodrive  
José María LÓPEZ, WEC / FE driver  
Laurent MEKIES, Safety Director, FIA

an ear piece... all that stuff is really interesting. It's fascinating to see what can be done, and that feels like some really good research.

"I can also see potential in the work that's being done on the next generation of harnesses, and there's talk about maybe being able to integrate harnesses into seats. There are a lot of interesting projects."

Certainly, safety is a never-ending process, especially with the constant developments of new championships, disciplines and formulae for racing cars.

"Each time you raise the level in one area, you expose the next weakness," says Lapworth. "The HANS device has been very effective in reducing the number of fatalities and making quite big accidents survivable. But now we need to raise the seat standards, the standards of the belts, we need to look at all these things that weren't on the radar before when people weren't even surviving the initial impact."

The increasing prevalence of hybrid and electric cars has become a whole topic in itself for safety researchers.

"There's a lot of work being done that kind of almost gets missed in terms of embracing electric and hybrid vehicles.



AT GP Technical Director Frédéric Guyot has been impressed by the work conducted by the Research Working Group.



Prodrive tech boss David Lapworth has been a stalwart of motor sport safety groups for many years and helped oversee changes to the WRC.

Every time you remove a weak link, you expose the next one, and there's almost no end to that journey. You keep raising the safety level."

But the most important area for Lapworth is the rollout of safety to the lower levels of the sport.

"We need to recognise that the rollout is as important as the pioneering. It's great to have the top-level formulae like F1 being able to engineer new solutions and push the boundaries, but in terms of saving lives the rollout is where the big numbers come.

"There are 22 or 24 guys in an F1 race at the weekend, but there are thousands racing in different categories worldwide. So that's the area that is getting more focused through the discussions we're having. Let's consider not just what F1 needs, but how can we make this universal and how can we make it happen as quickly as possible."

This is one of the key objectives of the Global Institute – to ensure that the safety developments at the top of the sport are relevant and applicable to the lower levels. With advice and direction from senior engineers like Lapworth, Guyot and other research group members, this process is gaining pace. 4

## Research Working Group

### CHAIRMAN

Prof. Gérard SAILLANT President, FIA Medical Commission

### MEMBERS

Jacek BARTOS, Rally Safety Delegate, FIA  
François CHATRIOT, President, Oxygene PSA / former rally driver  
Lionel CHEVALIER, Technical Director, Signatech Automobiles  
Nuno COSTA, Safety Engineer, FIA  
Thomas GIDEON, Safety Director, NASCAR

Frédéric GUYOT, Technical Director, ART GP  
David LAPWORTH, Technical Director, Prodrive

José María LÓPEZ, WEC / FE driver  
Laurent MEKIES, Safety Director, FIA  
Andy MELLOR, Senior Research Engineer, Global Institute

Sam MICHAEL, Director, Australian Institute for Motor Sport Safety  
Gilles SIMON, Technical Director, FIA  
Prof. Jean-Charles PIETTE MD, Special Medical Delegate, FIA

Matteo PIRACCINI, Senior Research Engineer, Global Institute  
Christian SCHMIDT, Technical Delegate, DMSB

Charlie WHITING, F1 Race Director, FIA  
Peter WRIGHT, Senior Research Advisor, Global Institute

### OBSERVERS

Nikil ABRAHAM, Consultant, Global Institute  
Franck ADAMSON, Technical Manager, Supercars Australia  
Laurent ARNAUD, Technical Dept, FIA  
Jo BAUER, F1 Technical Delegate, FIA  
Alain BEAUFRÈRE, Researcher, Global Institute  
Guillaume CAPIETTO, Technical Director, PREMA

Dr Herve FARINES, Anesthetist  
Dr Michael HENDERSON, Doctor, Australian Institute for Motor Sport Safety  
Colin HILTON, Board Member, Global Institute  
Jeff HORTON, Director of Engineering, IndyCar

Tom KRISTENSEN, Vice-President, FIA Drivers' Commission  
Sameer PATEL, Research Engineer, FIA Safety Department  
Davide TERLETTI, Consultant  
Dr Paul TRAFFORD, Medical Director, British Touring Car Championship  
Terry TRAMMEL, Safety Advisor, IndyCar



As 2017 draws to a close, AUTO celebrates the achievements of the FIA's sporting champions, from those competing in the most high-profile championships right down to the worthy winners of grassroots series. And we start with a man who now has four F1 titles to his name...

05

# SITTING ON TOP OF THE WORLD

## FIA FORMULA ONE WORLD CHAMPIONSHIP

### Lewis Hamilton

The serene figure who cruised to a fourth drivers' title in Mexico with two rounds to spare was barely recognisable from the Lewis Hamilton of 2016, who had come off second best in a bitter inter-team spat with Nico Rosberg.

The 2017 Mercedes W08 chassis may have been a temperamental diva to tune but Hamilton, his pre-eminent status at Brackley reaffirmed, was in the perfect psychological place to deal with it and the renewed challenge from Ferrari.

When Sebastian Vettel won the season-opener in Australia, Hamilton quickly responded in Shanghai and, while there were difficult days in Russia, Monaco, Hungary and Austria, the Briton continued to score heavily.

Wins in China, Spain, Canada and on home soil at Silverstone kept him in touch with Vettel before the rapier thrust of wins at Spa, Monza and Austin all but sealed the deal.

While Vettel had his meltdown in Baku, Azerbaijan, Hamilton was teak tough throughout the season, his emotional expression reserved for the victory press conference in Mexico.

"Growing up in Stevenage, dreaming of one day being in Formula One, and where I am now is way beyond my imagination. I think dream big is definitely something we should all do - but to be four-time world champion... Four definitely feels a lot better than three..."

Hamilton was on dominant form through 2017 to keep the challenge of Vettel and Ferrari at bay.

FIA WORLD RALLY  
CHAMPIONSHIP

**Sébastien Ogier/  
Julien Ingrassia**

Sébastien Ogier's fifth consecutive WRC drivers' title was secured with just two rally wins – the lowest number for a champion since 2001 – but the barely-contained emotion from Ogier and co-driver Julien Ingrassia after Wales Rally GB hinted at its true worth.

"Emotion is something you cannot control... this is the strongest emotion I have been having in a rally," said Ogier. "It was really, really good what we did."

"I felt very proud and happy for the whole team. Malcolm [Wilson] and all his guys never had this happen to them before, but it's well deserved what the team achieved and to do it with a smaller budget than the manufacturers, it's amazing."

"I can easily say this has been the most competitive WRC season I ever drove and this is the case for the championship in general – it's been really good for the sport."

Having switched to an M-Sport-run Ford Fiesta following VW's withdrawal, consistency was the key for Ogier who started with a win in Monte Carlo, never finished lower than fifth and had just one non-finish on his scorecard, in Finland.

Ogier fended off slow-starting Thierry Neuville and Hyundai to score Ford's first drivers' title since 1981 and extend France's grip on the crown, which goes back to 2004.

Jari-Matti Latvala led after two rounds on Toyota's return to the WRC but Ogier was always in touch and, while Neuville briefly took the lead when the Frenchman retired in Finland, he handed the advantage back by non-scoring in Germany in the following event. It was all done a round early, leaving Ogier to contemplate the future.

Ice-cool Ogier showed supreme consistency through 2017 to claim his fifth straight WRC title.



FIA WORLD ENDURANCE  
CHAMPIONSHIP

LMP1  
**Brendon Hartley/  
Earl Bamber/  
Timo Bernhard**

A mid-season winning streak carried Germany's Timo Bernhard and New Zealand duo Earl Bamber and Brendon Hartley to the drivers' championship as they helped Porsche say goodbye with a third successive manufacturers' title. It's a second title for Hartley and Bernhard and a first for Bamber, who was grateful for continued development of the Porsche 919. "Everyone at the factory has worked so hard. When we brought the new high-downforce package in it was a real turning point for us this season," the 27-year-old said after the trio clinched the title with a round to spare.

The number two Porsche began its four-race winning run in the third round at Le Mans. Victory at La Sarthe clipped Toyota's wings and helped make it another perfect season for Porsche. Toyota pairing Sébastien Buemi and Kazuki Nakajima managed one more win than their rivals, but the Porsche trio finished every race and were only off the podium once when they came fourth in Fuji.

Hartley's Formula One adventures proved no distraction and winning with compatriot Bamber was especially sweet. "To share a second title with Timo and a first one with Earl, who I grew up racing with, is an incredible story," he said. "It feels incredible to be world champions again and big thanks to Porsche." For Bernhard, 2017 represents a career high. "It is an honour to go racing with these guys and it is definitely the peak of motor sport I have achieved," said the 36-year-old.



The combination of Bamber, Bernhard and Hartley made sure of a sweet swansong for Porsche in the WEC.

LMGTE PRO

**Alessandro Pier  
Guidi/James Calado**

Pairing up with Britain's James Calado to steer their factory-run AF Corse Ferrari 488GTE to a very finely judged FIA GT Drivers' World Championship was always going to spring a well of emotion from Italy's Alessandro Pier Guidi.

"This is the best second place of my career for sure," said the 33-year-old from Tortona after sealing the title at the ninth and final round in Bahrain.

"I realise I am now a world champion and it seems crazy as this is the first season for me to race in WEC," he added. "It is a great feeling and I want to say a big thanks to all the teams. To give me, an Italian driver, the chance to race at Ferrari is fantastic."

The duo began the year with a brace of second places but then found themselves playing catch-up after a problematic trip to Le Mans. A run of three victories from four races set them up for the endgame and they delivered with aplomb in a tight three-way battle among crews driving for Ferrari, Porsche and Ford in the final round at Bahrain.

The race was won by the No71 AF Corse Ferrari F488 of Davide Rigon and Sam Bird, but Pier Guidi and Calado finished second in the No51 F488 to take the title and add to the FIA World Endurance GT Manufacturers' Championship that was won by Ferrari in China.

Calado was as emotional as his Italian team-mate after completing the year with his seventh podium finish.

"Being able to call myself a world champion is something I've always dreamed of," he said afterwards. "I'm not sure we had the quickest car today, but I think we had the most consistent car and we stayed out of trouble. I've never gone over the line with so much emotion in all my life. It has been an unbelievable year for Ferrari and us."

James Calado and Alessandro Pier Guidi in action at the 6 Hours of Spa-Francorchamps.



FIA WORLD TOURING CAR CHAMPIONSHIP

Theo Björk

Theo Björk prevailed to take a career-defining maiden FIA WTCC title, but he had to endure a nerve-jangling final-round decider in Qatar. The 37-year-old Swede emerged as a title threat with the Polestar Cyan Racing factory Volvo S60 after finishing second in the first race weekend at Morocco and then taking a superb win in the main race at Monza in round two. He won again in round four at the Nürburgring to stay in touch with early leader Tiago Monteiro. However, the enforced absence of Monteiro following a testing crash handed Björk a golden opportunity, but his advantage began to dwindle following a series of rain-affected events in China, Japan and Macau. Ahead of the final round in Qatar, Björk had just 6.5 points in hand over new title rival Norbert Michelisz. However, a brake issue in qualifying left Michelisz out of contention and Björk drove without fault to take touring car racing's biggest prize, with the Swede finishing fifth in the opening race and fourth in the main race. Volvo Polestar also won the Championship for

Manufacturers, beating Honda by 28.5 points. "It's incredible now I've calmed down a bit, but it was completely crazy at the finish with so many feelings," said Björk after the final race. "It just feels good now. If you set a goal and achieve it, it's unbelievable."



Theo Björk marked himself out as a WTCC title contender early on with victories at Monza (above) and the Nürburgring.



The Swede led his charge in a Polestar Cyan Racing factory Volvo S60, taking the makes title ahead of Honda.

A run of five victories helped 29-year-old Johan Kristoffersson to the top in world rallycross.



FIA WORLD RALLYCROSS CHAMPIONSHIP  
Johan Kristoffersson

After finishing third in 2015 and second last year, the sequence was successfully completed by Johan Kristoffersson in the fourth ever FIA World Rallycross Championship, but he was made to work for it by Swedish compatriot Mattias Ekström. The reigning champion (EKS RX-Audi S1) began his title defence in fine style with a hat-trick of wins before Kristoffersson brought his PSRX Volkswagen Polo GTI into the winner's circle for the first of seven victories.

Five wins in a row from rounds six to 10 ensured the title fight was over with two rounds remaining and, after spraying the bubbly in Riga at the Nestle World Rallycross of Latvia, Tommy Kristoffersson's son could reflect on a job well done. "This is something that I've been working towards since 2013 and I think it will take a long time to sink in," he said. "I followed my father when he was racing – he has been to almost every race with me since and we have always worked well as a family team. "Petter [Solberg] is an excellent team-mate – we are both nerds in that we look into every detail. I am such a competitive person and I always wanted to become world champion, it is a dream come true. I can't thank everyone enough for this incredible moment."

## Best of the rest – FIA Driver Champions 2017

- FIA FORMULA E – Lucas di Grassi
- FIA F2 CHAMPIONSHIP – CHARLES LECLERC
- FIA F3 EUROPEAN CHAMPIONSHIP – Lando Norris
- F4 AUSTRALIAN CHAMPIONSHIP CERTIFIED BY FIA – Nick Rowe
- F4 BRITISH CHAMPIONSHIP CERTIFIED BY FIA – Jamie Caroline
- F4 CHINESE CHAMPIONSHIP CERTIFIED BY FIA – Charles Leong
- F4 GERMAN CHAMPIONSHIP CERTIFIED BY FIA – Juri Vips
- F4 SEA CHAMPIONSHIP – Presley Martono
- F4 ITALIAN CHAMPIONSHIP CERTIFIED BY FIA – Marcus Armstrong
- F4 JAPANESE CHAMPIONSHIP CERTIFIED BY FIA – Ritomo Miyata
- F4 NACAM C'SHIP CERTIFIED BY FIA – Calvin Ming
- F4 NEZ C'SHIP CERTIFIED BY FIA – Christian Lundgaard
- F4 SPANISH C'SHIP CERTIFIED BY FIA – Christian Lundgaard
- F4 UAE C'SHIP CERTIFIED BY FIA – Jonathan Aberdein



Audi driver Lucas di Grassi claimed his maiden Formula E title in the summer.

- F4 US C'SHIP CERTIFIED BY FIA – Kyle Kirkwood
- FIA MASTERS HISTORIC F1 CHAMPIONSHIP (HEAD & LAUDA CLASSES) – Michael Lyons
- FIA MASTERS HISTORIC F1 CHAMPIONSHIP (STEWART & FITTIPALDI CLASSES) – Max Smith-Hilliard
- FIA MASTERS HISTORIC SPORTS CAR CHAMPIONSHIP – Keith Ahlers/James Billy Bellinger
- FIA WORLD CUP FOR CROSS COUNTRY RALLIES – Nasser Al-Attiyah/Mathieu Baumel
- FIA AFRICAN RALLY C'SHIP – Manvir Baryan/Drew Sturrock
- FIA ASIA PACIFIC RALLY C'SHIP – Gaurav Gill/Stéphane Prevot
- FIA CODASUR RALLY C'SHIP – Gustavo Saba/Fernando Mussano
- FIA NACAM RALLY C'SHIP – Ricardo Triviño/Marco Hernandez
- FIA EUROPEAN RALLY C'SHIP – Kajetan Kajetanowicz/Jaroslav Baran
- FIA MIDDLE EAST RALLY C'SHIP – Nasser Al-Attiyah/Mathieu Baumel
- FIA WORLD RALLY CHAMPIONSHIP JUNIOR – Nil Solans/Miquel Ibanez
- FIA WRC 3 – Nil Solans/Miquel Ibanez
- FIA WRC 2 – Pontus Tidemand/Jonas Anderson
- FIA F3 WORLD CUP – Daniel Ticktum
- FIA EUROPEAN TRUCK RACING CHAMPIONSHIP – Adam Lacko
- FIA EUROPEAN DRAG RACING CHAMPIONSHIP (TOP FUEL) – Duncan Micallef
- FIA GT WORLD CUP – Edoardo Mortara

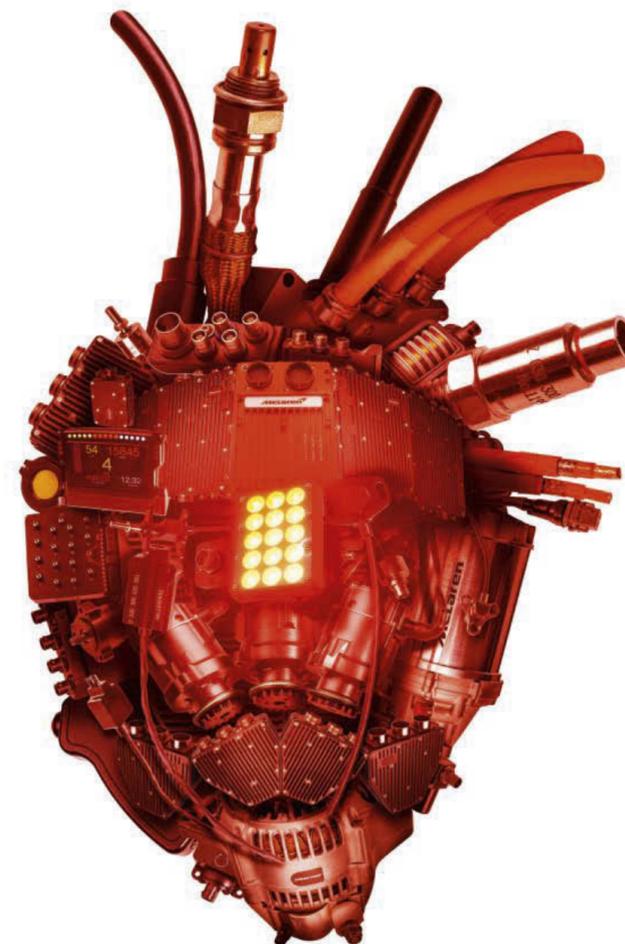
Rising talent Lando Norris this year became the youngest-ever F3 European Champion.



- FIA WORLD ENDURANCE CUP GT – Paul Dalla Lana/Pedro Lamy/Mathias Lauda
- FIA EUROPEAN TOURING CAR CUP – Petr Fulín
- FIA EUROPEAN RALLYCROSS CHAMPIONSHIP – Anton Marklund
- FIA EUROPEAN AUTOCROSS CHAMPIONSHIP (SUPERBUGGY) – Bernd Stubbe
- FIA EUROPEAN AUTOCROSS CHAMPIONSHIP (BUGGY 1600) – Petr Nikodem
- FIA EUROPEAN AUTOCROSS CHAMPIONSHIP (TOURING AUTOCROSS) – Ales Fucik
- FIA EUROPEAN AUTOCROSS CHAMPIONSHIP (JUNIOR BUGGY) – Justs Grencis
- FIA EUROPEAN HILLCLIMB CHAMPIONSHIP – 'Tessitore' (I), Tomas Vavrínek (II)
- FIA INTERNATIONAL HILLCLIMB CUP – Gabriella Pedroni
- FIA HISTORIC HILLCLIMB CHAMPIONSHIP – Harald Moessler (I), Vladimir Konicar (II), Giovanni Pagliarello (III), Angela Grasso (IV), Gregor Frotscher (V)
- FIA LURANI TROPHY FOR FORMULA JUNIOR CARS – Bruno Weibel
- FIA HISTORIC RALLY CHAMPIONSHIP – Antonio Parisi/Giuseppe D'Angelo (I)
- FIA TROPHY FOR HISTORIC REGULARITY RALLIES – Christian Crucifix
- CIK-FIA WORLD JUNIOR CHAMPIONSHIP – Dexter Patterson
- CIK-FIA WORLD CHAMPIONSHIP – Danny Keirle
- CIK-FIA WORLD KZ C'SHIP – Paolo De Conto
- FIA INTERCONTINENTAL DRIFTING CUP – Masato Kawabata



Britain's Dexter Patterson is a karting world champion at the tender age of 14.



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As it enters its fourth season, the all-electric Formula E Championship continues to gather strength, with new drivers and city centre venues helping to spice up the already close competition

06

# FORMULA E'S POWER SURGE

TEXT  
/  
SAM SMITH

There's no such thing as a transition season. That is the mantra being repeated by FIA Formula E Championship Founder and CEO, Alejandro Agag, as he and his team begin season four this month.

With the season having kicked off with a spectacular double-header at the second Hong Kong e-Prix at the start of December, the championship is entering its final year with the original Formula E design.

Although powertrain manufacturer freedom was granted for the start of season two in 2015, the current cars come to the end of their competitive lives next summer. That is when the generation two car, which is already testing, will come on stream and provide almost double the usable energy for drivers, making the 'car swap stop' that has been a defining characteristic of the series' first three seasons a thing of the past.

The Spark SRT\_01 cars have served Formula E well, with the first generation of all-electric racers having put a significant charge bolt through the racing industry as it has quickly established itself as one of the key growth areas of the sport.

But those anticipating a quiet consolidation through the fourth campaign have clearly not spent five minutes with Agag, who along with FIA President Jean Todt has been the key driving force of the series over the past five years.

"Because we're so young, people make comparisons with other established championships," says Agag. "If we had 45 seasons under our belts, you wouldn't say that season 46 is

a transition season, would you? This is season four of Formula E and it's as big as any other season.

"The cool thing with season four is that the technology of the top teams with this kind of car is peaking, but the followers are catching up, so it might be our closest season yet. This is great for the championship, for the competition and for the racing of course."

## TECH BREAKTHROUGH

Aims and objectives are crucial in motor sport. Agag has delivered on many so far as Formula E gets a foothold on the sporting landscape. Each season has seemed to have a distinct theme. This is something Agag attests to as a pre-determined strategy in his modus operandi.

"We like to have targets for every season. Sometimes the targets just evolve and sometimes they are ingrained from the very start," he says.

Season three was undoubtedly the manufacturers' season for Formula E, as the regulations freed up development of aspects of the car. The coming campaign, insists Agag, will be one for audiences, whether they are at the venue or tuning in around the world.

"Obviously, season five is going to be the technology season," he says. "There is a huge amount of excitement around what we are building and how we are doing it, but we need to look at season four as the one where we reach more eyes and ears. ▶

Formula E boss Alejandro Agag has strived over the last five years to drive the series forward.



Audi team boss and racing veteran Allan McNish has praised Formula E's strong driver line-up.



Season two champion Sébastien Buemi is expecting a close title fight as the rivalry in Formula E builds.

“The viewership, the championship’s reach, TV, online – everywhere we’ve invested a lot of money, a lot of resources. I think you will see a lot of TV product to expand our reach.

“The TV product is going to be strongly enhanced already in season four. We’ll have more cameras, new graphics and we will reach more people online, on TV and through all media. There’s a lot of new stuff going on as we have a strengthened media package.”

That package includes a new deal with North One, formerly the producers for ITV’s award-winning Formula One coverage. The company joins equally celebrated Aurora Media, which spearheaded the Formula E TV production through its first three seasons.

So far there have been several announcements, including Eurosport committing to an expanded involvement in broadcasting the races.

Meanwhile in the UK, one of primetime TV’s most familiar faces, Vernon Kay, will front the race shows and much more. The daytime quiz show host will attend all of the Formula E events.

The season four calendar will see Formula E’s most structured schedule yet. It is one which has a more consistent cadence and frequency, something the sport has worked hard to achieve.

“We have brought in four new races this season and we believe we have our best dates yet,” says Agag. “Santiago, São Paulo, Rome and Zürich become the latest major cities to host races. The Zürich event in particular has created headlines as it prepares to welcome back circuit racing after a 63-year absence. It’s a great story and we have a great promoter there that has done a brilliant job.

“What a great symbol – to have racing reintroduced to Switzerland with electric [power]. I think this is where things are going – to race in a city today, you have to be electric. It’s going to be more and more difficult for non-electric championships to get into cities because it’s a sign of the times – cities need to be clean and they need to have electric cars. Formula E really

is the championship of the cities. Zürich and all the host cities prove that.”

The driver roster in the sport is also changing for season four with a host of new faces arriving. Joining the regulars will be three-time Le Mans winner Andre Lotterer, former GP2 champion and Williams F1 test driver Alex Lynn, 2016 FIA World Endurance Champion Neel Jani, former Sauber and Toyota F1 star Kamui Kobayashi, multiple DTM winner and recent Macau GT World Cup victor Edoardo Mortara and, finally, ex-GP2 race winner Luca Filippi

It is a strength-in-depth that Audi Sport ABT Schaeffler team boss, Allan McNish, believes is by far the best ever.

“I think you have massive strength in all areas, there are no real weak spots in that respect,” says McNish. “From the driving pool there are some very strong line-ups and some quite aggressive line-ups as well – guys who like to get their elbows out, who push and shove and race hard, they are also used to winning big races as well. Then from a team perspective everyone has had to raise their level and that is across the board, so I think season four will be very competitive.”

#### CLOSE CONTEST

The performance convergence suggested for this final season of Formula E in its present guise could guarantee the closest competition yet. Should it do so, it will be a campaign to savour,

as all three seasons so far have gone down to the wire in terms of the championship battle.

“It is the final season with this current generation of car so most people will have a bit of a handle on the car and the tyres, as they are a carry-over from season three,” reckons McNish. “Some will have had a bigger move forward with the powertrains, but you are getting to a point where I would suggest that most teams are pretty much on top of the hardware now.”

Season two champion Sébastien Buemi agrees, saying: “There are teams that have invested a lot of effort into season four, so it is hard to predict what will happen.

“This year we did not re-homologate anything on our car. We have done as much as we could. Some of the resources went to season five, but we are still pushing hard and it will be a tough fight.

“My feeling is that if we get everything perfect, we [will] still have a chance to do well and fight for race wins, but when things are maybe not perfect then it might not be like last season where you drop to fifth or sixth place – now you may be further down.”

As ever in Formula E, expect the unexpected. ◀

Swiss driver Edoardo Mortara will join Formula E for season four as part of the Venturi team – and will race on home soil in Zurich.



**‘This is where things are going – to race in a city today, you have to be electric. Formula E really is the championship of the cities’**

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TEXT  
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BEN BARRY

After two decades of sales booms, scandals, negative publicity and falling sales have left diesel's future uncertain amid growing confusion among car buyers. Is this a short-term blip, or the start of an irreversible decline? AUTO examines the evidence and speaks to industry insiders to gain a clearer picture

# IS DIESEL RUNNING ON EMPTY?

The diesel engine was invented by Rudolph Diesel in the late 19th century. Early on, it established itself as the fuel of choice for heavy goods vehicles and industry thanks in large part to the engines' robustness, high torque outputs and efficiency. In modern times, diesel has rapidly increased its share of the European passenger car mix, partly because diesel vehicles burn on average 20 per cent less fuel, partly because enhancements in technology have transformed levels of refinement and performance far beyond the coarse and sluggish non-turbocharged diesels of the 1970s, '80s and sometimes even the early 2000s.

Crucially, CO<sub>2</sub> emissions of diesel cars are on average 20 per cent lower than petrol equivalents, and CO<sub>2</sub> is linked to climate change. That's why European governments incentivised their take-up over the last two decades with attractive tax breaks linked to each car's CO<sub>2</sub> output. With all these factors coalescing, diesel began outselling petrol across Europe from 2009.

However, the European Automobile Manufacturers' Association (ACEA) reveals diesel fell from 50.2 per cent of new car registrations in EU-15 countries in 2016 to 46.3 per cent in the first half of 2017. In some markets, the trend appears to be accelerating: UK diesel sales tumbled 22 per cent in September, 30 per cent in October.

The reversal can be attributed to several, sometimes overlapping, factors. Prices for both petrol and diesel have fallen, thanks to the cost of a barrel of crude oil dropping from \$158 in June 2008 to just \$55 in November 2017; UK petrol

costs that generally stayed above £1.30-a-litre between 2011 and 2014 today average £1.17 according to the RAC Foundation. The running costs of petrol cars now seem more palatable.

#### SCARE STORIES

Negative publicity has swirled around diesel, with city centre air-quality scares caused by high levels of nitrogen oxide (NO<sub>x</sub>). NO<sub>x</sub> is emitted in higher quantities by diesel vehicles – particularly older diesels – than petrol and linked to photochemical smog, which causes breathing difficulties.

Notable cases include the UK's highest court demanding immediate action to cut NO<sub>x</sub> levels, which have breached limits in 16 cities since 2010. In late 2016, the mayors of Paris, Madrid, Athens and Mexico City all pledged to ban diesel vehicles by 2025.

Euro 6 emissions standards were introduced from September 2014, and have reduced the NO<sub>x</sub> that new diesel passenger cars sold in Europe can legally emit from Euro 5's 180mg/km to 80mg/km (a figure that remains higher than the 60mg/km stipulated for both Euro 5 and 6-certified petrols). Nonetheless, plenty of older cars remain in use, and the threat of higher charges for diesels clouds the issue for owners and potential buyers of both new and used diesels. Will any future penalties target new, cleaner diesels as robustly as older cars? Will residual values be affected? Will a buyer lock in to a three-year lease, only to face higher taxation or diesel prices?



The Jaguar ePace utilises the latest generation of Jaguar Land Rover's Ingenium diesel engine, which has received heavy investment.

Longer-range plans include announcements by the UK and French governments to ban the sale of all conventionally powered cars from 2040. Volvo and Jaguar Land Rover have also committed to the electrification of all new models from 2019 and 2020 respectively, though the announcements ultimately left room for the hybridisation of internal-combustion engines. Both these plans affect diesel and petrol vehicles equally, but the push for cleaner solutions came amid a focus on diesel particulate emissions.

Despite the negatives, diesel is likely to remain a key focus for car manufacturers for years to come. It simply has to. EU targets demand each manufacturer's fleet should average no more than 95g/km CO<sub>2</sub> by 2021. Yet the ACEA revealed that the recent 152,323 decline in European diesel car sales was offset by buyers switching to petrol models, which typically emit 20 per cent greater CO<sub>2</sub>. Market penetration of Battery Electric Vehicles (BEVs) – with zero exhaust emissions if harder-to-quantify pollution associated with electricity production – remains low at 1.3 per cent, hybrids faring little better at 2.6 per cent.

As Daimler boss and ACEA president Dieter Zetsche explains: "We have a very positive stance on the future, not despite diesel, but because of it... The latest generation of diesel vehicles is crucial for our continuous efforts to decarbonise road transport, they are the most effective mass-market solution today, because they emit 15-20 per cent less CO<sub>2</sub> than equivalent petrol vehicles. As long as the minimal market share of electric vehicles does not significantly and rapidly increase, diesel remains the most effective lever to achieve climate goals in the near future. Therefore any rash move away from this technology will make it more difficult for our industry to meet the European Commission's targets."

BMW boss Harald Krüger strikes a similar tone: "Future mobility will definitely depend on state-of-the-art diesels as well [as electro-mobility]. Modern, efficient diesels ensure lower CO<sub>2</sub> and therefore make an important contribution to protecting the environment. In addition, diesels

## 'Modern, efficient diesels ensure lower CO<sub>2</sub> and therefore make an important contribution to protecting the environment'

HARALD KRÜGER, BMW



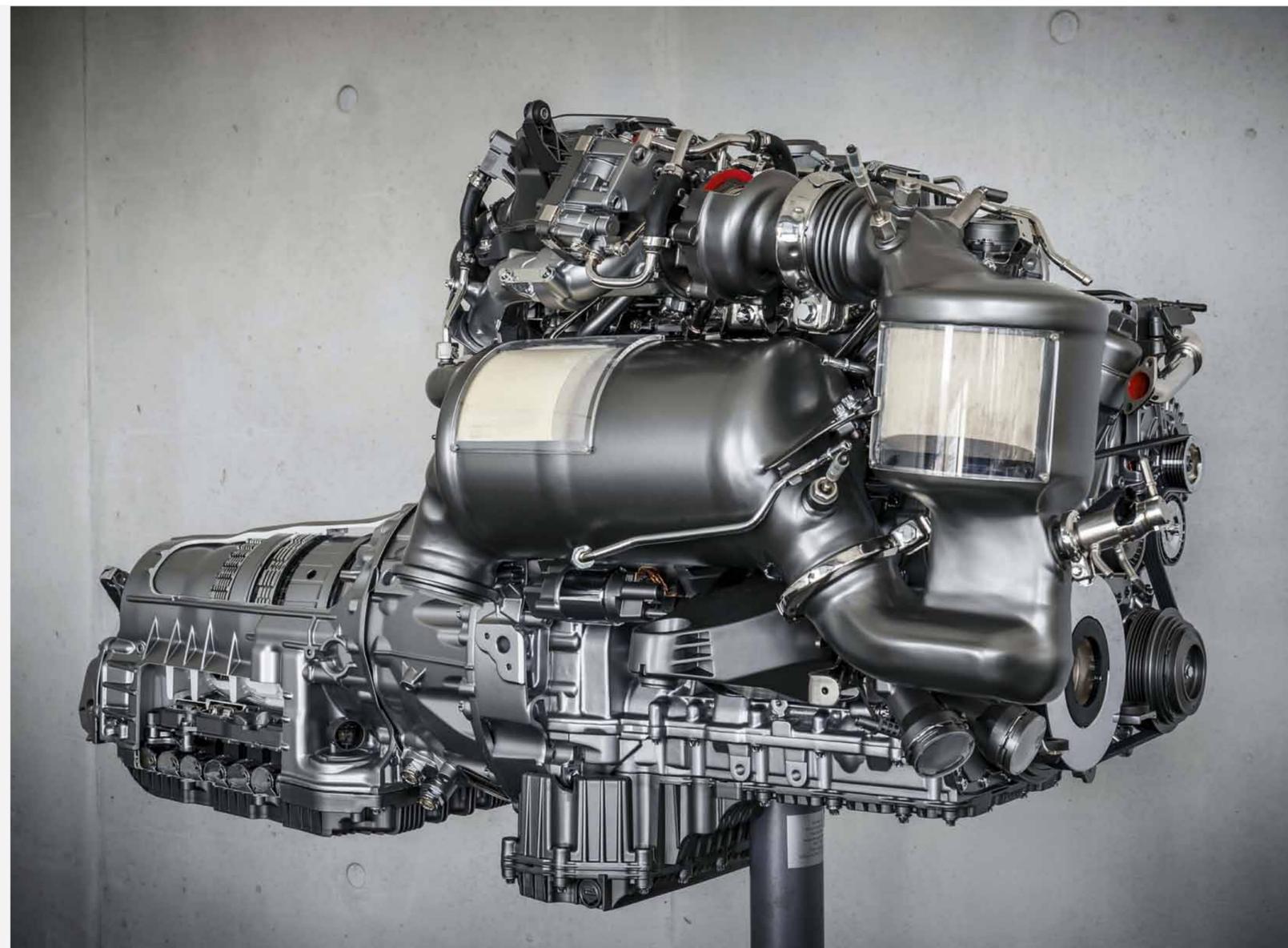
Daimler boss Dieter Zetsche says diesel is still the most effective option when it comes to meeting environmental targets.



BMW's Harald Krüger believes the immediate future for the car industry depends on diesel as well as electro-mobility.



Amid all the confusion, JLR MD Jeremy Hicks says diesel power remains the most popular choice for its European customers.



Mercedes' new four-cylinder turbodiesel engine is a flexible design that is being used across the model range.

are just as clean or even cleaner than petrol engines. This can certainly be said of particulate, hydrocarbon and carbon monoxide emissions, meaning that three of the four major diesel pollutant issues have been resolved and no longer have any adverse effect on air quality."

#### THE WAY FORWARD

Car companies have been investing in smaller, cleaner diesels for some time. BMW, for instance, began making huge gains a decade ago with its Efficient Dynamics technology, which employed such ideas as active aerodynamics and part-time battery charging to reduce fuel consumption and CO<sub>2</sub>.

Jaguar Land Rover invested £500 million in a new UK engine manufacturing plant in 2014,

to produce its new modular Ingenium petrol and diesel engine family. Engines available today feature roller bearings on the camshaft and balancer shafts, an offset crankshaft and variable oil and water pumps, reducing friction by around 17 per cent. A split cooling system further ensures engines achieve optimal operating temperature faster, improving efficiency, particularly during short urban journeys.

The four-cylinder Ingenium turbodiesel in Land Rover's new Discovery saves weight, delivers comparable performance to a previous-generation V6 and emits 22 per cent less CO<sub>2</sub> at 159g/km. JLR has also ensured all Ingenium engines are compatible with future hybridisation, in line with its plans for 2020 and beyond; the company claims to have invested billions on researching and developing new hybrid technologies.

UK MD Jeremy Hicks says that while JLR petrol sales have increased, diesel remains king: "Petrol sales have increased because we have more petrol engines in our range than ever before. These new options give our customers more choice but account for only 10 per cent of our range – new diesel cars remain the most popular choice for our European consumers, with diesel often being the most affordable, practical option."

The nub of the diesel problem can be traced to the divergence between diesel emissions recorded in official test laboratories and those recorded in independent investigations.

In 2013, non-profit organisation the International Council on Clean Transportation (ICCT) commissioned West Virginia University to test Volkswagen diesels sold in the United States. ▶



**'These technologies put diesel on a par with petrol and means they no longer make a significant contribution to city particulates'**

JEREMY HICKS, JAGUAR LAND ROVER

Volkswagen seemed to have engineered its four-cylinder diesel to meet stricter US NOx emissions standards where others had failed, and promoted the Clean Diesel Jetta as "one of the cleanest and most fuel-efficient engines on sale in the USA". That quickly changed from May 2014, when the ICCT revealed that models tested emitted far more NOx than allowed under law.

The dieselgate scandal had begun, and the fallout was wide-ranging. VW admitted fitting 'defeat devices' to 11 million cars worldwide – allowing them to covertly recognise laboratory test procedures – and ongoing costs associated with the scandal have topped €16 billion.

Dieselgate spread from the US and has engulfed other makers. Recently VW, BMW and Mercedes-Benz announced the recall of 5.3 million diesel vehicles for a software update that reduces NOx output by almost a third, despite the makers claiming to meet all NOx emissions standards.

It was symptomatic of a wider problem linked to the NEDC (New European Driving Cycle) test, which was conceived to create consistent test conditions for every new car on sale in Europe. When the French government carried out comparable laboratory tests, it found 12 of 52 diesel cars breached either 'Euro 5' standards

(introduced in September 2009, with diesel NOx limits of 180mg/km) or 'Euro 6' standards (from September 2014 onwards, with diesel NOx at 80mg/km). Worse, when these test procedures were replicated on track with NOx allowances increased fivefold to account for more demanding conditions, 21 models failed. UK and German governments conducted similar studies, again finding widespread compliance problems.

**FUTURE TESTS**

The fall-out led to the rapid introduction of two new European emissions tests from 1 September 2017, replacing NEDC. The first is the Worldwide Harmonised Light Vehicle Test Procedure (WLTP), which continues to be conducted in laboratory conditions, but subjects cars to longer, more dynamic procedures with a greater range of engine speeds, loads and gear changes based on half a million miles of real driving data.

The second, more ground-breaking test is the Real Driving Emissions (RDE) test. RDE involves cars being fitted with portable equipment and driven in both everyday and more extreme conditions. The tests will be phased in gradually, but by 1 September 2018 all new cars sold

**Mercedes' new four-cylinder turbodiesel is being produced at its engine plant in Küsslede, Germany.**

in Europe will be subject to WLTP, with RDE mandatory by 1 September 2019. Analysis by JATO Dynamics Ltd confirms the new tests will make achieving the new fleet-average CO2 limits of 95g/km by 2021 even harder – a BMW X5 30d that emitted 156g/km on the NEDC emits 183g/km on WLTP, a 17 per cent increase.

The standards themselves are perfectly achievable for modern diesels to meet, however. Mercedes-Benz has invested around €3bn in a new generation of internal-combustion engines, including the new four-cylinder turbodiesel in the 2016 E-class. The modular design can be scaled up and down in size and power, and is being aggressively rolled out across model lines.

Codenamed OM 654, the engine is designed to meet future RDE standards, achieves 3.9 litres-per-km (72mpg) and 102g/km in the E220d E-class, and is said to boast NOx emissions below the 80mg/km limit, even during RDE testing. Mercedes attributes this to a stepped-bowl combustion process, multi-way exhaust gas recirculation and new exhaust after-treatment technologies. The latter is known as Selective Catalytic Reduction (SCR) and is configured directly on the engine rather than just ahead of the exhaust's catalytic converter, as was the case. This makes the system more effective across a broader range of operating temperatures and driving styles. The compromise – like all Euro 6 diesels employing SCR – is the need to fit a tank of Diesel Exhaust Fluid, consumed on average at a rate of one litre every 500 miles; if it runs dry, the car must be programmed not to start.

SCR and existing Diesel Particulate Filters are enough for Jaguar Land Rover's latest engines to pass the new tests, according to Hicks. "It's thanks to technologies like these that Jaguar Land Rover has reduced CO2 by 25 per cent, NOx by 84 per cent and particulates by 95 per cent in the past decade. This puts diesel on a par with petrol and means they no longer make a significant contribution to city particulates," he says.

The costs of meeting the regulations is easier to amortize in larger, more expensive cars, but harder in more affordable compact models. In February, *Autocar* reported that VW would cease production of a three-cylinder turbodiesel engine fitted to the Polo, and had abandoned plans for a 1.5-litre four-cylinder diesel in favour of a petrol engine with mild hybrid technology using a 48-volt energy-recuperation strategy. Off the record, one engineer told AUTO that it's this rise of 48-volt technology and hybridisation in petrol models that could really entice consumers away from diesels. "Once that becomes mainstream, and you get petrol refinement, good performance and great mpg and CO2, why buy diesel?"

In the long term, there's no doubt that the combustion engine is under threat, but that's as applicable to petrol as it is to diesel. In the medium term, it appears petrol will continue to increasingly challenge diesel, but there's life left in Rudolph Diesel's invention yet. The technology is there, but the key is consumer confidence and clarity from European governments on future legislation. ◀



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Li Shufu:  
from humble  
photographer  
to automotive  
giant in just  
two decades.



TEXT

JUSTIN HYNES

In many ways the world of automobile production is akin to a member's club, a reserve controlled by an inner circle for which the great lexicographer Samuel Johnson might have coined the word 'clubbable' – a group rich in privilege, in old world view and longevity. It's a club that rarely acknowledges claims for new membership, viewing the 'me too' efforts of upstart tech brats and emerging market entrepreneurs as slightly vulgar. And in the vast majority of cases, which briefly blossom and rapidly fade, that viewpoint has proved valid.

However, over two decades of enormous change in the motoring landscape a number of claimants have emerged for whom membership of so elite a club is not fanciful but is becoming increasingly hard to ignore – the core Korean manufacturers, who have taken on the might of the Japanese industry and won, Tesla's Elon Musk maybe and perhaps most significantly of all, in terms of domestic volume sales alone, China's Li Shufu.

Once billed as "the biggest car maker you've never heard of" by a UK finance blog when he bought into the company that makes London's iconic black cabs, Mr Li has over the past 20 years built his Geely company into an automotive giant encompassing not just the domestic companies that sell an increasingly desirable range of cars to Chinese drivers, but also Sweden's Volvo brand, Malaysia's Proton and, by default but with definite design, Britain's Lotus sports car company.

It's a portfolio that on the surface may appear scattershot, playing to oddly disparate market sectors, but for Shufu it's part of a pattern that not only provides for an ever-growing global footprint but also a future vision of sustainability and automation that he believes is crucial to embrace.

His status as perhaps one of the world's next great car makers is a far cry from his humble origins, however.

## 06 'There's no magic in car production'

Twenty years ago the Chinese auto industry lacked know-how, technology and credibility. One man has sought to change that, Geely's *Li Shufu*. And having brought world standards to bear on Chinese design and production – and returned Volvo to huge success – he's now seeking to shape the way we drive in the future...

Shufu began his career as a budding photographer in his hometown near Taizhou City in Zhejiang Province, using a 100Rmb graduation gift from his father to buy a bicycle and a cheap camera. The money made from photographing tourists at beauty spots was invested in a small studio. Growing frustrated with the cheap camera he was using, he built a better one, and then built the studio equipment.

He moved on to building refrigerator parts, and then motorcycles in 1993 and eventually, in 1997, automobiles, with Geely (a word meaning auspicious in Mandarin) the first non-state-owned car maker.

The company got off to a stuttering start and as with many Chinese companies of the early 2000s sought simply to produce somewhat ersatz versions of existing designs. In a 2008 interview with Britain's *Financial Times* Li, riding a successful domestic wave, revealed that his company was in the process of building 42 distinct models, many loosely based on cars already found on the streets of western countries.

However, refinement came swiftly, largely predicated on what some might have termed an outlandish and others a bold vision for the development of his brand.

### TIME OF CHANGE

In 2008 following the global economic crash, Ford sought to offload a number of underperforming assets, Swedish car maker Volvo being one. The asking price was in the region of \$6 billion. By the time the market had collapsed almost completely and Li signed on the dotted line two years later, he'd acquired the company for a fee that would top out at approximately \$1.5bn. "I just felt that with Ford owning all these brands, at some point it could give us an opportunity to get one of them, and Volvo was my favourite," he said at the time.

Since then Li has transformed Volvo, not only leveraging its expertise to inform the development of increasingly marketable Geely products in China, but also reframing Volvo as a premium brand manufacturing technologically-advanced cars built on the bedrock of its reputation for safety research. "Particularly in China, I think a lot of people start to realise: OK, what are the things that they truly should value?" he said of Volvo's value to Geely. "That's something that fits perfectly well with what Volvo is offering."

Of the cross-pollination that now exists between Geely and its other brands he also said: "We will unlock significant benefits across our portfolio by sharing both technologies and next-generation vehicle architectures. I am confident these synergies can be achieved while preserving the separate identities and strategic autonomy of our different automotive brands."

The synergy has resulted in dramatic improvements in sales for both. Last year, buoyed by improved product design and engineering following its purchase of Volvo, Geely's China

**'I felt that with Ford owning all these brands, at some point it could give us an opportunity to get one of them, and Volvo was my favourite'**

sales grew 50 per cent to 766,000 vehicles, powered by models such as the GC9 and Boyue, as well as small cars featuring Volvo technology. For 2016, net profit more than doubled to 5.1 billion RMB (US\$741 million). The figure is set to rise 37 per cent to 7 billion RMB (US\$1bn) this year and sales for 2017 are set to exceed 1.2 million units.

Export sales still remain a weak spot for Geely Auto. In the first half of this year the company sold just 3,848 units, down 64 per cent on the same period last year.

However, selling Geely cars in Europe and the US does not appear to be an immediate goal for Shufu – that is an assault to be conducted with other brands as the spearhead, brands such as its connected urban millennial-focused LYNK & CO,

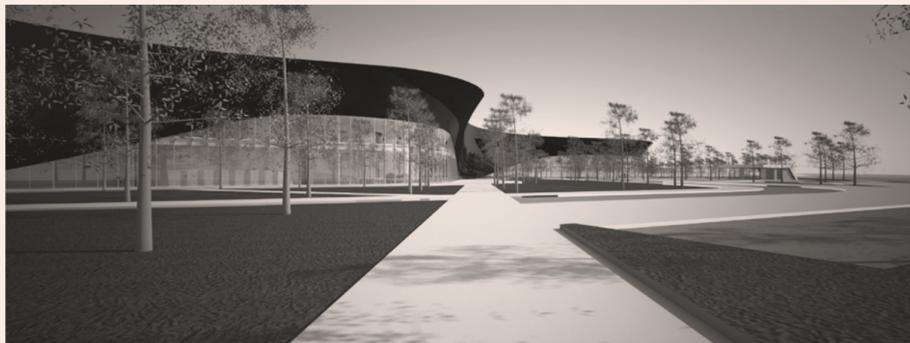
**Geely's Emgrand GX7 has helped to boost vehicle sales at home, which grew by 50 per cent in 2016 and are set to exceed 1.2 million units this year.**

at the higher end Volvo and at its most niche by Shufu's most recent acquisition, Lotus, purchased as part of a deal to acquire Malaysia's Proton brand.

And Volvo has been a huge success story for Li. This year remains on track for a fourth consecutive year of record sales. In the first 10 months of 2017, global retail sales amounted to 461,313 cars, up 8.6 per cent compared to a year ago.

Sales in China, Volvo's largest market, continued to increase rapidly. In October alone 10,744 cars were sold in the market, up 29.5 per cent compared to the same period last year. The Asia Pacific region was Volvo's fastest growing region in October, up 24 per cent compared to 2016. ▶





For Shufu, success on such a scale is far from complicated. In a round table interview in Shanghai in December 2016 he said: "The formula is very simple. We just produce a good product for our users and let our users experience the value of that product. There's no magic in car production. Everything goes back to fundamentals."

"The technology, quality, performance, design, how safe the car is, whether we offer customers good value for money and whether customers can experience very good service throughout the process," he continued. "It is as simple as that. If we can reach or exceed the expectations of our customers, I think we can be successful. Product is the most important success factor in this industry."

#### FUTURE FOCUS

And it is the future of that product that Shufu is turning his attention to. As the automotive world shifts gears from fossil fuels to alternative energies and as autonomous mobility research continues apace, Shufu is taking steps to position his brands accordingly.

Earlier this year Volvo announced that every car it launches from 2019 will have an electric motor, placing electrification at the core of its future business. "This is about the customer," said Volvo CEO Håkan Samuelsson. "People increasingly demand electrified cars and we want to respond to our customers' current and future needs. You can now pick and choose whichever electrified Volvo you wish."

Volvo is to launch five fully electric cars between 2019 and 2021, three of which will be

Volvo models and two that will be high-performance electrified cars from Polestar, Volvo Cars' performance arm.

In the months since, Volvo has taken its Polestar sporting and performance offshoot and developed it into a standalone brand. And Shufu has backed the strategy with heavy finance, to the tune of 5 billion RMB (USD \$756m) to support the initial phase of Polestar's product, brand and industrial development.

The investment will be used, among other things, to establish a Polestar manufacturing facility in Chengdu, China, where it will spearhead the development of new technologies and enhance Volvo Cars' leadership within electrification and connectivity.

Polestar's first production car, the Polestar 1, is a 600bhp two-door, four-seater hybrid coupé. It has a pure electric range of 150km – the longest full electric range of any hybrid car on the market. The electrified performance car will go into production in Chengdu in mid-2019 and will be closely followed later that year by a smaller vehicle named Polestar 2.

Shufu's ambition also extends to autonomous cars. Writing in the *Wall Street Journal* last year of China's need to embrace autonomy, the Geely boss said: "This is not a matter of commercial advantage. It is more important than vehicle autonomy being a competitive selling-point, as cruise control or SatNav was briefly at the end of the 20th century. To be effective, automation must be ubiquitous. This is about a societal benefit. So there needs to be societal co-ordination to deliver the best results."

**From top: the planned Polestar manufacturing facility in Chengdu, China; Li Shufu acquired Lotus as part of a deal to buy Malaysia's Proton brand; with the future in mind, Geely also owns connected automotive brand LYNK & CO.**

"If we get this right, China might fulfil the 2015 forecast by Boston Consulting Group, which predicted that our country could become the world's leading market for automated vehicles within 20 years. That will not be achieved through closed platforms. It requires cross-industry cooperation with inter-operable systems, as already happens in other sectors such as aerospace or IT. It will require intelligent traffic management systems, and rules and regulations for the transition period in which automated vehicles will interact with manually-driven cars.

"The benefits are clear. In an era when 95 per cent of all accidents are related to driver error, automated driving can save lives. Cars that drive themselves more efficiently will also require less fuel. Ultimately, they can be connected together electronically, potentially transforming sectors such as taxi operations and freight transport.

"Of course, there will always be models available for those motorists who love their performance cars and who cherish the freedom of the open road. But the real performance that we have to address is outside on the congested, polluted and sometimes hazardous roads. That is where vehicle automation – with the right policy support – could help re-open our roads."

While it's not an uncommon view within the motor industry, the pace at which Shufu sees such change being delivered is, and just as in two decades the quiet, media-shy photographer has built a burgeoning global powerhouse, perhaps his vision for alternative energies and futuristic forms of mobility is also about seeing the big picture before anyone else. ◀

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06

TEXT  
/  
PINO ALLIEVI

The Brembo name is synonymous with providing high-end stopping power to some of the world's most exclusive automotive brands, but according to company president *Alberto Bombassei*, it's all born out of a passion for track competition

# BRAKING POINTS

His office looks out over the countryside. Green in summer, yellow in autumn and grey in winter. Further away are the mountains, which by the end of October are beginning to turn white. Alberto Bombassei has always lived in this heavily industrialised corner of Lombardy, Italy, but with unspoilt countryside just a few minutes drive away. Mountains, rocks, waterfalls and endless vistas. He's from Bergamo, a chocolate-box town of well-educated people, where art plays an important role - tough people, pure and meticulous, with a mentality that has something of the German about it, sometimes maybe a bit too much so.

Bombassei's Brembo takes its name from the river that runs near the factory that puts the brakes on the world. No other company in this business produces as much as it does, with over 9,000 employees in factories across 16 countries, including China, USA, India and Brazil. It supplies all the giants of the car and motorcycle industry. The head office is in Stezzano, very close to Bergamo, in an area known as the Red Kilometre, created by Alberto Bombassei, which is home to all sorts of companies and even a

branch of the University of Bergamo. They work together, ideas buzz around a technological centre, unique in Italy.

Bombassei was born in 1940 and has a welcoming smile, as befits an entrepreneur with roots in this area. He's a man who doesn't say much, but one that has turned Brembo into an industrial miracle. But he doesn't overplay that, almost as though he's scared of being seen as boastful. The residents of Bergamo are known for being self-effacing and he conforms to the stereotype. It's hard to get figures out of the president. But he does let slip that investment in the 400-person R&D department ran to 118 million Euros in 2016, with a global turnover of 2.279 billion Euros. Its value on the Stock Exchange has gone up by 770 per cent over the past five years, which means the shareholders are happy.

Among the directors of the company are his daughter Cristina, her husband Matteo Tiraboschi, who is Bombassei's number two "and one day it will be his job to take the reins." Bombassei's son Luca, meanwhile, works as an architect in Milan - "he's happy doing that, which makes me happy as it's good that he has chosen his own path."

## TRACK TESTED

Inside the classic glass and concrete structure designed by Jean Nouvel, it feels like a cross between a successful millionaire's home and a sophisticated First Class airport lounge. In Bombassei's office, there's an extensive library from which one can deduce he is interested in just about everything. It's a relaxed environment, ideal for quiet reflection, born out by the fact that 1,900 patents have come out of it, evident proof of creativity at the cutting edge of competition. Today, it is one of the biggest Italian companies and it all began through sport, which is something Bombassei smiles about before telling the story.

"I have always loved competition and right from when I was a kid I took part in hillclimbs with a Fulvia HF. I'd get the first editions of *Quattroruote* and *Autosprint* and feast on those. ▶

Alberto Bombassei splits his time between his hugely successful Brembo company and an active role in Italian politics.



Bombassei was nervous about meeting Enzo Ferrari, but formed a good relationship with the famed car maker.



Brembo started as a small firm making mechanical components in the 1960s before switching to brakes – it now has factories in 16 countries.

**‘Sport is an exceptional and irreplaceable testing ground for companies like ours. Competition is fundamental to the development of Brembo’**

I was working in the metal working company started by my father and uncle in 1961; we made mechanical components for various customers, including Alfa Romeo. Then, one day, a truck tipped over near our factory. It was transporting Dunlop disc brakes destined for Alfa Romeo, the first company in Italy to use them.

“At some point, Alfa asked us if we could try and recover some of the load. We did it, while taking a close look at the items that had come from England. And we realised that, with our technology, we could do better. Alfa listened to what we had to say and trusted us and that was how it really all started. It was 1964 and we had around 30 employees. A few years later, we were involved in competition, with Moto Guzzi and Suzuki Italia, who were taking part in endurance racing. Then it was time for Ferrari. Sport is an exceptional and irreplaceable testing ground for companies like ours. You get used to the highest possible levels of quality and efficiency, and working to a tight time scale. Competition is fundamental to the development of Brembo.”

Maybe Brembo would not be what it is today if its path hadn't crossed that of Ferrari.

“Definitely, I was at Ferrari very often to talk about supplying our discs and I'd developed a good relationship with Piero Ferrari. But one day I asked if it would be possible to at least have a brief word with his father. He smiled at me and arranged a meeting for the following week. That was in 1975.

“The days leading up to the meeting were a torment and I couldn't sleep the night before. I thought Enzo Ferrari was a severe person, someone unapproachable. But I found a man who was open and took a shine to me, treating me like a son. He gave me a chance and we managed to produce parts that worked well immediately in testing at Fiorano. The drivers were Lauda and Regazzoni. Clay was lead-footed, an old style warrior. Niki was more poised and his analytic ability, which one could compare to today's computers and simulators, would be fundamental to the development of Brembo brakes on the Ferrari. He was incredible!”

In 1981 at Monaco, Gilles Villeneuve won using Brembo aluminium callipers, almost on their debut.

“That was so satisfying! He had a brutal driving style, but he was also a great test driver who understood the technical side. Don't forget, alongside the Ferrari drivers was the engineer, Mauro Forghieri, who worked with us and pushed forward the development. There's always pressure in Formula One. It's a discipline where mistakes are not contemplated – if you make one, you are ostracised. I've always liked that sort of challenge.”

And Michael Schumacher?

“At the time he showed up at Ferrari, the cars had a lot of power and were very fast. Michael

braked very violently. At this time, braking had become more physical, because you had to step on the pedal with a force of 60 kilos. Schumacher was daring enough to go to the limit, hitting the brakes harder than his rivals without ever locking up the wheels: he had an amazing sensitivity. He followed our work closely, understanding it and making suggestions.”

#### STOPPING POWER

But what of Brembo's relationship with today's F1 teams? What is that like given that the company supplies seven of the 10 outfits?

“Good, because we have always respected the confidentiality of each one of them. We are Italian and the first team with which we worked was Ferrari. But that has not impeded us from also supplying Mercedes. Actually, Mercedes is our number one customer when it comes to road cars. The important thing is to act correctly. Would you believe that, in the early years, we knocked on the door at Fiat without even getting a conversation with them.”

Brembo has always been welcomed with open arms in Germany, perhaps because of the affinity mentioned earlier.

“That's true,” says Bombassei. “Twenty-five years ago came the first approach with Porsche and they threw open their doors to us. There was an immediate understanding and it was clear that in Stuttgart there was an incredible car culture mixed with a great passion. We produced our famous red callipers with them, which were



Gilles Villeneuve en route to victory in a Brembo-shod Ferrari at Monaco in '81. Above: the Brembo boss drives a Porsche on a daily basis but has just bought his first Ferrari.

married to alloy rims that had plenty of space to show off the discs. It immediately became fashionable. Nicely designed and visible callipers and discs became an added value for Porsche, later imitated by others. A long time ago, in the United States, there was a TV commercial with a woman washing her car and she said, 'look what a lovely car, it's got Brembo brakes.' And the advertisement wasn't even paid for by us! Today, all sports cars in the USA fit our systems.”

Is there a crossover from motor racing to production parts?

“I'd say almost completely. The effort we put in on the race track to gain a hundredth of a second per lap is transferred to the production parts to reduce braking distances for the end user. Otherwise, there'd be no sense in it.”

#### THREE HORSEMEN

Over the years Bombassei has interacted with three huge personalities at Ferrari: Enzo Ferrari, Luca di Montezemolo and Sergio Marchionne, so how would he describe them?

“Ferrari was like the Pope. His benediction

opened the doors to the highest level across the world. When Lauda won the title in 1975, Enzo Ferrari gave me a gold watch: look, I'm wearing it now, it's been on my wrist for over 40 years and I will never take it off, as it brings back memories that are close to my heart. Montezemolo put all his effort into Ferrari for 26 years. Kind and educated but woe betide making him lose his cool because he would shout like a madman and make the windows shake and I saw that side of him too. I got to know Marchionne through [Fiat President] John Elkann. He is open-minded and makes himself available. If you do something well, he acknowledges it, but if you don't, he goes into a rage and it's terrible to behold. He brought me onto the board of the FCA, which I left when I moved into politics. I have a cordial and occasionally confidential relationship with him.”

Last July, Bombassei was inducted into the Detroit motoring Hall of Fame...

“It was very gratifying and immensely emotional. It doesn't seem real to me to be there in company with the likes of Ferrari, Bugatti, Agnelli and Pininfarina. It's something that scared me, but made me proud.” ▶



Despite its long association with Ferrari, Brembo prides itself on having a good relationship with all the current F1 teams.



Bombassei describes his relationship with Ferrari boss Sergio Marchionne as "cordial and occasionally confidential".



Since 2013, Bombassei has also been involved in politics. Why? And how does he divide his time between Brembo and the Chamber of Deputies?

"I base myself in Rome for two or three days a week and the rest of the time I'm at the company. I felt I had to give something back to Italy, to contribute to its growth. I am passionate about it. For example, I am part of the Commission for Productivity, Commerce and Tourism and I feel I am one of the fathers of the 4.0 industrial project, which involves a change of direction for the country to grow. It's a revolution that will be embraced by those who have the will to do so. Those who don't understand run of the risk of closing down or getting smaller. We are already embarked on this and in the last year and a half, we have taken on 420 people, most of them young graduates. The world is changing at the speed of light and you have to be able to adapt."

**THE NEXT GENERATION**

On the subject of renewal, what does Bombassei think of the Tesla phenomenon?

"Tesla is a customer of ours and has fitted Brembo right from its very first car. [CEO Elon] Musk is a dreamer. We built a factory in Mexico to meet his demands, but it seems to me that his level of growth is less than expected. In the meantime, he is establishing a huge facility to produce the batteries. On the Stock Market,

Tesla is worth more than General Motors."

Like many captains of industry, Bombassei's day seems to last three times longer than anyone else's. So how does he do it?

"I am pretty much a creature of habit and have a normal timetable. I get up at 7.30am and I am in the office an hour later, and in the evening I'm often at a dinner or a meeting to tackle the problems confronting Italy. I am happy to do that, because I believe it's useful to talk with people and listen to their expectations and problems."

So what does he do in his limited free time? "I read the papers and some books on economics. I have a few historic cars and I've driven them in the historic Mille Miglia: a Mercedes gullwing 300 SEL, some Austin Healeys, a 1939 Triumph.

"My daily car is a 911 or a Porsche Cayenne, which is much more comfortable. But for the first time I've ordered a Ferrari, a Tour de France, which arrived a few days ago."

Given that Bombassei has spent his life in the car industry, has he ever considered building one? "We did make a Brembo with four electric motors - one per wheel, including the brakes - based on a Fiat 500 Abarth chassis as an experiment," he recalls. "It was on display at the Frankfurt motor show four years ago. Some of the ideas used on this prototype were taken up by others, which pleased me. It was a shock tactic, but Brembo's skill is in slowing down cars, not in building and selling them on the market." ◀



Bombassei presented FIA President Jean Todt with an award marking his entrepreneurial and sporting successes on a visit to Brembo's new showroom earlier this year.

**'I felt I had to give something back to Italy, to contribute to its growth. I am passionate about it'**



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06

# HARNESSING CHILD SAFETY

Shocking figures revealing the number of child fatalities in traffic accidents around the world have prompted a successful campaign, backed by the FIA Foundation, to promote the use of car seats

TEXT / KATE TURNER

The FIA Foundation is working with governments and auto clubs around the world to promote the use of Child Restraint Systems.



Every parent wants the best for their children; to protect them and keep them safe from danger the best way they know how.

For most of us, baby and child car seats, known as Child Restraint Systems (CRS), are an integral part of any family's transport. Seatbelts, air bags and CRS are so ubiquitous – habits that we barely think about – that it can be difficult to visualise a world without them.

But what does a world without CRS look like? Globally, a child passenger dies in a car crash every eight minutes. That's more than 65,000 children killed while travelling in cars each year. A baby is 90 per cent more likely to die in a traffic crash without CRS, a toddler 80 per cent. It has been estimated that in the first 50 years of CRS use, over one million children's lives were saved.

So why would any parent knowingly put their children at risk? The answer is simply that they do not know.

Education about child safety on the road and in the car is a shared responsibility. That responsibility runs right from the top by governments building legislation and informing families, to the automobile industry creating affordable and safe equipment, to parents applying their knowledge, right down to children learning the habits that will stay with them for a lifetime. It may take a village to raise a child – as the popular proverb would have it – but it takes a country to provide protection.

Shockingly, just 32 per cent of the population worldwide is adequately protected by appropriate legislation on child seats. Only 98 countries have legislation and, incredibly, only 23 per cent of

these countries have adequate enforcement.

Even where there is legislation and a high awareness of CRS, parents still may not be protecting their children as well as they believe with common mistakes putting them at risk.

The question, then, is how to enact behavioural change across the globe, to help every parent secure their child no matter where they live or how much they earn.

This change is slow to bring about and can only happen with the active participation of governments, expert voices such as automobile clubs and by raising public awareness of the true benefits of CRS.

## CULTURAL CHANGE

Leading the way in road safety for developing countries, Latin American NGO Fundación Gonzalo Rodríguez, recognised that children as road users had been largely neglected across the region. Launched in Uruguay in 2008, the 'EDU-CAR' child seat campaign was supported by international agencies such as the FIA Foundation and the World Bank Road Safety Facility, and was carried out in collaboration with the Uruguayan National Road Safety Agency, municipalities and enforcing bodies.

María Fernanda Rodríguez, President of Fundación Gonzalo Rodríguez, explains: "When we realised that the word 'child' was not included in our National Traffic Act, we understood the vulnerability our children were exposed to. We defined a plan that ended up becoming a huge challenge: to have children included in our regulations, promoting a strong cultural change to create the conditions for safe mobility.

"We were very fortunate to have the technical and financial support of the FIA Foundation, without which it would have been hard to achieve the improvement of regulations not only in our country but in other countries in the region, and build interest from governments and the health and education sectors, as well as companies working in this area. Although it wasn't easy, the experience has enabled more children in Latin America to travel safely."

Through research, training and raising awareness, the Fundación pushed the mandatory use of CRS up the public agenda until, finally, in 2012 legislation on CRS was passed.

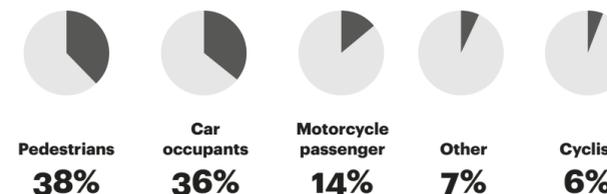
Advocacy to promote child safety is the key first step to promoting safe journeys for children. Automobile clubs globally are building CRS awareness among governments, stakeholders, industry and the public to reach a critical mass and bring forward child safety legislation.

This year has seen huge success for this work as both Mexico and the UAE adopted CRS legislation following an advocacy campaign through their auto clubs using the FIA's 'Toolkit for child safety in cars'.

The Toolkit is part of the FIA's road safety programme funded by the FIA Foundation and is built on the principle that every country can improve its CRS use. This digital advocacy and

## CRS and Road Safety

EVERY YEAR  
**186,300**  
CHILDREN AGED UNDER 18 DIE IN THE WORLD AS A CONSEQUENCE OF ROAD TRAFFIC ACCIDENTS  
36% of those killed were occupants in a four-wheeled vehicle



### LEGISLATION: COUNTRIES WITH SPECIFIC REGULATIONS ON CRS

96 countries have a specific act on CRS use



**⌚**  
A CHILD DIES EVERY **8** minutes in a car accident

### CHILD RESTRAINT SYSTEMS (CRS) REDUCE THE CHILD PASSENGER'S DEATH RISK BY:



EVEN IN COUNTRIES WITH HIGHER RATES OF CRS USE  
**60-70%** OF PARENTS MAKE MISTAKES WHEN USING THE CHILD SEATS

Sources: Safe Kids Worldwide (USA data) and CASPER Project (European data).

campaigning tool was disseminated to member clubs involved in advocacy work on child safety.

Designed to serve as a centralised resource database, the Toolkit provides materials and methodology for conducting surveys, a practical manual for advocacy as well as visual materials to promote CRS use. Developed for five different levels, depending on the legislative situation in a country, the kit runs from Level One for clubs operating where there is no CRS and seat belt law, through to Level Five where a country has strong legislation and enforcement.

Seven pilot projects (in Belarus, Chile, Japan, Mexico, Paraguay, United Arab Emirates and Uruguay) were started in 2016 at a range of levels to help clubs use Toolkit materials, promote regulatory reforms and raise public awareness. Belarus and Chile have poor enforcement and low CRS use, while work in Japan, where use is widespread, focused on providing specialised information to engage consumers to identify common mistakes.

These Toolkit pilots demonstrate the very real way member clubs can enact change, says Andrew McKellar, FIA Secretary General for Mobility: "The FIA firmly believes that the FIA Global Program for Child Safety can make a real difference. Successful advocacy initiatives implemented by the FIA clubs under this global framework is proof of how the power of working together can result in significant regulatory changes and enhanced public awareness."

Auto clubs around the world are changing how parents protect their most valuable possessions: their children. We have the technical knowledge, the means to influence and the tools to communicate the vital importance of Child Restraint Systems. Every country can do more, and by sharing resources and best practices we can accelerate the speed at which legislation is being developed, enforced and communicated. Working with governments, we can build a future where every parent is confident that their child will have a safe car journey. ◀

## CASE STUDY: BELARUS

The FIA's Toolkit programme was piloted in Belarus to great effect

Belarus saw the international launch of the Toolkit programme in November 2016 and has been working on its implementation for the past year. The mandatory use of CRS was introduced across the country in 2015 for children up to the age of 12. However, there have been barriers to the effective implementation of legislation, namely a lack of public awareness of correct CRS use, a lack of training for experts and the financial burden on lower income families.

The Toolkit and activity programme was implemented by the Belarus Auto Moto Touring Club (BKA) with the support of state authorities, UNICEF and private sector partners.

Surveys found that just half of parents who drove used CRS correctly and 23 per cent actually viewed compulsory CRS legislation as a negative step.

Some of those with CRS in their cars were not necessarily using them at all – paying lip service to the legislation. The pilot used a range of media activity to engage with the public about the legislation. This included presentations for journalists and online guides. Across Minsk and regional cities, parents received hands-on, practical help, ranging from Road Police talks at work places, pre-natal talks, on-street observations and interventions, and drop-in street stalls. BKA also introduced a CRS donation programme across Belarus and Moldova to allow families struggling financially to access CRS from those parents who no longer needed them.

Irina Potyagina, Director of BKA, says: "We kept being asked where to find all the information in one place. We also found that Belarusian Road Police, who inspected cars and enforce the legislation, didn't know either. "The practical information about CRS and how to use them showed that we needed to put the information in a brochure. From this range of activities, we have seen a really great result."

BKA's initial reporting indicates that in just one year, child injury in cars has been cut by 31 per cent and CRS use has increased to 90 per cent.



Concepts such as Mercedes' IAA (Intelligent Aerodynamic Automobile), first shown in Frankfurt in 2015, feature simplified user interfaces that rely on high-resolution touch screens, eye-tracking and gesture control.

The morning work routine of the 21st century would appear quite alien to a visitor from even a few decades ago. There are overnight emails to read, perhaps also texts; replies to dictate, calls to make, some to answer, a whole morass of interaction to get through before starting the real work of the day. Then you find a parking space, pull on the handbrake and go into the office.

While the physical act of driving has not greatly altered in the last 50 years, the 21st century has seen the wider experience changed beyond recognition. It is the secondary functions of the vehicle through which progress is demonstrated, and upon which the modern battle for sales depends. Car-as-office-extension is one scenario, but car-as-living-room is equally applicable. Ever greater personalisation makes the car a living/working space, complete with communications and enhanced entertainment connectivity.

This brings with it problems. A vast amount of information is being hurled at the driver, who also has to contend with car-specific technologies such as satellite navigation, complex climate control, and greater situational awareness from the vehicle itself in the form of lane departure warnings and traffic signal recognition. In an effort to keep the driver informed and entertained, the risk of distracting them has been greatly heightened and information overload is a very real threat. In the past, the threat of distraction was primarily an external influence; today, the interior of a vehicle is more than capable of providing its own distractions.

There are, of course, limits – no vehicle manufacturer is going to let a driver update a Facebook page while on the move – and there are plenty of advocates for a simpler, more restrictive car. But this is in itself problematic: the vehicle mimicking the functionality of a smart phone is the lesser of two evils; having the driver tapping away at the smart phone itself is ultimately more dangerous. ▶

TEXT  
/  
MATT YOUSON

06

# INFORMATION OVERLOAD...

With modern vehicles becoming increasingly connected and interior displays growing ever more complex in terms of data delivered to drivers, are we now approaching the point of too much information? AUTO investigates



Lee Bauer of vehicle systems supplier Delphi says cutting out extraneous information in the vehicle is one way to tackle driver distraction.

or manual via centre console or centre stack).

The results suggested many tasks commonly executed in the vehicle are too distracting to be safely performed while it is moving. The authors described this as 'troublesome – because motorists may assume that features that are enabled when they are driving are safe and easy to use.'

The research – which used a standardised test (ISO 17488:2016) for assessing cognitive loads, and the NASA Task Load Index for subjective measurement of perceived workload – also found what it described as 'surprisingly large differences between vehicles in the overall demand of IVIS [In-vehicle information system] interactions.' This would seem to suggest some cars do a better job at presenting information and managing the load than others. This is an issue not only created by technology but also mitigated by more intelligent solutions.

"The desire to deliver information has, in some ways, exceeded people's capacity to consume it," says Lee Bauer, Vice-President, Vehicle Architecture at systems supplier Delphi. "We need to get the driver away from reading lists and gauges and become more predictive with what information they need, presenting information that is relevant. That requires context: you want different information at an intersection than you do when pulling into your driveway."

As a major manufacturer of display technology, Delphi's proposed solution is the multi-layer display (MLD), essentially a context-driven smart display that uses both physical separation and 3D effects to highlight significant information. In essence, it encourages the driver to see what they need to see, relegating extraneous information to the background.

"Humans see the world in two visual planes,

one behind the other," explains Bauer. "The MLD technology creates the ability pull some information forwards, it directs the eye to that particular piece of information. It's a very powerful tool to have and it reduces distraction time by placing the information the driver wants right in front of them."

With most cars having two or three displays, hunting for information comes with an inherent problem called 'change blindness', referring to the time taken to refocus when jumping from screen to screen and, to a certain extent, consuming all the information that screen offers before disregarding the extraneous content.

"MLD will allow you to blend out information that could deliver visual noise and focus on the information inside the context – for example, if the context is the radio, I don't need to see anything that isn't connected to the radio," adds Bauer. "It allows changes to happen more quickly, rather than reading whole screens, which happens today."

**VISUAL AIDS**

A different technology solution is not predictive but gives the appearance of being so. At last year's Consumer Electronics Show, Delphi demonstrated its take on a pupil-tracker system. The eye glance technology uses cameras mounted behind the steering wheel and in the centre stack to track the movement of eyeballs, sensing where your attention is focused and bringing that particular function to the fore.

"Everyone has had the experience of reaching over for a button and missing – but at a distance of one metre your eyes are much more accurate than your finger," says Bauer. "Drivers don't like searching their screens for things, so presenting

options automatically creates a better user experience, but also a fundamentally less distracting one that takes less time and allows them to interact without touching the screen."

Bauer will not be drawn on what constitutes an acceptable time for a driver to have their eyes off the road. In the US, the NHTSA issued guidelines in 2013 for a series of distraction tests that implicitly suggest any visual/manual task should take no longer to complete than 24 seconds total time, including a cumulative limit of not more than 12 seconds of Total Eyes Off Road Time. The guidelines also recommend tasks be designed to be completed with individual glances of no more than two seconds. A second test method, using a visual occlusion technique, requires subjects to perform tasks wearing goggles that open and close every 1.5 seconds, with the task again to be completed in 12 cumulative seconds or less.

The baseline for these limits is reassuringly traditional: it's the timeframe the NHTSA deems necessary to tune an analogue car radio.

Distractions tend to be classified as visual (eyes off the road), manual (hand off the wheel) or cognitive (attention not focused on driving), plus multi-modal derivatives of the above (visual-manual tasks, for example, selecting a music track from a list on a touchscreen). Decluttering a display lowers levels of visual distraction and perhaps reduces cognitive disturbance but can do little for manual tasks.

The increasingly common solution to manual distraction is the introduction of voice control – but according to the Utah research this isn't the panacea it is sometimes presented as. It suggests that, while auditory/vocal interaction is less demanding than using the centre console, it is more demanding than pressing a button on the centre stack. While voice commands result in a reduced visual demand, that advantage is offset by longer interaction times. One solution is the use of 3D cameras for gesture control. This has been pioneered by BMW in the 7-series, which now recognises five hand gestures.

"Gesture is very interesting. Ultimately it will deliver the ability to interact with displays we can't touch," says Bauer. "When BMW started with gesture it was to demonstrate the possibilities. It will deliver, ultimately, the ability to interact with displays and information that you can't touch. The finger is the most common way that we interact with all of our devices today. You want to interact without touching."

Better technology may allow drivers to escape from the information overload created by the last generation of better technology – but where will it end? We may have reached the limit of how much information a driver can safely process but in terms of capacity to deliver information, we have barely scratched the surface. Driverless cars may, of course, render the subject moot – but while humans are still behind the wheel and spending more time in their cars, the temptation is to demand (and deliver) as much information as possible. Deciding how that will work is the automotive industry's next big safety battle. ◀

The genie isn't going back in the bottle: people are going to do more than simply drive when in the vehicle – and so the process must be managed.

To put the problem in context, figures released in the US by the National Highway Traffic Safety Administration (NHTSA) recorded 35,092 traffic fatalities in 2015, of which roughly 10 per cent (3,477) involved one or more distracted drivers. This was an 8.8 per cent increase from 2014.

Further, of the 5.6 million non-fatal crashes reported to the police in 2014, 16 per cent were 'distraction-affected', resulting in 424,000 injuries. Not every distraction is information-based: the NHTSA reflects that traditional distractions (for example, interaction with passengers) are a contributor to accidents, but also that in-vehicle systems and portable devices play a significant role. One of their recommendations was that portable devices (smart phones, MP3 players etc) become easier to pair with the vehicle, and operated through an in-vehicle interface.

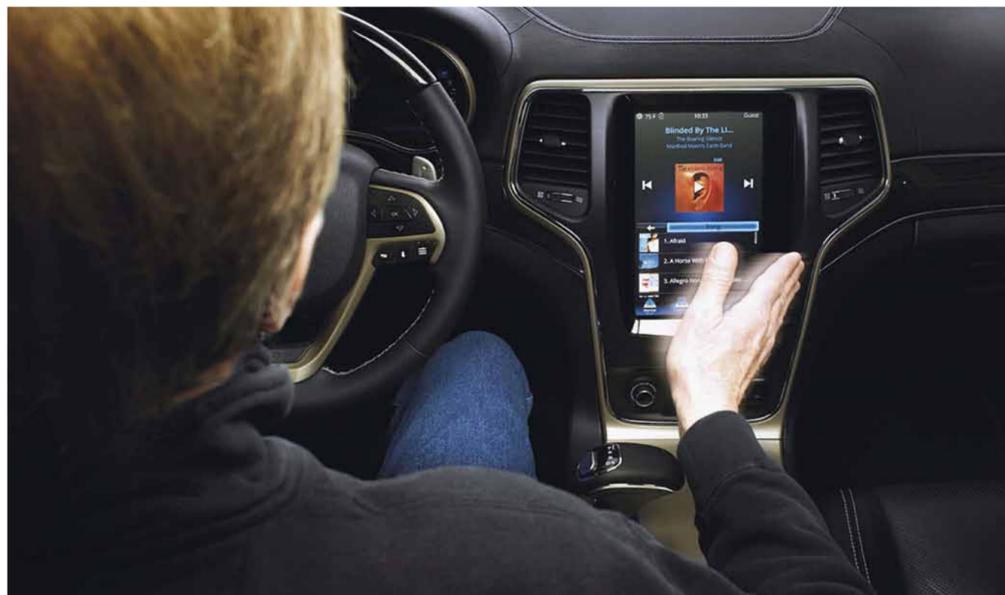
Systems such as Apple's CarPlay and Android Auto, as well as more basic Bluetooth pairings, now see widespread use. This mitigates the potential for distraction by placing information in an environment easier to control (the dashboard) but it doesn't make the problem go away.

**ASSESSING THE PROBLEM**

Surprisingly, the process isn't particularly well understood. The pace of change is swift, and while car makers are cautious about introducing more functionality, the cumulative load is still increasing. Drivers are bombarded with information. How much of their attention span is left for the primary task of driving the vehicle?

A recent report titled Visual and Cognitive Demands of Using In-Vehicle Infotainment Systems, sponsored by the AAA Foundation for Traffic Safety and carried out by the University of Utah Department of Psychology, detailed research that attempted to classify the level of visual, manual or cognitive distraction associated with different secondary tasks within the vehicle, noting the type of interaction (vocal

BMW has pioneered the use of 3D cameras in a car to recognise hand gestures as a way of allowing drivers easier interaction with infotainment systems.



Automotive firm Hella has found ambient lighting in cars can improve driver focus.

**The colour and the shape**

Anybody who enjoys watching TV in a darkened room has probably been told that doing so will damage their eyes. This isn't entirely an urban myth: while not causing permanent damage, it can cause eyestrain, headaches and fatigue as the constantly changing light levels requires the pupils to work harder while the rods and cones in the eye suffer from residual excitation. To a limited extent, a similar problem occurs in the vehicle. Over the last few decades of the 20th century, sources of ambient light gradually disappeared, leaving only a task light and, perhaps, a map light to be used as required. The only real illumination came from the dashboard. That has changed in the last few years with ambient illumination returning to the vehicle, first in the form of smaller, cooler LEDs and, more recently, RGB LED modules offering a wide pallet of colours. Hella is one of the world's largest manufacturers of automotive lighting systems, both exterior and interior. Ana Bizal, Head of Pre-Development in the interiors division argues that, while implemented for aesthetic reasons, ambient interior lighting also offers improved focus and safety benefits. "Based on our feedback, we see with the right lighting levels the driver is more alert – and by not sitting in darkness, spatial awareness is improved. Of course,

ambient lighting in the vehicle is there to make the driver feel good – but equally it's much easier to locate items and buttons if you're not surrounded by darkness." According to Bizal, Hella's research suggests different colours work better for different groups of people: blue tones were identified as calm and confident and preferred by men; women preferred amber or red, with the former perceived as pleasant and the latter bold. Green, surprisingly, wasn't particularly well thought of by either gender – but was liked more by older people. Ambient light sources tend to be soft tones – they must not be viewable from outside the vehicle – but no particular colours were deemed to be more distracting than others: it is blinking lights that cause distraction. Hella did introduce a dynamic lighting module for the Chevrolet Camaro – but the system only activates when the car is parked. There is, however, the possibility that distracting, dynamic lighting may have a future inside the vehicle, because sometimes distraction is useful. "Ambient lighting hasn't really been of legislative interest so far but we're starting to touch against legislation now," says Bizal. "As the interior becomes an ecosystem, it might be possible to add safety functions through the use of dynamic lighting. The human eye is naturally drawn to flickering, moving light – so perhaps we can advance safety by using that to convey information to the driver. Can we add lighting that indicates a pedestrian in the road, or a car overtaking you? Examining these possibilities is the next step for designing illumination systems."

06

# Playing a leading safety role

Movie and TV star *Michelle Yeoh* has been a long-time activist for road safety and this year became an ambassador for the FIA's #3500Lives campaign. She explains how the initiative can help reduce the death toll on the world's roads and why she's passionate about the use of child safety restraint systems

**How important is the #3500Lives campaign in raising awareness of road safety issues on a global scale, and how valuable is the FIA's association with JCDecaux in achieving that goal?**

The visibility we have been able to achieve with this campaign has been remarkable. The #3500Lives campaign is about delivering simple road safety messages to as great a number of people as possible and through the co-operation with JCDecaux we have been able to deliver these easily implementable safety tactics to people in 75 countries and over 900 cities worldwide. I think it's incredibly impressive that the campaign has been able to mobilise such a large and concerted effort across so many countries simultaneously.

**You have been involved in road safety campaigning for some years now, so have you seen the effectiveness of similar projects on a smaller scale and what is your ambition for this campaign?**

For me, the key to #3500Lives is the simplicity of the road safety advice being disseminated. None of the solutions we are presenting are complex, but we know that each one is highly effective in reducing fatalities and injuries on the world's roads. My ambition is that we present these simple,



Michelle Yeoh has long campaigned for greater safety on the world's roads.

affordable, life-saving strategies to as many people as possible and that as a result behaviours change or people begin to lobby government to improve legislation or infrastructure.

**How much more impact do you feel such campaigns have when they feature public figures and role models as ambassadors?**

I think it's of value, just in providing a connection, particularly so for younger people who may look up to the individuals featured in the campaign. That's especially true in the case of the sports stars taking part in #3500Lives such as Rafael Nadal and Marc Marquez, and also music stars such as Pharrell Williams. By linking together these famous names with simple messages about risk factors – speeding, drinking and driving, wearing a safety belt and motorcycle helmet, using a Child Restraint System – I hope we can build sufficient mass to break through.

**Your key message is Protect Your Children – what are the essential methods of ensuring that happens and does it vary from country to country? For example, child safety seats are widely used in many regions as well as safe walking to school, good road behaviour etc...**

As adults, we have a particular responsibility for our children, for all children. The best way to protect them is to make their environment safe. That means we need to design roads and streets that are self-explaining and safe to navigate. We need to promote traffic calming to make it impossible for cars to drive fast near children. In many places around the world none of these safeguards are present and children's lives are at risk every day just in making what should be an easy journey, say to school. Every child has the right to a safe walk to school and we need to press for action at executive level to improve infrastructure where it is lacking. Additionally, I would say that it's about making sure your child wears a helmet if on a scooter

or motorcycle. This is hugely relevant in many emerging economies where two-wheel transport is the norm. Also we need to encourage the use of Child Restraint Systems in cars. According to the World Health Organisation the use of child restraints can reduce infant death in car crashes by 71 per cent and toddler deaths by 54 per cent, and yet many countries still have no legislation in place mandating the use of child seats – and that needs to change. The fact is that 500 children die on the road every day on the way to school or just playing outside. That is a terrifying number but it can be reduced if we implement these straightforward solutions. It's not rocket science and it doesn't have to be hugely expensive.

**Your home country of Malaysia is involved in some interesting road safety measures such as the Safe Steps programme. Can you tell us about it and the progress being made across Asia...**

Safe Steps is a pan-Asian public service initiative spearheaded by the Prudence Foundation in partnership with National Geographic and the FIA. It's a powerful example of the multi-sector cooperation that

**'None of the solutions we are presenting are complex, but we know they are highly effective in reducing fatalities and injuries'**

is necessary in achieving the UN's Sustainable Development Goals. The campaign features public service announcements that are being shown across Asia on FOX channels and which reach 80 million households every day. That's backed up with activities in Malaysia, Indonesia, the Philippines, Thailand, Myanmar and Cambodia. In Vietnam, campaign billboards will be installed across the centres of Ho Chi Minh City and Hanoi, as well as at 12 universities.

**The #3500Lives campaign is about trying to encourage good practice on the roads. How can people promote that individually?**

Firstly by putting the advice into practice themselves and setting an example for their family and friends. It's about taking responsibility for your own safety and for that of other road users, particularly children and pedestrians. Beyond that it's about lobbying for change at local and regional level, pressing for good roads, infrastructure and legislation. The road safety strategies we are promoting are not complex or expensive, but if we adopt them and encourage the same behaviour in others we'll reduce the terrible toll on our roads. ◀

## Security on display



The FIA's #3500Lives campaign can only succeed if its safety messages reach as many people as possible around the world. In partnership with advertising giant JCDecaux the campaign messages will be displayed on the company's advertising spaces worldwide, as seen in these pictures of #3500Lives going global. Materials associated with the campaign are available to everyone and can be accessed through the #3500Lives campaign site. Just scan the QR code (right) to find out more about the FIA's mission to save lives on the world's roads.

SCAN AND DISCOVER  
Download the free Unitag app at [unitag.io/app](http://unitag.io/app) and scan the code to discover more about #3500LIVES



India



China



Oman



Italy



Thailand



Portugal

# ‘Winning in Monte Carlo was the thing I always wanted to do’

TEXT  
/  
TONY THOMAS

07

World Rally Championship titles, Pikes Peak assaults, Nürburgring lap records, *Walter Röhrl* captured them all, but 40 years down the track and still at the wheel, it's his four Monte wins in four very different cars that satisfy him most

“Can you call me later? I’m driving – in the Bavarian forest – and the reception here is not so good.”

It's the perfect intro to one of the biggest-ever beasts of world rallying. Walter Röhrl is at the wheel – *of course he is*. And he's right to put us temporarily on hold: the backbeat of a muscular engine, hurrying Röhrl towards his home, is more impediment to conversation than any sketchy phone signal would be.

The rumble, or scream, or throb, of a tuned motor must surely accompany Röhrl in his dreams, for even at 70 and long retired from active competition, this two-time world rally champion remains steeped in the sport that made his name.

Tomorrow he's flying to a Porsche motor sport function – on driving duties, not mere glad-handing of VIPs. The summer was peppered with

test and promotional events including the co-development and launch of the dizzying 700bhp 911 GT2 RS. Next week it's Spain for demo laps in the new 718. His calendar remains full.

It's one way, he explains, of staying sharp. “If I stopped now, sitting in a fast car and driving fast, then I would lose the skill and I would never get it back. But as long as I stay in form, it's okay. I still feel like I have it under control; I don't feel any different when I'm driving – and the young guys still say I'm okay.”

A chuckle and a flashback. There's Röhrl, hanging out the back end of a Fiat 131 in 1980 or an Opel Ascona in '82, drifting them very sideways, but always under control, from lock to lock on tarmac, snow and gravel, as he scrambled to his two world titles.

Then it's the fabulous Lancia 037 – the ultimate expression of the rear-wheel-drive world rally car.

Next up, four-wheel-drive, flaming turbos and downforce: the Audi Quattro – the 600bhp terror of the forests that ripped up the rule book for rally car speed. Röhrl was right there through this transition from 'old school' rallying into the neon-lit Group B '80s, laying down thick black lines of ink across the most thrilling – and dangerous – chapter in the sport's history.

Not that it ever felt so perilous from the bucket seat, even as Röhrl and feted peers such as Markku Alén, Ari Vatanen, Henri Toivonen, Michèle Mouton and so many others scorched trails through the hordes who'd troop in their thousands into the forests to be spellbound by their magic. The wild machines produced for Group B – the regulatory framework that defined top-tier rally machinery from 1983-86 – proved hugely attractive to both manufacturers and fans, though with ultimately tragic results. ▶

At the age of 70, Röhrl remains as busy as ever behind the wheel, with no sign of slowing down just yet...



Spectator control in the '80s was often notional at best, leaving competitors with no choice other than to aim their cars right into the masses, who'd crowded onto live rally stages in the hope of getting as close as possible to their heroes.

"If I watch the videos now," says Röhrl, "I cannot understand that I was able to do that, because I am shocked to watch it. But at this time it was your daily work and you got used to the situation. It was part of the job and finally they [the spectators] would jump away – or you hoped they would. It was crazy, really, and I am so lucky never to have had an accident in which a spectator died, because if I had killed a person, I don't know if I could have kept on doing this."

"It wasn't even a question," he continues, "of making a mistake yourself – I always trusted myself not to do that. But even a minor mechanical failure, or a puncture, could have sent your car straight into a crowd at a very high speed."

Others were not so fortunate. At the 1986 Rally Portugal, the Ford RS200 of Joaquim Santos left a stage and ploughed into spectators, killing three and injuring 31 more. This accident and the fatal crash for Lancia driver Henri Toivonen and co-driver Sergio Cresto, later in the year on the Tour de Corse, spelled the end for Group B – that most unshackled, yet revered period of rallying.

"When Henri died, I honestly wasn't surprised," says Röhrl. "We were team-mates at Opel in 1982 and he was fast, but he had a lot of accidents. He was a bit crazy – speed-drunk, I think."

Despite the tragedies, the echo of a Quattro straight-five is carried on Röhrl's words as he recalls the experience of being in the vanguard of rallying's four-wheel-drive revolution: "It was

## 'It was a course where one mistake could be your last mistake. So suddenly I was excited by the challenge'

such a special time," he says, "and even now people get a little bit crazy when they talk to you about Group B. I'd driven for Lancia in 1983 and the 037 was the best rear-wheel-drive car I ever drove. It was so precise – like a formula car – so light and powerful. But by then Audi had really started to refine their four-wheel-drive system and I realised that without it there was no way any more to win a rally."

### QUATTRO CHALLENGE

Röhrl had tried a Quattro earlier in the '80s and while he had been impressed by its traction, other aspects of the car's performance, such as its handling balance dominated by understeer, were not to his taste. By 1984, though, the Quattro had been tuned more to his liking, thanks in part to a central differential, which distributed power more fluidly between the four wheels and sweetened the handling.

Against mid-engined rivals from Peugeot (the 205 T16), Lancia (the Delta S4) and Ford (the RS200), the Quattro was always held back by its front-engine layout that resulted in nose-heavy handling, but its engine was the mightiest of all. "And the sound from those five cylinders and the

turbo wastegate when you lifted off the throttle... That was so special," says Röhrl.

The Quattro, like all its Group B ilk, was a handful: a 600bhp turbo motor, trapped inside a stripped-out bodyshell that could trace its origins to a mid-size road-going coupé. Four-wheel drive was essential to keep the show stitched to the road.

It was brutal – brutally quick – and demanded that even a two-time world champ completely revise his driving style in order to realise its potential. "I had to learn how to left-foot brake," says Röhrl, "to make the car turn in."

He recalls the troubles he encountered during an Audi test in November 1983, shortly after the switch from Lancia and the rear-drive 037. During practice passes of a snowy forest stage, Röhrl at first used his conventional right-foot-braking technique. All seemed relatively normal until he encountered black ice, when: "I simply couldn't make the car turn in and I rolled."

With the notoriously icy Rallye Monte-Carlo barely two months away, Röhrl realised he had a problem: "So I started using my left foot, but at first it was like I was using my foot on the clutch pedal – you know, just a big push with no sensitivity, no feeling. I was making a lot of mistakes and crashing and it was a bit of a disaster for me."

Then a revelation: Röhrl realised that he'd been trying to adjust the car's cornering attitude by altering brake-pedal pressure with his left foot. His epiphany was to keep left-foot-braking pressure constant, but to alter the car's corner approach by "playing" with the throttle at the same time. Not easy, but it brought instant results: in heavy snow on the '84 Monte, Röhrl and long-time co-driver Christian Geistdörfer led home an Audi 1-2-3.

That was the last of Röhrl's four Monte Carlo wins and his third on the trot – each of those having been taken in cars with a different drivetrain configuration: 1982 was a front-engined, rear-wheel drive Opel Ascona; '83 was the mid-engine, rear-drive Lancia 037, then in '84, the Quattro.

"Those four wins do make me a little bit proud," Röhrl admits, "more than winning the drivers' titles, actually, because when I started out in rallying, winning in Monte Carlo was the thing I always wanted to do."

So much so, in fact, that after his first win in 1980, he thought about quitting rallying altogether, having achieved his life's ambition! ▶

Röhrl nearly quit rallying in 1980 after realising his dream of winning in Monte Carlo – co-driver Christian Geistdörfer talked him round.



The German famously led home an Audi 1-2-3 on the '84 Monte – his third win there on the trot.



The Lancia 037 was, says Röhrl, the best rear-wheel-drive car he ever drove – his '83 season included an Acropolis Rally win.



After being talked into competing, Röhrl set a new record in the 1987 Pikes Peak aboard the Audi Sport quattro S1.



“Honestly, when I won, I really thought about stopping. But Christian [Geistdörfer] put me under a lot of pressure. He said to me, ‘You must be crazy. This is your first chance to make some money and now you want to stop!’

“It was a fight for maybe three or four weeks but then I said to him: ‘Okay, maybe you are right.’ It wasn’t a question of the money, actually, but I realised that rallying had become my life. I was crazy about rally driving. And I had also started to be motivated by the idea of trying to show that it was the driver and not just the car that was important. So to win rallies and championships with different teams... that was a big motivation for me.”

#### FRESH PEAKS

Röhrl stopped top-fight rallying in 1987 after a 15-season career that brought 14 wins from 1975-85. But the thirst for competitive driving and his relationship with Audi remained strong. Time for a few adventures beyond the special stages...

Most famously, these included an assault on the notorious Pikes Peak hillclimb course in Colorado. For generations it had been a gravelly stomping ground on which US racers of repute would prove their mettle. From Fred Junk, who took his Chalmers Special up the hill in 1916, to the likes of Mario Andretti in '69, Rick Mears in '76 and numerous scions of the Unser family, an assault on ‘The Peak’ was a US rite of passage.

During the Group B era, however, Audi twigged that some of the hardware they’d developed for forest campaigns might be handily re-purposed for an attack on the Pikes Peak leaderboard. In 1985 and '86 they used the Quattro to set new course records with Michèle Mouton and Bobby Unser. For 1987, they called Röhrl...

“When Audi asked me about it, I wasn’t really interested,” he remembers. “You know, it was one day of sitting in the car for just 10 minutes of driving. But Audi needed some positive PR in the US to help with sales, so I said ‘Okay’. Then, the first time I drove up it in a rental car, I realised that the gravel road had a feeling a bit like the surface of the Nürburgring, where I’ve always loved driving. And I could see that, like the Nordschleife, it was a course where one mistake could be your last mistake. So suddenly I was excited by the challenge.”

Röhrl relates how, together with his wife, he set about learning every sinew of the 19.99km, 156-corner course, “so that I *always* knew where I was. We had a name for every corner.”

And on July 11 1987, driving a much-modified short-wheelbase Quattro, with a 750bhp motor triggered by “a throttle like an on/off switch”, Röhrl smashed the course record by more than 21 seconds to become the first up the hill in



**‘I was thinking maybe I should slow down a bit... but I’m not ready to stop just yet. Maybe next year’**

under 11 minutes. Audi subsequently retired the Quattro from competition.

Röhrl’s four-wheel-drive adventures weren’t done though. In 1989, he was part of a driving squad that also included Hans Stuck, who took on the US IMSA GTO silhouette saloon racing series in an extravagantly modded Audi 90 Quattro. Much of its innards were carry-over tech from the Pikes Peak project.

The car was fearsome – and successful – though Röhrl admits his passion was never for driving on the track, with the sole, notable exception of his beloved Nürburgring. There, as recently as 2007, he held the outright lap record for production vehicles in a Porsche 911 GT2, with a time of 7m32.0s.

Röhrl’s ease with track driving stems, he believes, from his instinctively ‘clean’ style founded on brevity of cornering line. His very first forays behind the wheel, in his teens, were as a chauffeur for a commercial director. It was then that he learned the importance of looking ahead and carrying speed through corners.

But where did he learn to tap-dance? Any cursory scan of Röhrl YouTube clips throws up gems of his hard-working race boots, both feet alternating on the brake pedal, right boot stroking

**Röhrl took time to learn every corner of the 19.99km Pikes Peak course before becoming the first person to complete it in under 11 minutes in the Audi.**

the throttle as he heel-and-toes, left foot alternately pumping the clutch and tapping the brake. It’s as mesmerising to watch as it is awe-inspiring, yet Röhrl is nonchalant: “Honestly I didn’t even know I did this with my feet until a producer asked to put a camera in the footwell of one of my Audis to film the pedals. I was amazed when I saw it.”

A natural gift, then? Albeit one polished by dedicated application to craft and an enduring passion for his sport that earned him the universal respect of his peers.

Certainly these attributes carried Röhrl through a stellar career that made him Germany’s first (and still only) world rally champion. His sole regret is that he wasn’t born earlier “...because then I could have raced in the Mille Miglia and Targa Florio when they were still the great road races. Driving those in a Porsche 908... for me, that would have been perfect.”

And even at 70, he’s not done yet. “I was thinking recently that maybe I should slow down a bit,” he says, “and I know that one day I will have to decide that it’s finished. But I will have to be very certain about that, because if I stop and then try to start again, that would be dangerous. And I’m not ready to stop just yet. Maybe next year...”

PS4



FIA-certified Gran Turismo Championships starting in April 2018

07

# AMERICAN BEAUTY

For its 2018/19 'super-season', the FIA World Endurance Championship will return to one of US racing's most famous circuit – Sebring. AUTO looks back at almost seven decades of competition in the City on the Circle

TEXT

/  
DAMIEN SMITH

Sebring International Raceway: a flat, featureless circuit based around an aging airport in a nondescript part of Florida, about three hours north of Miami. It doesn't sound like much. But the basic physiognomy sells this place short – because on race weekends there's something magical about Sebring for true-blood fans of global motor sport.

Which is precisely why the 3.74-mile road course simply has to be a part of the rejuvenated FIA World Endurance Championship when its new 'super-season' format launches in 2018, for the first time across two calendar years. Sebring is special, and fittingly its place on the WEC schedule – for the first time since 2013 – will offer something entirely unique in a brave new world.

The circuit, nestled away from the US-27 turnpike in Highlands County, oozes character. Its craggy features and worn-in ambience are warmly endearing, both to the hard-core fans who throng to the fabled Turn 10 and the enduring procession of European disciples who have crossed the Atlantic for the past 60-plus years to race in its famous once-around-the-clock 12-hour slog-athon.

Yes, the races are as tough as the place looks. Half the time of Le Mans it might be, but there's a reason why the sport's greatest manufacturers have relished the challenge of the

Sebring 12 Hours for so many decades. The adage goes if you can last and win on Sebring's infamously teeth-rattling concrete bumps, victory at the French classic is in sight. The Florida enduro, traditionally held on the third Saturday of March each year, tests the mettle of both man and machine in a manner that can't be replicated in any carefully manicured private test.

Then again, to summarise Sebring as simply the perfect precursor to Le Mans does the race a monumental disservice. This place proudly stands alone, because its own heritage glistens with the brightest jewels of motor racing history. Stirling Moss, Juan Manuel Fangio, Mario Andretti, AJ Foyt and the greatest heroes of every generation have raced and won here, and when you roll off Golden Eagle Drive, trundle through the gates, over the road bridge and into the dishevelled (usually chaotic) infield paddock, their echoes resound.

It helps that Sebring has changed so little through the years. Sure, circuit layouts have been tweaked and (some) modern amenities added. But the front stretch, Turn 1 sweep and much of the rest would still resonate for the likes of Fangio, were the double Sebring winner of 1956-57 to return today from his seat among the racing gods.

Like Silverstone, the circuit's roots were sown during WWII. Hendricks Fields was an army airforce base founded in 1941, a year before Pearl Harbour. B-17 combat crews would subsequently train here, but when peace broke out in '45, Hendricks was deactivated – and Sebring airport founded in its place.

It was aviation and motoring enthusiast Alec Ulmann who had the idea of hosting motor races here. America's first sports car endurance race, a six-hour affair, was held at Sebring on December 31, 1950 – and two years later, the first 12 Hours took its bow, on March 15, establishing the spring-date tradition. ▶

At 22, Bruce McLaren became F1's then-youngest winner when he took his Cooper to victory in Sebring's only Grand Prix, run in 1959.





## 'The Cooper ran out of fuel on the last lap and Brabham baled to shove his car to the finish'

In a script that was becoming familiar, glory at Le Mans in 1966 was pre-dated by breakthrough success at Sebring – and with a dash of drama worthy of Hollywood. Dan Gurney was two minutes from victory when his Ford MkII's engine faltered and like his old friend Brabham, the Californian was forced to get out and push. Thus it was Anglo-American duo John Miles and Lloyd Ruby who prevailed in their GT40 X1 Roadster, in a race overshadowed by the death of four spectators and, in a separate accident, of GT40 driver Bob McLean. Sebring's first layout changes followed as a consequence.

Literal Hollywood drama played out in 1970 when Steve McQueen entered a Porsche 908 ahead of his forthcoming movie to be filmed at Le Mans. But with the talented Peter Revson doing the lion's share behind the wheel, the novelty entry become something more serious. Sebring's reputation for high attrition thwarted the Gulf Porsche 917s, leaving Revson on for a surprise victory. In the pits, McQueen – with a leg in cast following a motorcycle accident – looked set to claim the plaudits, to the fury of Mario Andretti. Inspired to spoil a perfect Hollywood ending, the Italian-American put in one of the most satisfying performances of his long career to grab victory for Ferrari. It is remembered as the most famous, and perhaps the best, Sebring 12 Hours of them all.

The following decade wasn't an easy one, for both Sebring and sports car racing as a whole. But the race survived energy crisis cancellation in '74, the drain of manufacturer interest and changes in promoters and sanctioning bodies to become a key component of the wonderful Group C/GTP era of the 1980s. These were years when Porsche made hay, setting an incredible record by winning every race between 1976 and '88. The German marque remains the most successful at Sebring with a roster of 18 overall wins, with Ferrari second on 12. ▶

Twelve months on, in 1953, the FIA chose the Sebring 12 Hours as the host of its first ever world championship sports car event – won by decorated war veteran John Fitch and Phil Walters in Briggs Cunningham's Chrysler-powered C4R.

Cunningham would continue to deliver American success on home soil, but the international lure of Sebring was established at pace: Grand Prix drivers in assorted European exotica began circling Florida in March as a key date in their diaries. By '55, a Cunningham-entered Jaguar D-type co-driven by future F1 champion Mike Hawthorn was vanquishing Ferrari at Sebring.

But it would be the great Italian marque that would take a stranglehold on the 12 Hours during its early years. Between 1958-64 Ferrari would remain unbeaten at Sebring, Phil Hill and Olivier Gendebien carrying off a trio of victories apiece during a golden era for the long-distance Prancing Horses.

### ONE TO REMEMBER

Amidst all this, for the one and only time, Sebring hosted a Formula One US Grand Prix, in what turned out to be a thriller of a championship finale.

In 1959, Jack Brabham and his little Cooper-Climax had confirmed the future path for single-seater motor racing: from now on, power would be all about push rather than pull, with engines placed behind drivers' shoulders rather than in front of their feet. The Australian arrived in Florida in December with his first F1 title in sight, although the push he required to get over the line turned out to be more literal than he would have wished.

The Cooper ran out of fuel on the last lap and Brabham baled to shove his car to the finish, the new champion slumping in exhaustion once his toil was complete. Meanwhile, team-mate Bruce McLaren claimed victory, his first in F1, to become what was then the youngest winner of a world championship Grand Prix. The following year, F1 would continue its search for a US home, with another one-off at Riverside in California, before establishing roots at Watkins Glen in upstate New York. It would never return to Sebring, but the drama of '59 ensured the circuit's brief F1 chapter would never be forgotten.

By the mid-1960s, Jim Hall's wondrous Chaparrals were re-establishing America's sports car credentials, he and Hap Sharp winning the 12 Hours in '65. But it was the might of Ford that emerged as Ferrari's real threat, a battle fuelled by cold, hard revenge following the spurning of the Blue Oval's advances to buy a controlling share of Enzo's empire.

US GP winner McLaren with John Cooper, whose other driver Jack Brabham won the title after pushing his car to the finish line at Sebring.



Porsche won every 12 Hours race between 1976-88, with Bobby Rahal and Jochen Mass taking the '87 laurels aboard a 962.

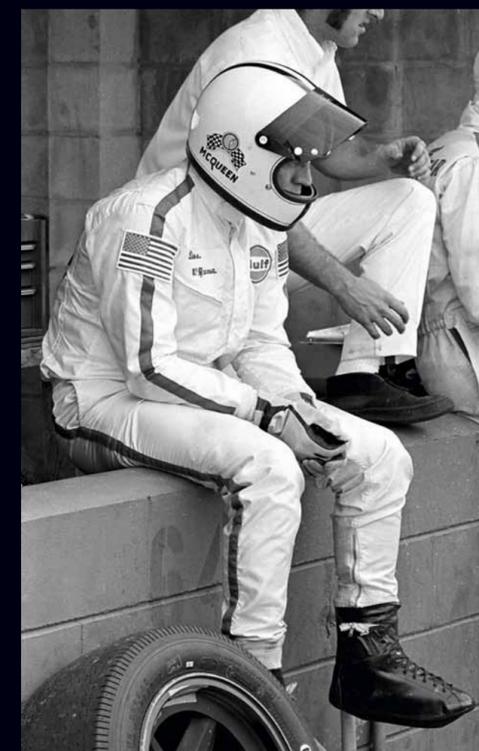
Audi scored the second of eight straight wins in 2001, with victory in an R8 for Rinaldo Capello, Michele Alboreto and Laurent Aiello.



Mario Andretti's heroic drive in the 1970 12 Hours earned Ferrari a win and spoil the party for Steve McQueen and Porsche...



BMW won in 1999, the first year of the American Le Mans Series, but Audi (above) was waiting in the wings, scoring a podium on its sports car debut.



...A disgruntled McQueen, leg in plaster, could only look on as Andretti overhauled Peter Revson in the Porsche 908.



The Ferrari 333SP took the second of three wins in 1997, with a four-strong crew of Andy Evans, Fermin Vélaz, Yannick Dalmas and Stefan Johansson.

Tom Kristensen scored his record sixth Sebring win in 2012 in the No2 Audi shared with Allan McNish and Capello.



But Sebring still had the tendency to throw up unexpected results: the Porsche that crossed the line first wasn't always the expected one, while the likes of AJ Foyt added to the illustrious list of race winners. The great Texan took his final big win at the 12 Hours in 1985, sharing a Porsche 962 with Bob Wollek.

**AUDI'S GOLDEN ERA**

The death of Group C/GTP in the 1990s opened the door for Ferrari to unexpectedly win sports car races again, when its pretty customer 333SP prototype scored a trio of victories, before manufacturer might returned with the birth of the American Le Mans Series in 1999. This was another key date in Sebring's race history. As it would at Le Mans, BMW prevailed, with Tom Kristensen claiming the first of his record six wins, while Audi landed a podium on its sports car debut – a precursor to a new era of German dominance.

Audi would conquer 11 of the next 14 races in Florida, including a glorious straight-out-of-the-box win for its ground-breaking diesel-powered R10 TDI in 2006. The new technology would define sports car racing for the next decade, but that victory – at a race considered the most demanding of them all – remains high in Audi's roster of proudest sporting achievements.

Among the other wins was Kristensen's record sixth, teamed with Allan McNish and Rinaldo Capello in the R18 TDI in 2012 – the first round of the FIA's new World Endurance Championship. Now, after three years off the calendar, Sebring is gearing up for its global series return as we await the start of the all-new WEC 'super-season'. But fans in Florida need to be patient – and here's why.

In May 2018, Spa will host the opening six-hour race of the WEC season, before Le Mans once again draws the eyes of the world in June. Further six-hour rounds at Silverstone, Fuji and Shanghai will carry the season through 2018, and for the first time into the following calendar year as a new – and unique – 12-hour race is ushered in at the beloved Florida airfield track.

As tradition dictates, the Sebring 12 Hours itself will run on Saturday March 16 2019 for the US-based WeatherTech SportsCar Championship, from 10am and into darkness to the 10pm finish. Then at midnight, the new WEC race will begin, racing into the dawn and a noon finish on the Sunday. From there, the season will continue for a second visit to Spa in May and will end for the first time at Le Mans, with a second 24 Hours counting for one single 13-month season.

So much novelty, then, and a great deal to look forward to. But for those who love long-distance sports car racing, Sebring in March 2019 will be the date to circle. The countdown is long, but the wait will be worth it. ◀

**'That win – at a race considered the most demanding of them all – remains high in Audi's roster of proudest sporting achievements'**

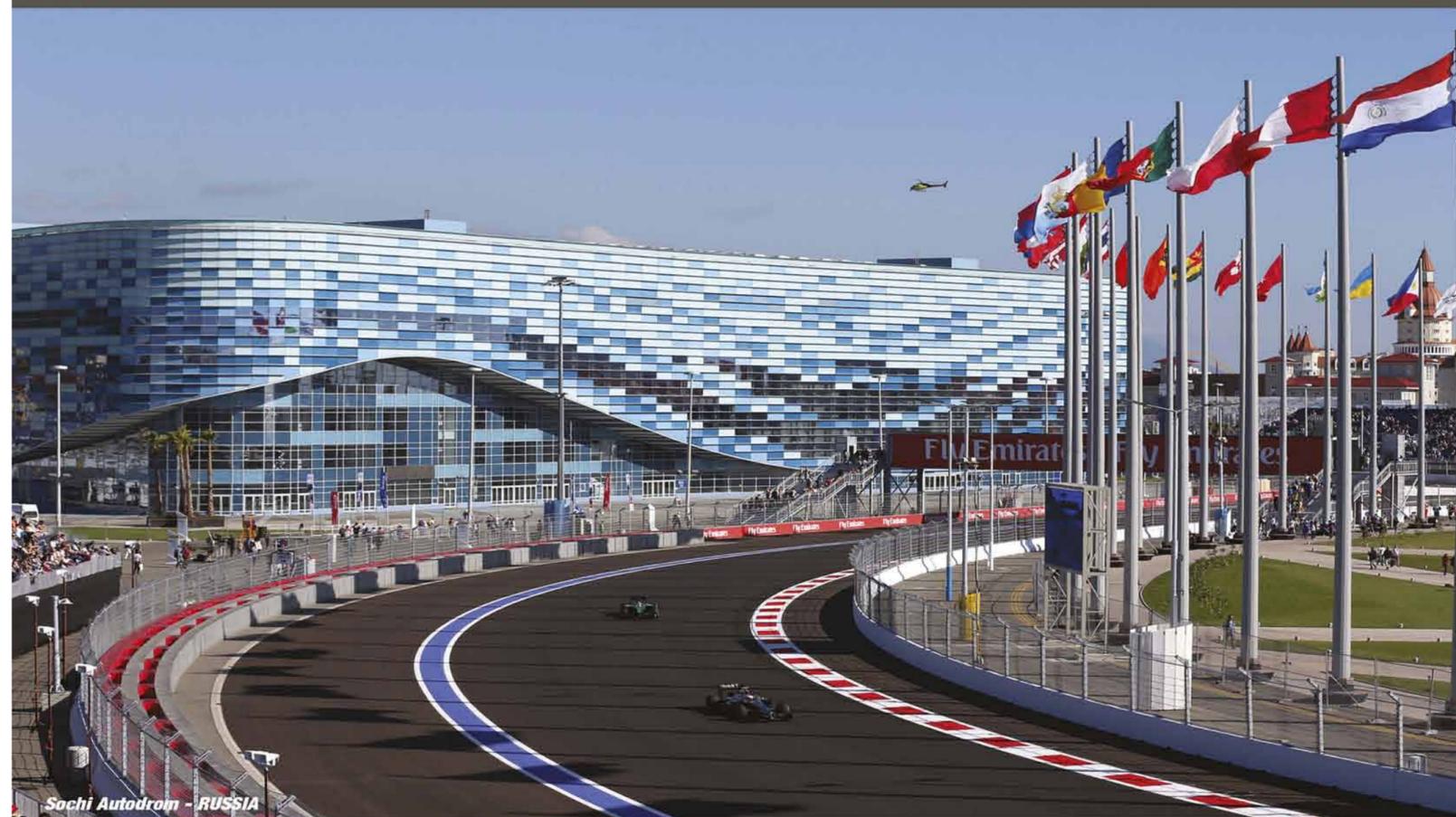
Sebring honours this year went to the Wayne Taylor Racing Cadillac of Alex Lynn, and Ricky and Jordan Taylor. In 2019 the 12 Hours will share the billing with a new WEC race.



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P87



08

# Driving Norway forward

TEXT / GAIA PELLICCIOLI

How Norway's forward-thinking motor clubs are supporting sport, future transportation and road safety ›



**ROYAL AUTOMOBILE CLUB OF NORWAY**  
 • Plugging into an electrified future for transport  
 • Aiming for a nation of zero road fatalities



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 • Diversifying to meet new market segments  
 • Investigating mobility as a service to meet demand



**NORGES BILSPORTFORBUND**  
 • Accessible sport for the next generation of champions  
 • Building environmentally-sustainable motor sport



# Royal Automobile Club of Norway

## / Charged for evolution



Royal Automobile Club of Norway President Finn Eirik Eilertsen supports his country's advances in adopting electric mobility.

In 1912, in the fjord of Oslo, 10,000 people attended a car race on ice, the first motor sport event organised in Norway. The promoter of the event was the Royal Automobile Club of Norway (KNA), which at the time was the only automobile club in the country. With an ice race representing an obvious risk, the club, just five years old at the time of that first event, later took control of implementing safety standards for both spectators and drivers. The multi-day event, which became hugely popular, can be considered a predecessor of the rallies that we know today.

Since then, the KNA has continued to promote motoring in Norway, as well as the interests of an ever-growing community of road users.

"As the number of cars on the road increased, the KNA established emergency telephones along the roads across the mountains and emergency services for its members," says club president Finn Eirik Eilertsen. "Guide books with great car trips were made and hotels were KNA-approved. Motor tourism grew, and the KNA became the leading club in Norway."

The club, which now consists of 28 groups spread across Norway, currently offers traditional member benefits (such as discounts, legal and technical assistance, roadside assistance and a social club setting) and works on traffic safety, consumer issues and motor sport events. Since 1932, the KNA has organised

motorsport in Norway, annually delegating sporting authority to the Norges Bilsportforbund (NBF).

In a rapidly changing market, KNA has been able to anticipate and adapt, diversifying its service offering. For example, it manages camping sites and cabin rentals, a service which has become an important source of income.

"We previously recruited new members through an insurance contract," says Eilertsen. "This ended 10 years ago, however. The club lost about 50 per cent of its members, as well as its most important recruitment channel. Since then, we have been striving to find new recruitment channels in an increasingly demanding market."

However, one source of recruitment – and a regular haunt for members – is an informal 'clubhouse' near Oslo. "The KNA has acquired a well-known property where motorists and motorcyclists have been gathering for weekly social events for the past 50 years," Eilertsen explains. "It is located 17 kilometres from downtown Oslo, and it is used as a meeting place for people interested in cars and motorcycles, as well as being the common meeting place for the club. You could compare it to Ace Cafe in London".

Another important area of growth for the organisation is representing the interests of the rapidly increasing number of electric motorists in Norway, with the country being the world leader



Home-grown rally talent Ole Christian Veiby has competed internationally, while the KNA has long supported motor sport events.

in the average number of electric cars per capita. Norway recently became the fourth country in the world to have 100,000 electric cars on its roads, a remarkable number given that the total population is just five million inhabitants. In order to cater for that burgeoning market, the KNA has developed a strong collaboration with the Norwegian Electric Association.

### FUTURE FOCUS

The extraordinary increase in the 'green' fleet of cars can only partially be attributed to the availability of low-cost renewable hydroelectric energy in the country. The main factors responsible for this trend are tax relief, subsidies and green

investment, which have brought the price of an electric car in line with that of a conventional model.

"There are high fees on cars in Norway, however electric vehicles have no fees and they also offer several advantages such as free parking, charging, no toll fees and they can drive in bus lanes," says Eilertsen. "There is considerable political encouragement of electric vehicle purchase instead of petrol or diesel models. Politicians want a ban on the sale of new petrol and diesel vehicles in 2025. In cities they keep introducing higher road tolls for petrol and diesel vehicles, fewer parking spaces and car-free city zones. All populations in cities are encouraged to walk, use public transport or bicycles – not cars.



Tourists can rent electric Renault Twizys on the west coast of Norway to explore the Geiranger fjord.

The goal is fewer cars, less polluting cars and cleaner air in the cities".

If today a lack of choice in models and electrical propulsion is still a limit, the real problem facing electric cars is battery life, an issue exacerbated by Norway's cold climate in which batteries discharge more quickly than in more temperate regions. This leaves cars unable to cover the long distances that national geography requires.

"Fifty to 60 per cent of all new passenger cars sold in Norway are electric and hybrid vehicles and this is expected to increase," says Eilertsen. "The problem is that the waiting list for EVs from the dealers is getting longer. However, some buyers are also waiting for cars with greater range and these will be on the market in 2018-19."

Like other clubs, the KNA is actively involved in promoting road safety and even if Norway has an admirable safety record, with only 100 deaths in 2017, for Eilertsen there can be done, especially by involving the authorities even further.

"The vision of zero killed and severely injured is very strong," says the club president. "A proposition to the Storting [Norway's parliament] on traffic safety has been made in order to involve politicians to an even greater extent. A joint action plan is being developed through which authorities, clubs, non-profit organisations and others contribute with their efforts. Every year the effect is measured against goals and what has been implemented. In this way, a wide range of contributors are involved in the traffic safety efforts."

In a bid to improve road safety, the club has become the voice of motorists and has strengthened its advocacy position.

"The KNA is a body entitled to address and call out the authorities, and is involved in anything from vehicle fees, road construction and legislation to traffic safety," says Eilertsen. "Road tolls, environmental restrictions and traffic safety in particular are topics for discussion. Traffic safety has been important since the beginning and KNA strives for increased focus on young drivers, driver training and risk awareness."

Despite technological advancements in recent years and the greater changes in mobility likely to come, Eilertsen is certain that the club must remain at the side of automobile drivers. "KNA's future role will probably be to represent those who have cars and those with a particular interest in them, including veteran cars and the cultural history of cars," he says. "Throughout our history, we have aspired towards the best possible conditions for motorists and this is reflected in our primary purpose – true joy of driving. Our goal is to become a larger club and a relevant player in the new automotive shift."

"The transition from horse and cart to the automobile is comparable to the transition we are currently experiencing, which is about electrifying, digitising and automating the transport sector. We believe driving in cities will become more difficult and more expensive. There will be more zero-emission vehicles. There will be autonomous shuttle buses making transport easier for those without cars. There will be better public transport and bicycle paths. Cities grow, and the need for personal cars will be reduced.

"What will the consequences be for young people growing up in a car-free city?" Eilertsen continues. "How will they understand traffic? Will they have their own cars? Will they drive at all?"

When the time comes, the KNA intends to be ready with an answer.

**'Our goal is to become a larger club and a relevant player in the new automotive shift'**



NAF wants to provide for all types of transport, not just cars, with products and services made available to cyclists too.

"We've been a central stakeholder in the debate on car taxes for more than 10 years," says Andersen. "We have succeeded in establishing the principle that vehicle taxes, which traditionally have been very high in Norway, should be based on a car's emissions, not the engine power."

"Our most important concern now is that the politicians do not reverse all the good work and introduce taxes on electric cars before they are competitive in the market."

Thanks to a close collaboration with the authorities and non-profit groups, with 13 per cent of revenues due to road safety education, the club is a central player in road safety.

"NAF has responsibility for 26 training courses across the country, which are central to the obligatory part of the driving permit programme," says Andersen. "In addition, we run a series of courses and activities – and reach out to kindergartens, schools, including the school bus services, and businesses."

To improve safety standards, NAF has also promoted the construction of safer roads, which allow drivers to make minor errors without causing a serious accident. Andersen calls this the "forgiving roads" philosophy.

"Our road safety work touches on the political, with a long-standing commitment to increasing the turnover of the car fleet, reducing the number of old, unsafe cars on our roads. Recently, we've increased our attention on road safety issues in urban areas, working with the authorities to improve conditions for cyclists and pedestrians."

The club's close relationship with the authorities led it to introduce an important mobility campaign this year, in order to showcase its role as a link between politicians and the public, and to raise awareness about the influence NAF members have.

"In conjunction with this year's parliamentary elections, NAF developed a major campaign where we got all eight party leaders to seek our members' advice on issues such as urban transport, car taxes and electric cars," says Andersen.

"The campaign was a success, with more than 40,000 visitors to the website, and it highlighted our role as an important stakeholder in the transport debate."

Another important area of NAF's activity is vehicle inspection and repairs, which accounts for 20 per cent of its income, and which the club is looking to expand.

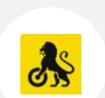
However, Andersen wants to go further than providing assistance for cars only. He says all types of vehicle should allow for safe, efficient and environmentally-friendly travel.

NAF sees its future role within the context of an integrated mobility system, which puts the consumer at the heart of transport services by offering them tailor-made mobility solutions based on their individual needs, with personal data at its core.

"It is essential that we take the position as the main distributor of products and services in people's everyday travel. To succeed, we will expand our portfolio to include new technology, and products and services related to leasing or car sharing. We'll also define our position within the travel industry, where our aim is to be our members' preferred provider of important information when travelling in Norway."

"We will develop products and services that are relevant to our future members' needs and are currently in the process of digitally transforming the entire organisation."

This is the future of transportation, with permanent connections between infrastructures, vehicles and users. But we are not there yet.



# Norges Automobil-Forbund

## Keener focus, bigger rewards



Fredrick Andersen, President of the Norges Automobil-Forbund, is focused on road safety and future transport needs for its members.

"Getting smaller to play bigger" might seem an unlikely motto for an automobile organisation with half a million members – and which is currently adding 50,000 new members a year – but for Norway's largest club, the Norges Automobil-Forbund (NAF), the catchphrase expresses a philosophy that focuses on members' needs in order to grow.

NAF President Fredrick Andersen explains: "We urgently need to improve our segmentation model and deliver with higher relevance to different needs among our members. Improving data quality and analysis will be crucial over the next few years, and to meet future member

needs we might introduce different types of memberships that could disrupt our existing model.

"We have established several autonomous teams to create new products and services, as well as develop our existing portfolio."

### CHANGING NEEDS

A look at NAF's member benefits reveals it has already achieved considerable diversification, catering for segments beyond just motorists.

"The transport sector is rapidly changing and we are working to develop our existing portfolio of member benefits to include electric car owners, cyclists and commuters in large cities," says Andersen. "Norway is in the forefront of electric car adoption and we're looking at how we can help our members through this major change."

NAF has successfully adapted to the explosion in electric vehicle ownership in Norway by improving the quality of roadside assistance for electric bikes and cars.

"EV assistance is part of NAF's ordinary roadside breakdown service," confirms Andersen. "And member benefits concerning charging electric cars and bicycles at home will soon be launched."

While the rising popularity of EVs has been encouraged by eco-incentives promoted by government in recent years, NAF is concerned that this trend will be interrupted now that they have achieved a degree of market competitiveness.



# Norges Bilsportforbund

## Making motor sport more accessible



Norges Bilsportforbund President Per Madsen is working to attract more young Norwegians into motor sport.

According to Per Madsen, newly-elected President of the Norges Bilsportforbund (NBF), the secret of a successful motor sport organisation resides in accessibility and giving new generations the opportunity to carve out a career in the sport.

With 5,500 licenced drivers on an annual basis, 13,000 one-time licenced drivers and 130 clubs organising 470 events each year, NBF, the national sporting authority annually delegated by the Royal Automobile Club of Norway since 1932 to exert control over motor sport in the country, is making solid efforts to ensure it is accessible, particularly to young enthusiasts.

"Since 2007, we have worked hard with a young drivers' development programme," explains Madsen. "And since 2010 we've received funding from the FIA Sport Grant Programme for this initiative. We are very grateful to the FIA for this funding that has been crucial in developing major activities in this important area."

"Now we can see the results. We have several young drivers at international level who are, or have been, programme members. Andreas Bakkerud, bronze medallist in World Rallycross 2016, Dennis Olsen, second in the Porsche Supercup this year, and 14-year-old Dennis Hauger, who this autumn joined the Red Bull Junior Programme after some spectacular results in karting. He'll be starting in Formula 4 next year."

In order to encourage young people into motor sport it's essential that there are low-cost alternatives to attract them: good local working clubs, facilities and circuits.

An initiative Madsen feels is well adapted to the Norwegian context is Cross Car, which was brought to life this year by the FIA ASN Task Force and Development Department as a new level at the base of the off-road and rally pyramid.

"Cross Car is a good start on the pathway to rally and rallycross," he says. "We've seen that drifting is also a good option in Norway for those who are not motivated or don't have the funding for racing. Grassroots motor sport will grow in the future."

### ROLE MODELS

Another project aimed at attracting young people, particularly in the future, is the Sim Racing Cup, which NBF launched this year. It's a virtual platform that has demonstrated on several occasions how driving ability in real conditions can be compared to that in the virtual dimension.

Young people need role models and in Norway they are not lacking, particularly in off-road and rallying, with top names such as Andreas Mikkelsen, Mads Østberg, Ole Christian Veiby, Petter Solberg and Andreas Bakkerud.

"It is important for our young drivers to see their heroes compete in Norway. In a way, it brings their own dreams closer," says Madsen. "We could see this clearly in 2003 when Petter Solberg became World Rally Champion. That was a boost for rallying in Norway. When you have top drivers, the media coverage whips up interest among the public."

The success of international sporting events is not, however, limited to having great champions. For Madsen, it's the close co-operation between the various players involved – drivers, sponsors, clubs, organisers, fans and the media – that ensures events are successful.

Most of all, the sport depends on the invaluable work of volunteers and officials, without whom it couldn't run.

"We must work with clubs and organisers to make volunteer participation attractive," says Madsen, for whom the recruitment of volunteers is a key objective.

Besides a great rallying heritage Norway boasts a long tradition of autocross competition, including a national all-female class that attracts about 70 participants every year, and rallycross in which NBF is involved in various successful national and international events, including the FIA World Rallycross Championship round hosted at Hell since 2014.

"We have a long rallycross tradition and a good national series. We are part of RallyX Nordic together with Sweden and Denmark, and from next year Finland will host events. RallyX Nordic is an FIA NEZ (North Europe Zone) series. We have a good level of cooperation within it."

Even though no complete international rally event is planned, the club hosts certain stages of Rally Sweden and actively cooperates with the Swedish clubs in its organisation.

"We hosted the World Rally Championship in 2007 and '09, but due to financial problems we haven't run Rally Norway since. But we have a close co-operation with Sweden."

"Since 2012 Rally Sweden has visited Norway for one day each year, with Norwegian clubs organising the stages. Our Secretary General is a member of the board of Rally Sweden, and several Norwegian officials and marshals have rally duties. It's a good example of border-crossing. It's been a success and will continue in the future."

Apart from promoting sporting events, Madsen is keen to develop close links between members of the FIA family – which was the aim of the FIA Sport Regional Congress held in Gardermoen in 2016.

"This was the first time the club hosted such an event in Norway since it became an FIA member in 1908," he says. "It was an honour for the club to play host to so many motor sport friends from Europe."

Another significant feature of the Norwegian Sports Federation's programme is environmental sustainability. "Yes, we care" was the NBF's motto during the 2009 Rally Norway, when the federation created a working group to ensure the sport's environmental sustainability.

"After one year, we saw that these efforts were bearing fruit and the topic became increasingly relevant. As a result, we changed the status of the working group to a commission."

In March 2015, the NBF attained an Achievement of Excellence in the FIA Environmental Certification Framework, which gave it the impetus to continue improving its work in the field of sustainability.

"There is a lot of focus on electric cars in motor sport," says Madsen. "In Norway, we have many private electric cars and have accumulated a certain experience with them. Inside the NBF, we also have a tradition of adapting easily to new trends."

## 'It is important for our young drivers to see their heroes compete in Norway; it brings their own dreams closer'



Rising Norwegian racer Dennis Olsen with rally star Andreas Mikkelsen.

09

# MAKING IT COUNT

With the FIA's 2017 world championships coming to a close, AUTO did some number crunching to work out the stats worth savouring...

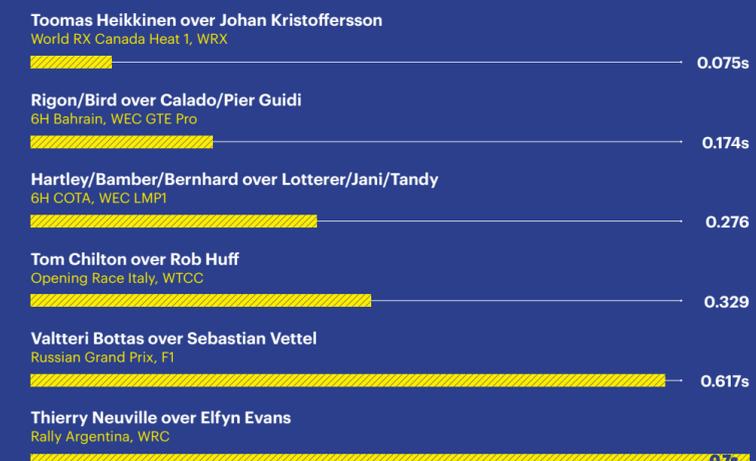
## COUNTRIES HOSTING MOST EVENTS



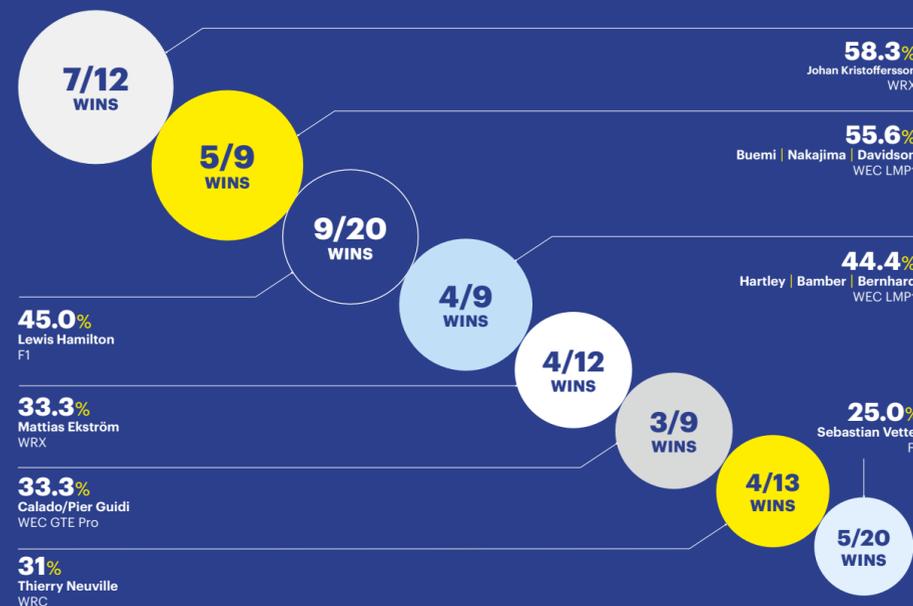
## CONSECUTIVE WINS IN 2017



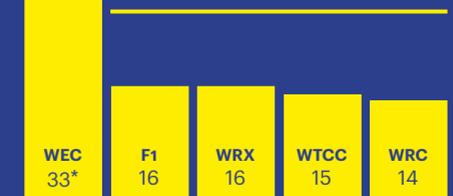
## CLOSEST FINISHING MARGINS PER SERIES



## BIGGEST WIN PERCENTAGE

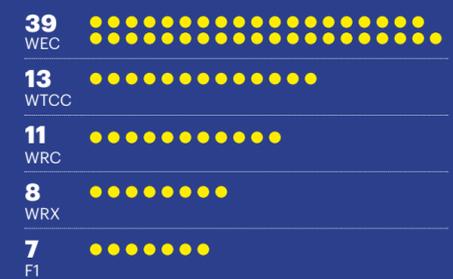


## TOTAL NATIONALITIES REPRESENTED PER SERIES

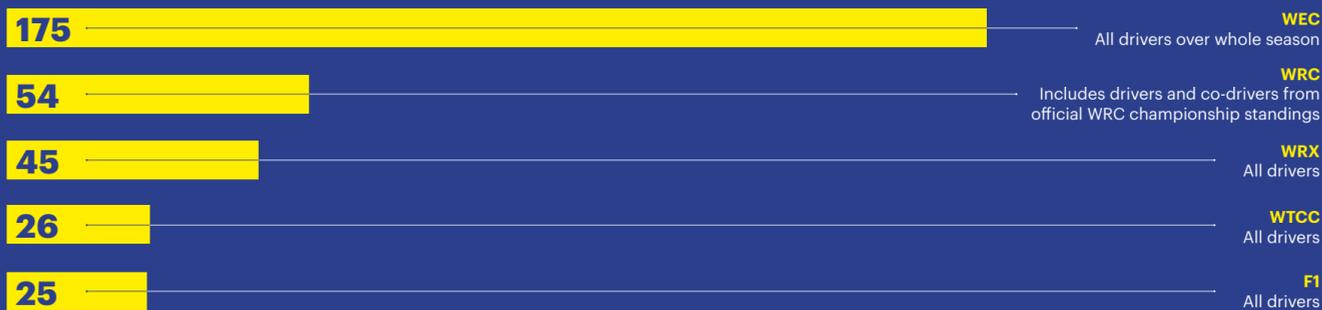


\*Includes one-offs such as in Le Mans 24 Hours

## NUMBER OF DIFFERENT DRIVERS ON PODIUM PER SERIES



## TOTAL ENTRANTS PER SERIES



## MULTIPLE CHAMPIONSHIP WINNERS



## YOUNGEST DRIVERS



## MANUFACTURERS REPRESENTED\*\*



\*\* 'Manufacturer' refers to any constructor, private or works, that maintains a permanent presence in an FIA World Championship series.

**FINAL LAP**  
*the last word*

Felipe, after 16 seasons of involvement in grand prix racing, you're calling time on your Formula One career. It was particularly emotional in Brazil, where you raced in front of your home crowd

for the last time. How did that feel?

The nicest memory I will keep with me of my final race at Interlagos is being able to bid farewell to the crowd, which I did from the podium with my son Felipinho by my side. That podium is linked to two of my most vivid memories from my Formula One career: the win in 2006 when I wore a race suit in Brazilian colours, and then in 2008 when I came so close to winning the championship. So to be able to stand on it again with my son, to thank all my fans, was really a very special feeling.

Looking back, are you happy with what you achieved during your career?

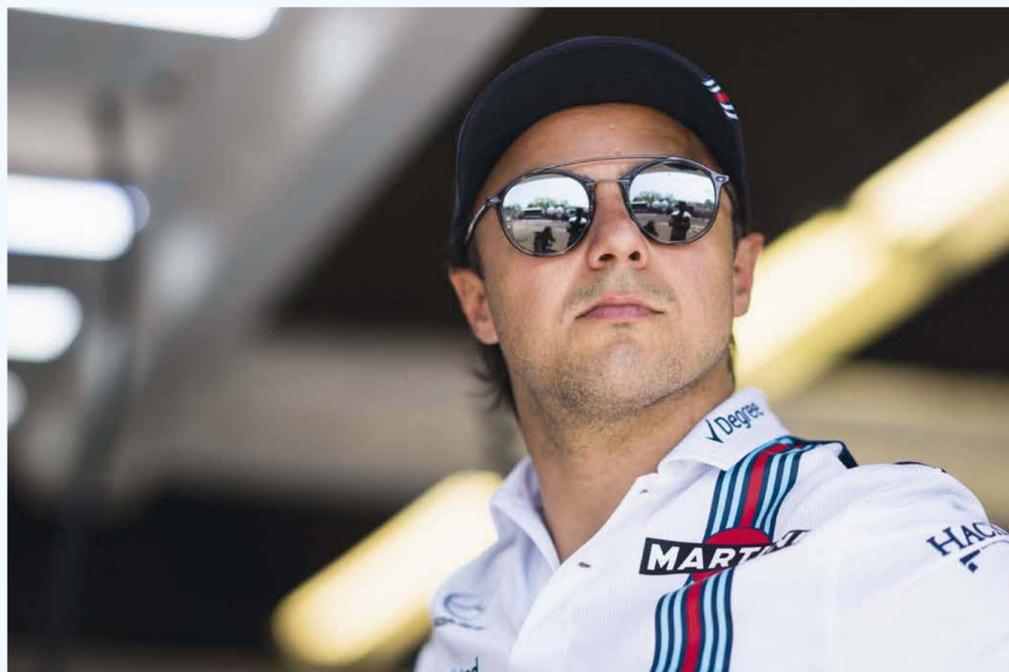
I am happy with what I have achieved in Formula One. I have raced at the highest level, for historic teams like Ferrari and Williams; I have won 11 grands prix and two of them at Interlagos, my home race, which for a Brazilian is simply priceless, and I came very close to winning the world title.

There have been some difficult moments, in the sporting sense and otherwise, which helped me grow in stature and become stronger as a driver and as a man. One thing I have liked a lot over the past year, from my first 'retirement' to my actual one, was feeling the affection and respect from so many people in F1, not just those I know best, those I have maybe worked with, but from so many other people.

You've seen plenty of changes in F1 over your time in the sport. How do you see the current climate and the initiatives brought in by the new commercial rights holder?

This is a particularly important moment for Formula One as it goes through some major changes. The arrival of Liberty has definitely brought a breath of fresh air that can only be a good thing.

I was particularly impressed with the initiatives aimed at the fans. The sport definitely needs to be more open, because it had become too closed in on itself. Now, it's a case of laying down the foundations for the long-term future. Formula One definitely has to stay as the pinnacle of motor sport. It has to continue being the series that every driver aspires to, where the best challenge each other in the quickest and most technologically advanced cars. When I was a kid, I dreamed of racing in F1, and I'd like the kids of today and tomorrow to have the same dream. I'm sure the new owners and the FIA, along with the teams and the constructors, will know how to find the best solution.



# Felipe's farewell

10

After 269 grands prix, 11 wins and the agony of missing out on the 2008 title by a single point, *Felipe Massa* is bowing out of Formula One. Here, he reflects on his career, his future plans in the world of karting and the fact that in 2018 there will be no Brazilian on the F1 grid...

TEXT

/  
LUCA COLAJANNI

**You've made no secret of your desire to race on. Have you thought any more about which series you would like that to be in?**

I grew up racing and I want to continue racing, but I haven't made a decision yet. I have to say I have been impressed at the way Formula E is growing. Last winter I got the chance to test the Jaguar in Sicily and I had a lot of fun. I like the format, both technically and in sporting terms, which means drivers show how quick they are but also use their intelligence in how they drive.

**It was recently announced that you're taking on another role, as President of the CIK/International Karting Commission. Why?**

Because it's something very close to my heart. I took my first racing steps in karting and it

taught me so much about the sport – not just in terms of the pure racing but about competition, fairness, how to win and how to lose and about the joy of motor sport.

FIA President Jean Todt knew I wanted to give something back to the sport and he knows my passion for karting so he offered me this role and I was happy to accept. I'm excited about it. A lot of great work has been done in karting in recent years and I hope to continue that.

**Your departure from F1 means that for the first time in almost 50 years there will be no Brazilian driver on the grid. How do you feel about that?**

Naturally, I'm disappointed. My country has been an integral part of F1 thanks to drivers such as Ayrton Senna, Nelson Piquet and Emerson Fittipaldi and I am honoured to have been part of it. What is worrying is that there is no sign of anyone coming through in the short term. The economic situation in Brazil has part of it, but it's not the only problem.

To go back to karting, there is no structure to prepare young drivers to move from karts to single-seaters and there is no national series that can get them ready to make the move to Europe, which is still the place that offers young drivers the best opportunities to progress. I tried in 2010 with Formula Future Fiat, but it didn't work. Today, seeing how Formula 4 is doing well in so many countries, I think Brazil needs a championship like this. We have a new president of the Confederação Brasileira de Automovilismo, Waldner Bernardo de Oliveira, and I really hope that can be a new impetus to do something for the youngsters.

# NEW YEAR, NEW PROJECTS!

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