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PRIZE GIVING 2018

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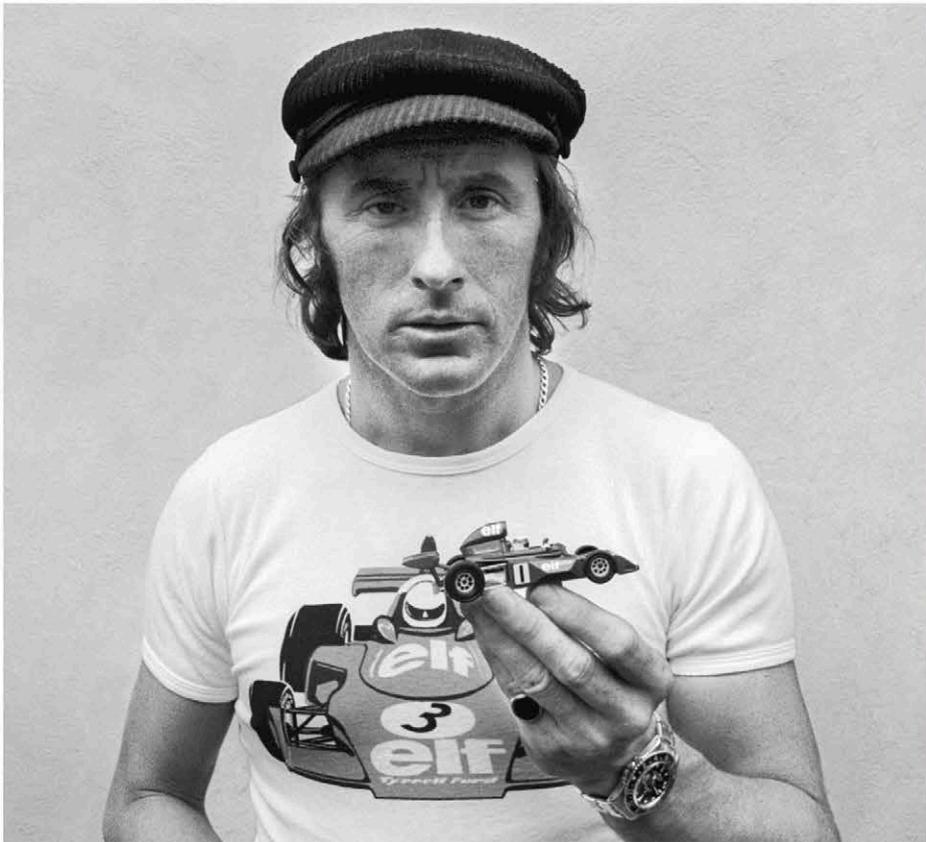


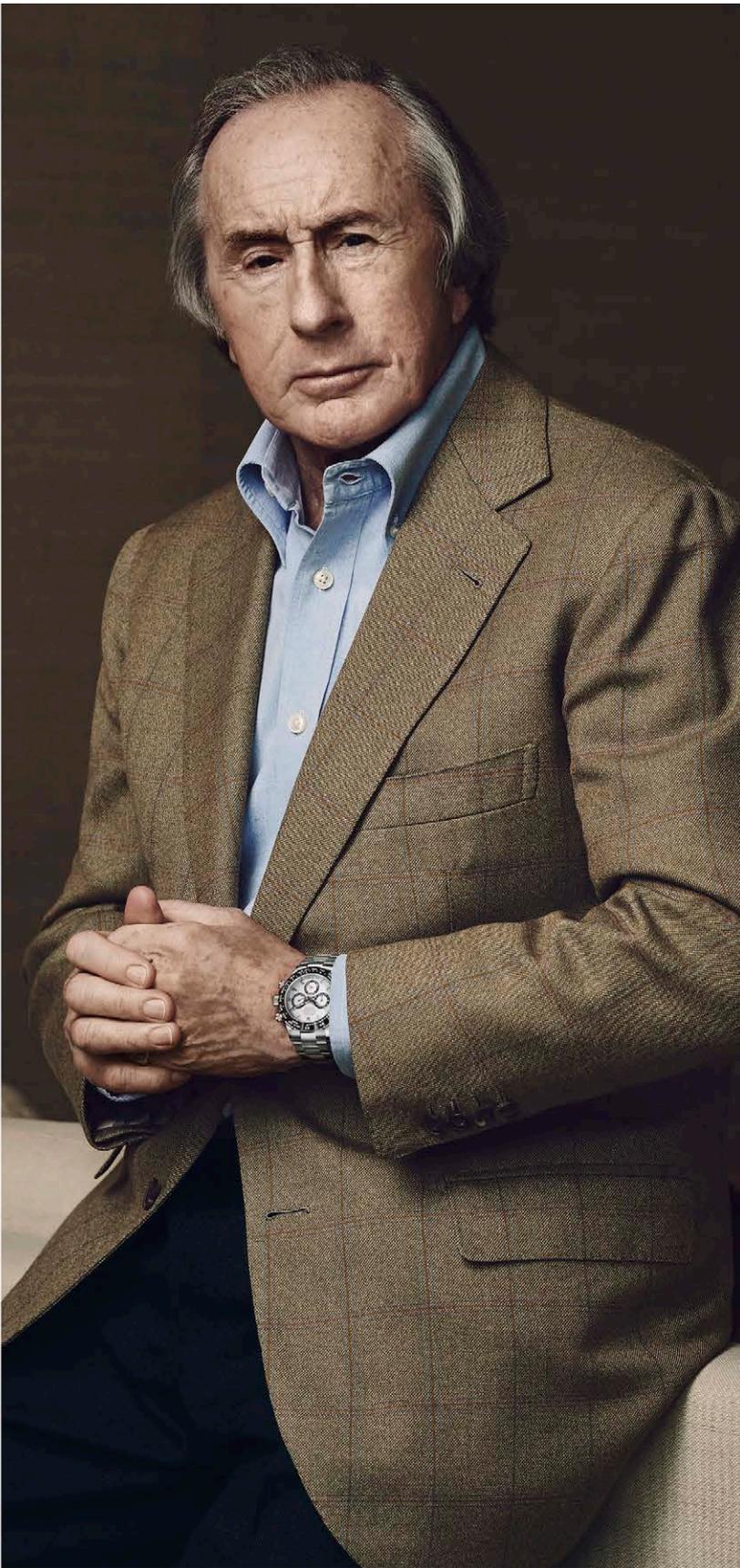


GERMAN GRAND PRIX 1973



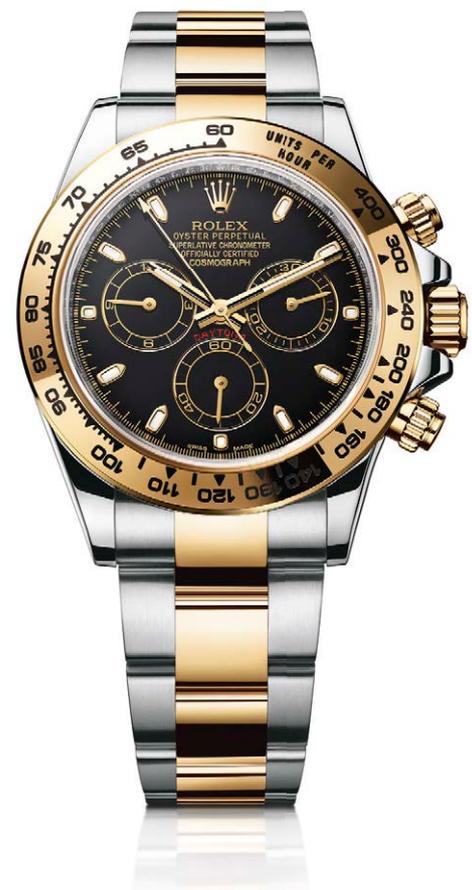
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Printing: Golinelli Communications Lab
We would like to thank the following for their help with this issue of AUTO: Frédéric Billet, Peter Bayer, Suzi Elliott, Sabine Kehm, Sarah Le Port, Caroline Morard, Cristian Olarean, Mark Wilford, Tom Wood, Jan Würzler
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Design Origination: seiddesign, Stuttgart

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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,

This final AUTO of the year celebrates a special moment in the life of the FIA family, as its publication comes not long after the GENERAL ASSEMBLY and the PRIZE GIVING ceremony that honours the winners of the FIA championships. I would like to take this opportunity to thank the RUSSIAN AUTOMOBILE FEDERATION and its President, VICTOR KIRYANOV, for the hospitality extended to us in the city of St Petersburg. Therefore what better cover story than the protagonists of what has been another exciting season of motor sport.

The final edition of 2018 is a good time to look back over the past year and to look to the future. This is particularly relevant in the world of karting, the first step on the racing ladder, and in this issue we hear the thoughts of FELIPE MASSA at the end of his first year as President of the FIA International Karting Commission. Felipe is still busy on track himself, racing in Season 5 of the ABB FIA FORMULA E CHAMPIONSHIP, which recently began at Ad Diriyah, in Saudi Arabia.

Elsewhere, we take a look at the new FIA Formula 3 Championship, the launch of which completes the racing ladder for young drivers on the way to the ultimate form of single-seater racing, F1. This new championship is the latest to get the Halo device and in our technical section we look at how innovations from the top levels of motor sport are cascaded down to other disciplines. Speaking of talented youngsters, among the current crop is one particularly dear to me – MICK SCHUMACHER. We feature the winner of the 2018 FIA Formula 3 European Championship in our Driving Forces slot.

In Mobility, we feature two women helping to advance the cause of road safety, OLGA ALGAYEROVA, Executive Secretary of the United Nations Economic Commission for Europe and MICHELLE YEOH, who was recently made a Trustee of the FIA Foundation. We also profile Toyota chief AKIO TOYODA.

Finally we present an overview of the FIA FOUNDING MEMBERS CLUB and the FIA Heritage Cup, and speak to nine-time Le Mans winner TOM KRISTENSEN about his remarkable career and work as President of the FIA Drivers' Commission. We also look to the future, with an analysis of the impact made by motor sport's debut at the recent YOUTH OLYMPIC GAMES in Buenos Aires.

Enjoy the read,



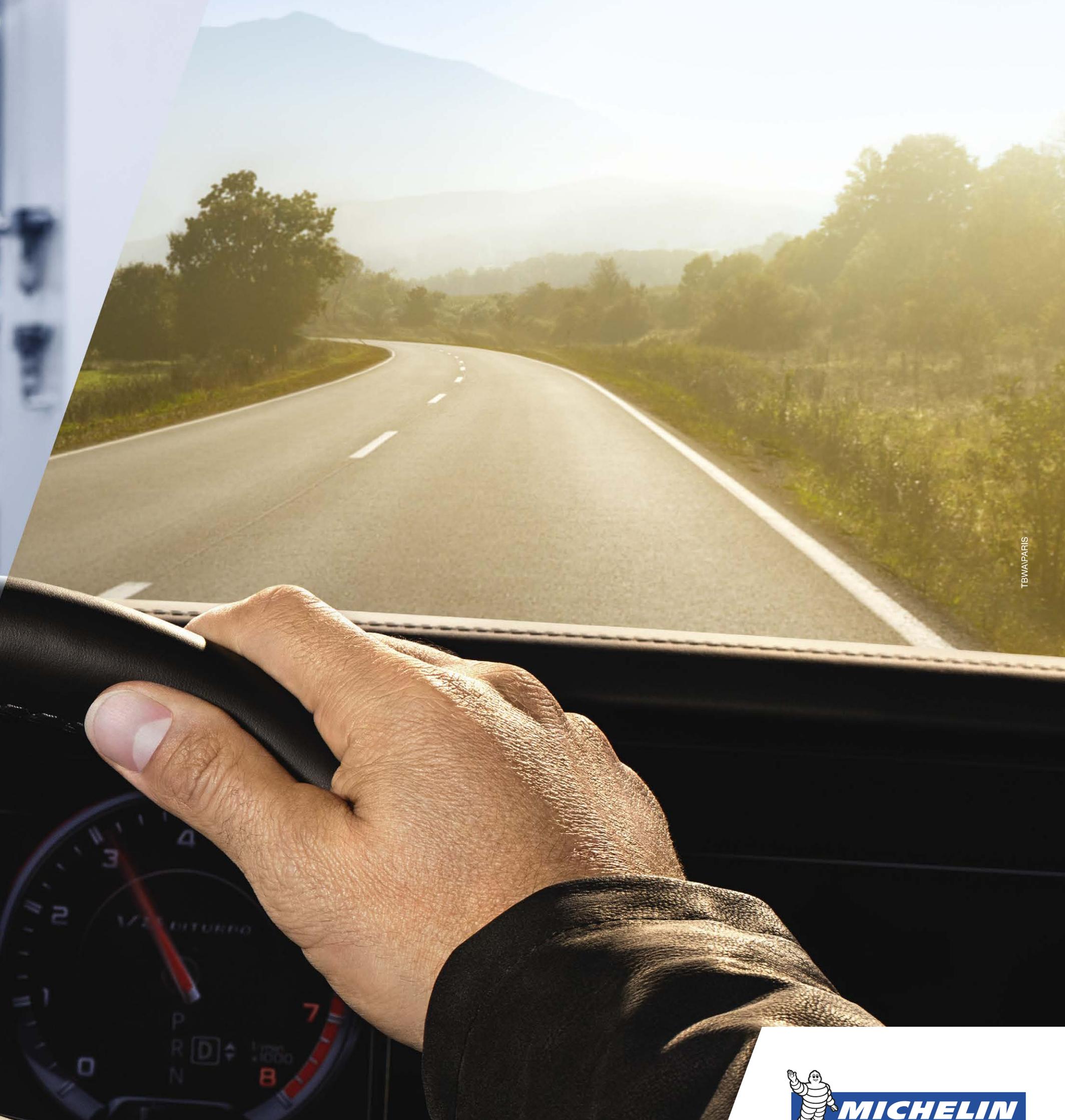
JEAN TODT,
FIA President

A handwritten signature in black ink, which appears to be 'Jean Todt'. The signature is fluid and cursive, written over a light background.

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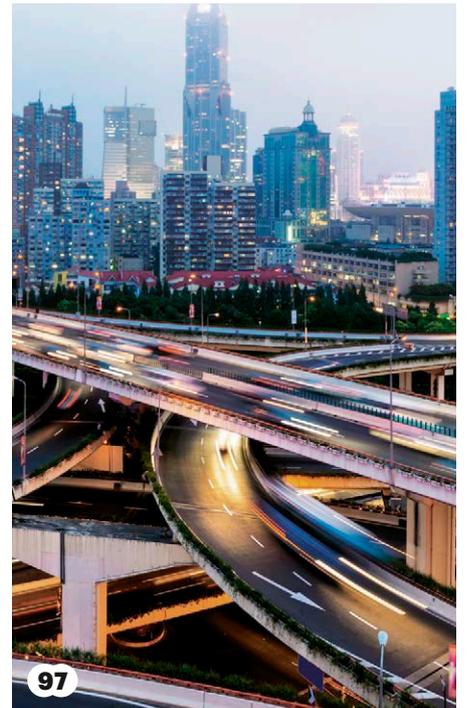
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Mari Hulman George

The Indianapolis Motor Speedway chairwoman was a pioneer of her time

BRITON'S DOUBLE DELIGHT

Motopark ace Dan Ticktum stamped his authority on the 2018 Macau Grand Prix with his second victory in two years, this time over team-mate Joel Eriksson and Renault F1 junior Sacha Fenestraz. "It was less surprising but more enjoyable than last year's win," said Ticktum. "When you dominate a weekend like that it is very, very special."



MACAU GRAND PRIX
**TICKTUM ON
TOP IN MACAU**

Red Bull Junior driver Dan Ticktum scored his second successive Macau Grand Prix victory following a crash-marred race in November. The McLaren Autosport BRDC Award winner took pole and dominated the qualifying race before leading the main event from start to finish. The race was interrupted by two safety car periods and was red-flagged when Sophia Floersch

and Sho Tsuboi collided. The German's car was launched over the Japanese F3 champion's, went over the barriers, through a safety fence and into a marshals' and photographers' area. Floersch, Tsuboi, two photographers and a marshal were taken to hospital, with Floersch requiring surgery for a spinal fracture, but all are now recovering from the accident.



TURKISH DELIGHT

Team Turkey enjoyed sweet success in the FIA GT Nations Cup, with Ayhan Guven and Salih Yoluc starting their Mercedes from pole for the race – the climax of a two-day meeting. After a safety car period the Turkish entry dropped to third behind the UK and Russia, but thereafter Porsche Carrera Cup champion Guven went on a charge to regain the lead, with the UK and Denmark rounding out the podium.



**FIA GT NATIONS CUP
UNITED
NATIONS**

Following a successful inaugural event, plans are underway for a repeat of the new FIA GT Nations Cup. This year's debut meeting was held at Bahrain International Circuit in December, where Team Turkey pairing Ayhancan Guven and Salih Yoluc took their Mercedes to a 3.311-second victory over the Team UK Ferrari of Chris Buncombe and Christopher Froggatt.

SRO Motorsports Group will continue as promoter for the 2019 event, which is set to run at the Vallelunga circuit in Italy. A November 2/3 date would place the meeting at the end of the European racing season. This year's race, run as part of the Bapco Bahrain GT Festival, involved 18 two-driver crews in cars decked out in the colour of each competing country's flag.



SOCHI'S STAR LINE-UP

Some of Russia's most promising junior racers joined Lewis Hamilton, Valtteri Bottas, Sebastian Vettel, Kevin Magnussen et al on the grid for the national anthem prior to the start of the Russian Grand Prix at Sochi Autodrom. The September race was won by Mercedes driver Hamilton on his way to a fifth world championship title.



FIA F1 FUTURE STARS
**LITTLE STARS,
BIG HEROES**

Launched at the start of the 2018 Formula 1 season as a means of encouraging the next generation of competitors, the Formula 1 Future Stars programme formed part of the pre-race ceremony at each Grand Prix. Children involved in junior categories of racing were invited by their respective ASNs to meet the F1 drivers and their teams during race morning,

culminating in the chance to join them on the grid as the national anthem was played. Sean Bratches, F1's Managing Director, Commercial, said: "These boys and girls are the lifeblood and the future of F1. The memory of standing by the best drivers in the world will hopefully inspire them to continue their pursuit of a career in motorsport."



01

NEWS

In this issue: France gives €3m to FIA-backed Road Safety Trust Fund; New Hypercar concept revealed to replace LMP1 prototypes; FIA President Jean Todt recognised for Halo safety device role; FIA Smart Cities winner Santiago takes delivery of 100 electric buses



NEWS FIA welcomes €3m contribution by France to UN Road Safety Trust fund

Jean Todt, President of the Fédération Internationale de l'Automobile (FIA) and the United Nations Secretary-General's Special Envoy for Road Safety, has welcomed a €3 million contribution to the UN's Road Safety Trust Fund.

France's contribution to the fund, which was established at the request of António Guterres, UN Secretary-General, and launched in New York in April 2018, was announced following a meeting of the FIA's High Level Panel (HLP) for Road Safety in Paris in October. The HLP, which brings together 57 leading personalities from both

French President Emmanuel Macron met FIA President Jean Todt and High Level Panel members to mark his country's €3m road safety contribution.

the public and private sectors who are committed to road safety worldwide, was a driving force behind the creation of the fund.

After being received at the City Hall by the Mayor of Paris, Anne Hidalgo, herself a member of the HLP, members of the panel met at the FIA headquarters at Place de la Concorde and were then hosted in the evening at the Palais de l'Élysée by the President of the French Republic, Emmanuel Macron.

There, President Macron announced France's €3m donation to the fund. The finance comes through the Agence Française de Développement (AFD) and is earmarked for road safety projects in Africa, where the road mortality rate is on average three times higher than in Europe. Mr Macron also stressed that road safety is one of the priorities of French development aid policy.

France is the first country to contribute to the Road Safety Trust Fund, which has already received donations from the FIA Foundation, Total, Pirelli and 3M groups.

Jean Todt and the HLP members thanked Mr Macron and Rémy Rioux, Director General of AFD, for the contribution, which will help to preserve lives on a global scale and set in motion a positive dynamic to finance this cause. The FIA President pointed out that more than 3,500 road traffic fatalities occur every day on the world's roads, among which 90 per cent are in developing countries. This makes road accidents one of the most serious pandemics of our time and the leading cause of death for 15-29-year-olds.

President Todt also called for all public and private actors, governments and large companies to contribute to the United Nations Road Safety Trust Fund.

NEWS FIA confirms 'Hypercar' rules for top level of endurance racing



Hypercar concepts will replace LMP1 prototypes at sports car racing's top level, competing in the WEC and at Le Mans.

The FIA has approved new rules for the top level of endurance racing, with a spectacular 'hypercar' concept replacing the current LMP1 category of prototypes.

The new regulations, which will come into force for the 2020-21 season of the FIA World Endurance Championship, were confirmed at a meeting of the FIA's World Motor Sport Council at St Petersburg, Russia in early December.

"Over the past few months we have worked hard to define a set of comprehensive regulations that we've developed with the help of a number of constructors, who have proved extremely motivated and willing contributors to this ambitious project," said FIA Endurance Commission President Richard Mille.

"The goal is the participation of hypercars in WEC races and the Le Mans 24 Hours," he added.

"To us these cars represent the future of endurance racing and the chance to bring back young spectators, female fans and people fascinated by these stunning vehicles. This will allow constructors to become major players in the development of endurance racing."

The new regulations centre on an innovative concept of a 'performance window', aimed at creating close competition between differentiated hypercar prototype designs. The regulations include aerodynamics capped by regulations to control costs and to ensure that performance does not compromise bodywork design, the employment of moveable aerodynamic devices front and rear, a maximum 520kW combustion engine to encourage diversity, and a front-wheel energy recovery and release system of up to 200kW.

The new regulations also mandate the use of production-based powertrains. A minimum of 25 road cars fitted with the combustion engine and energy recovery system (ERS) of the racing car must be produced by the end of a manufacturer's first season, with that amount rising to 100 by the end of its second season.

Cost control measures include a five-year homologation period, and limitations on parts per season, testing, tyres and personnel.

"When we established these rules we understood that we needed to focus on three goals," said François Fillon, President of the Automobile Club de l'Oest, which worked in partnership with the FIA on the new regulations. "The first was to reduce costs, the second was to stay at the cutting edge of hybrid technology, as Le Mans is still a testing ground for new technologies that are then used in road cars, and the third objective was to introduce cars with a hypercar look. The goal is to cap budgets at around €20 million for two cars."

NEWS Ford showcases technology to predict traffic incidents

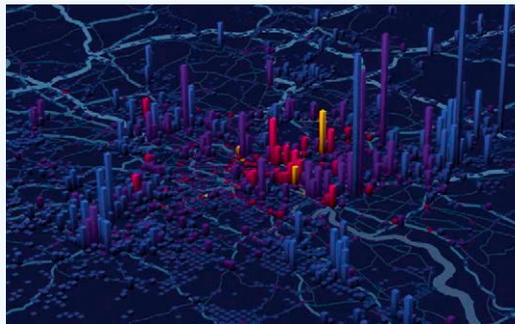
Ford has unveiled research it says could make cities safer through the utilisation of big data to predict future traffic incident hot spots.

The Ford Smart Mobility division of the auto maker has spent the past year recording one million kilometres of vehicle and driver behaviour in and around the city of London. The company tracked vehicle journeys in the capital and logged highly-detailed driving data from events such as braking, the severity of that braking and even where hazard warning lights were applied. This helped to identify 'near-misses'. The company then cross-referenced the information against existing accident reports and built an algorithm

to determine the likelihood of where future incidents might occur.

"We believe our insights have the potential to benefit millions of people. Even very small changes could make a big difference – maybe cutting back a tree that has obscured a road sign – whether in terms of traffic flow, road safety or efficiency," said Jon Scott, project lead at City Data Solutions, Ford Smart Mobility.

This concept features in Ford's City Data Report. Compiled using data obtained and analysed with the consent of participants, the report takes its findings from more than 15,000 days of vehicle use on 160 connected vans in London. The fleet of vans covered more than

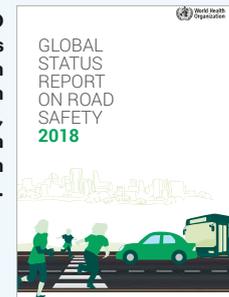


1 million kilometres and delivered 500 million data points.

The report also investigated other opportunities, such as how scheduling delivery van journeys for earlier in the day could benefit road users, and how using journey data could help to identify locations for electric vehicle charging points.

Ford's Smart Mobility division has built up a picture of traffic hot spots in London.

A new WHO report has shown an increase in road fatalities, prompting a call to action from the FIA.



NEWS FIA President calls for more road safety action after latest WHO report

FIA President Jean Todt has called on road safety stakeholders to "redouble their efforts" after the World Health Organization released figures showing that road fatalities are continuing to increase globally.

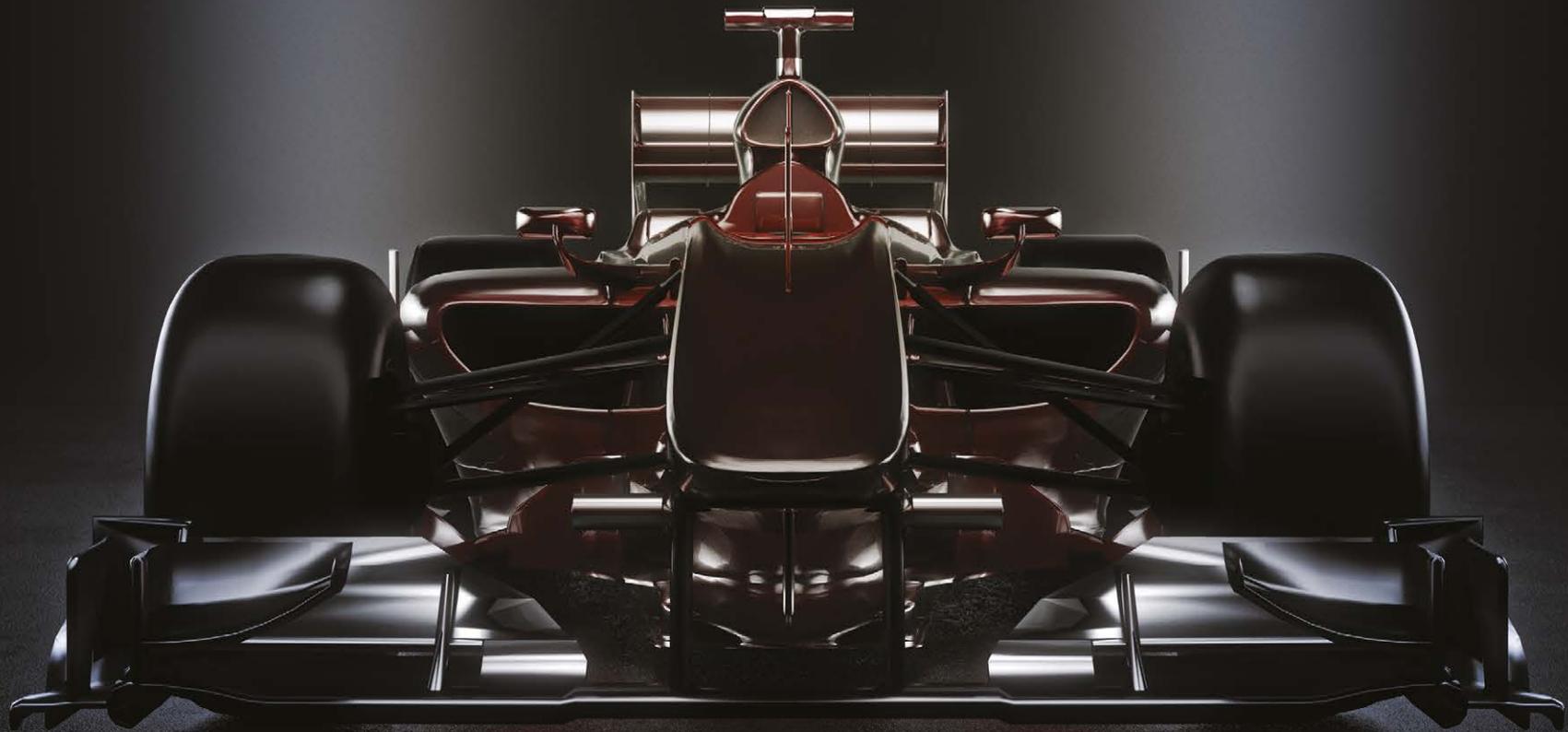
According to the WHO's Global Status Report on Road Safety, road fatalities have increased to 1.35 million, with road traffic injuries the leading cause of death among children and young adults aged five-29.

Responding to the latest figures President Todt said: "In my capacity as the UN Secretary-General's Special Envoy for Road Safety and as FIA President, I call on all stakeholders to redouble their efforts to improve global road safety and stop this carnage on the roads".

"These deaths are an unacceptable price to pay for mobility," added WHO Director-General Dr Tedros Adhanom Ghebreyesus. "There is no excuse for inaction. This is a problem with proven solutions. This report is a call for governments and partners to take much greater action."

The latest figures from WHO show that road safety remains a major public health issue, particularly in developing countries where the average fatality rate sits at 27.5 per 100,000 population in low-income countries, compared to 8.3 per 100,000 in high-income countries.

According to the FIA, current efforts are therefore far from sufficient if global road safety targets are to be achieved, notably the UN Sustainable Development Goal 3.6, which calls for a 50 per cent reduction in the number of road traffic deaths by 2020.



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NEWS FIA Smart Cities winner Santiago takes delivery of 100 electric buses

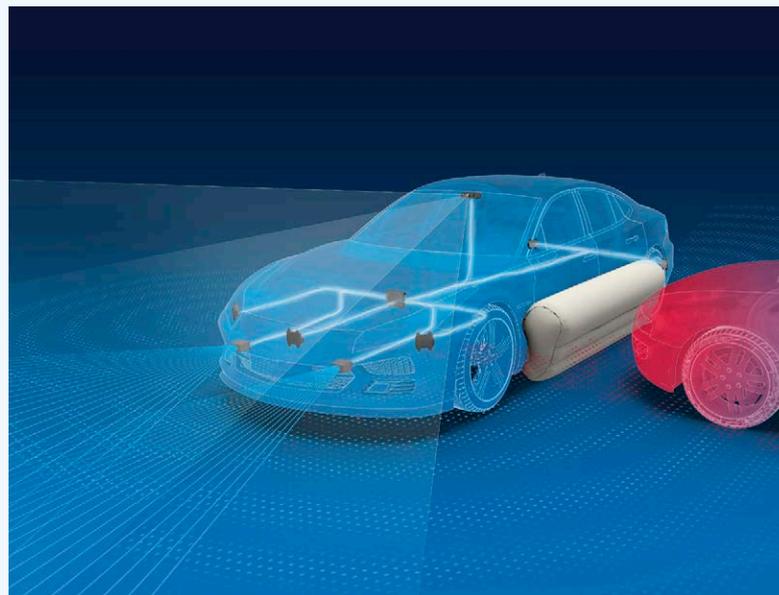
Santiago's plans to create a more sustainable public transportation system for the Chilean capital moved a step ahead in November as the city took delivery of 100 electric buses.

The recipient of the 2018 FIA's Smart Cities Award for the development of its Plan Integral de Santiago, which aims to bring a new model of sustainable mobility to the city, Santiago's authorities plan to create eight main roads and 12 exclusive corridors prioritised for public transport only, 13 bus-only streets (below), as well as bringing 200 electric buses to city streets by the end of next year.

The 100 new electric buses also form part of the national government's vision for a new transportation model, as Transportation Minister Gloria Hutt explained.

"President [Sebastián] Piñera's administration took on the challenge of making Chile a pioneer in the area of electro-mobility, and the introduction of the first 100 electric buses is part of that effort," she said. "The arrival of the first 100 such vehicles and the shipment of an additional 100 from China is the first step in what will be the new standard for the transportation system as defined in the Third Millennium Transportation Plan."

Santiago's Metropolitan Public Transportation Director Fernando Saka added: "This first stage will continue with the addition of another 100 electric buses and 490 EURO VI [low-emission diesel] buses, which will gradually be introduced over the course of 2019. These changes will be added to the improvements introduced to the system that will be seen in the new public tender."



NEWS External airbags could reduce injury by 40 per cent

A new research study has found that external airbags on vehicles could reduce passenger injury severity by 40 per cent during an accident.

German automotive technology group ZF, which carried out the tests on its external airbag concepts, believes that this technology could be implemented on production cars in just two years.

ZF's airbag system functions in a similar way to traditional interior airbags, except that it relies on a system of cameras and sensors to accurately detect an imminent side impact and deploy the technology at the right time. ZF is utilising the rapid advances in lidar, radar, ultrasonics and camera technology to recognise the vital details of what's coming at them, then react accordingly.

The airbag then serves as an additional crumple zone in the event of an accident, absorbing some of the forces of a side-impact crash. ZF estimates that the airbag, once it is set off, takes just 100 milliseconds to deploy.

"Occupant safety is paramount when developing new vehicles for automated and autonomous driving," said Dr Michael Büchsner, Head of ZF's Passive Safety Systems Division. "Our concept of the pre-crash external side airbag is a great example of how ZF wants to achieve its Vision Zero, a world without accidents and emissions."



German company ZF has tested an external airbag, which it hopes could be fitted to production cars in just two years.

NEWS FIA receives award at safety film festival



The FIA's 'Road to Change' film has won an award.

The FIA has been honoured with a prize at the 1st African Road Safety Film Festival, which took place in Marrakech, Morocco in November.

The Federation received the award for the film 'The Road to Change'. Made in 2018, it details the work of the FIA High Level Panel for Road, stars HLP spokesperson Michelle Yeoh and explains the global road safety challenge.

The Film Festival was held in support of the 1st African Road Safety Forum in Marrakech.

The Forum was organised by the Ministry of Equipment, Transport, Logistics and Water of the Kingdom of Morocco and the Africa Transport Policy Program (SSATP), under the patronage of his Majesty King Mohammed VI of Morocco, while FIA Member Club the Mobilité Club Maroc and its President Jalil Nekkouché were instrumental in facilitating the Forum's staging.

At the Forum, government ministers from across the African continent issued a declaration committing to improve safety in 2019 by, among other things: developing sound policies and effective strategies for road safety, backed up with appropriate action plans; creating lead agencies to manage road safety (for countries that have not yet done so), and allocating adequate funding to road safety activities.

In parallel with the Forum, African countries met to discuss and conclude on the proposed governance arrangement and initial work plan of the African Road Safety Observatory (ARSO).

NEWS Volvo and Chinese internet giant Baidu to develop autonomous cars

Volvo Cars has reached an agreement with Chinese internet search provider Baidu to jointly develop electric and fully autonomous drive-compatible cars with the aim of mass-producing them for China, the largest car market in the world.

According to the Chinese-owned Swedish car maker, the partnership will see the firms pool resources to take the next step and prepare for mass-manufacturing of fully electric and autonomous cars. Baidu will contribute with its Apollo autonomous driving platform, while Volvo will provide access to its expertise and advanced technologies of the car industry.

"With Baidu we take a big step forward in commercialising our autonomous-compatible cars, built on Volvo's industry-leading safety technology," said Håkan Samuelsson, President and Chief Executive of Volvo Cars. "There is a strong development in autonomous drive in China, where Baidu is a leading player, and the market there offers huge opportunities for us as the supplier of choice for autonomous fleets."

"We are very glad that Volvo Cars has established a strategic partnership with Baidu in the development of a fully autonomous car compatible with our autonomous driving platform, Apollo," said Dr Ya-Qin Zhang, President of Baidu. "We look forward to working closely with Volvo to provide the world with the safest auto products for the benefit of humankind."

Industry forecasts show that China is likely to become the single largest market for autonomous cars in the world in the coming decades. Market research firm IHS Markit predicted earlier this year that around 14.5 million autonomous cars will be sold in China by 2040, on a total global volume of around 33 million.



Volvo boss Håkan Samuelsson is bringing autonomous technology to China.

NEWS Audi acts to protect passengers in side-on accidents



Audi's new system lifts the car on one side in a T-bone crash to provide protection.

German manufacturer Audi has developed a new technology that raises the side of the car in a T-bone accident to provide further protection to the vehicles' occupants.

The safety system interacts with the AI active suspension to detect an incoming collision and raise the side of the car by 3.1 inches within half a second. With the side and floor structures of the car designed to be especially impact resistant, the aim is for more of the force to be absorbed before reaching the passengers.

"The door is structurally the weakest part of a car, but the bottom is the strongest," explained Thomas Stoerner, an Audi engineer who worked on the system. "Lifting the car makes the energy come to the lower part of the side."

Audi believes its new safety system should reduce the load on the passengers in a T-bone accident by up to 50 per cent, leading to a predicted decrease in chest and abdomen injuries sustained by those inside the car.

NEWS Todt welcomes 'important' UNRSTF contribution from Russian President

FIA President Jean Todt met Russian President Vladimir Putin in St Petersburg recently to accept the country's €2 million contribution to the UN Road Safety Trust Fund. The FIA President met with Mr Putin during the FIA's General Assembly series of meetings in St Petersburg ahead of the Federation's annual motor sport prize-giving ceremony.

"It was an important meeting with the President of Russia and we are very grateful to the Russian Federation for its contribution to the Fund," said President Todt, who also took the opportunity to present Mr Putin with an FIA Action for Road Safety race helmet.

The Federation's week-long series of meetings in Russia culminated in its prize-giving ceremony in honour of the FIA's 2018 motor sport champions. The gala evening is the highlight of motor sport's awards season and in the days leading up to the event FIA President Todt was present at two other awards events to accept awards. He was handed a Lifetime Achievement Award at German motor sport magazine Auto Bild's Motor Sport Race Night 2018, and receiving recognition at Britain's Autosport Awards for his role in introducing the Halo head protection device to motor sport.

The Halo debuted Formula 1 and F2 this year after a period of development and research. It

has proven its worth in several incidents, most notably in an F1 collision involving Sauber driver Charles Leclerc in which the device prevented a visor strike by another car.

At the Auto Bild Motor Sport Race Night 2018, President Todt received a Lifetime Achievement Award in recognition of his contribution to motor sport, mobility and safety. "This is a moment I will cherish always," he said after receiving the honour from former Ferrari colleague and FIA Single Seater Commission President Stefano Domenicali.



FIA President Jean Todt presents Russian President Vladimir Putin with an FIA Action for Road Safety helmet.

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02

QUESTION:

'IS TWO-WHEEL TRANSPORT THE FUTURE OF URBAN MOBILITY - AND CAN IT BE SAFE?'

With global leaders increasingly looking to cut traffic congestion and improve air quality in urban spaces, AUTO asked three experts whether two-wheel transport could help to provide a solution

Antonio Perlot

ANTONIO PERLOT SECRETARY GENERAL, ASSOCIATION DES CONSTRUCTEURS EUROPÉENS DE MOTOCYCLES (THE MOTORCYCLE INDUSTRY IN EUROPE)

'Think outside the box.' Never before has this expression been more suitable to describe what the answer to urban mobility challenges should be. The need to move away from 'business as usual' is widely recognised, as cities are facing more stringent air quality targets and seeking to avoid urban gridlock at peak hours – to ensure the health of their citizens, while improving their appeal and keeping their economies thriving.

As far back as 2011 the European white paper on transport stated the need to encourage the use of 'smaller, lighter and more specialised road passenger vehicles' for urban transport and commuting. More recently, the C40 network, bringing together nearly 100 cities from Europe and beyond that are home to over eight per cent of the world population and representing 25 per cent of global GDP, illustrates the aspirations of policy makers and the global direction future urban mobility plans should be taking in the coming years – with a higher focus on public transport and soft modes, while progressively moving away from space-consuming private transportation and the internal combustion engine.

These trends provide opportunities to think outside the box (or beyond the car) in the direction of two-wheeled transport, ranging from bicycles – standard or assisted – to mopeds and motorcycles, extending further to the whole 'light vehicles' category, which includes tricycles and quadricycles. These vehicles perfectly align with urban policy goals for passenger transport, as well as small-scale logistics. Within a multi-modal system – with their increased use in shared mobility schemes – they also provide flexible and efficient answers to the demand for 'last mile' trips. Finally, due to their characteristics in terms of size and weight, linked with the limited range of urban trips and reducing battery costs, electrification is expected to pick up strongly in the coming years in the commuting segment.

But what about the safety of these 'vulnerable road users'? Vehicle innovation, mainly in the field of active safety, is already and will continue to make the use of these vehicles safer.

In particular C-ITS connectivity, due to initiatives such as the Connected Motorcycle Consortium, will compensate limited possibilities for passive safety compared to passenger cars. New vehicle concepts are also showing the creativity of the light vehicle industry, providing further comfort and protection.

In the meantime, however, users of these vehicles also need to think



outside the box, raising awareness that their vulnerability deserves special attention, while responsibly using the vehicle with lights on to see and be seen at all times, and wearing dedicated protective equipment such as helmets and jackets.

Further attention is also needed from cities, which need to be mobilised to fully think outside the box, beyond the car, thereby making the safety of light vehicle users a priority in their transport policies, mobility plans and infrastructure management.

LLUÍS PUERTO

DIRECTOR, RACC FOUNDATION

The answer to this question is, it depends on the city. There are some cities where, because of the climate in winter for instance, motorcycles are not a preferred option for users. On the other hand there are cities with warmer climates throughout the year where this is a more preferred option. So, there is no single solution in this sense globally, and we can see that today: you don't have the same amount of riders in Canada as you do in Vietnam, if we put two extreme examples.

It is true that motorcycles have the potential to solve some of the problems we are facing in urban mobility today. They have a very low occupation of public space compared to cars. They provide very good travel times as a means of transport – faster than travelling by car or by public transport in big cities. They have a very low cost: purchase cost is low; maintenance cost is low; operational costs in general are lower, and parking is cheaper or even free in many cases. They also have very low CO2 emissions, if we go per passenger or per kilometre. They have a lot of pros that make them an interesting option for the future.

It's also easier to electrify this type of vehicle compared to buses or cars. They have a lower recharging time so it's easy to migrate from internal combustion engines to electric engines, something cities will push for in the next decade.

However, in terms of safety, it is at least five times riskier travelling by motorbike than it is by car. And that's an important obstacle in advanced societies, where safety is an important value. A quick comparison shows us that cars have evolved greatly, if we look back 25 or 30 years ago and compare them to today standards thanks in part to programmes such as EuroNCAP. However, motorcycles have barely improved the safety of the whole concept. For instance, we now have ABS (Anti-lock Braking Systems) on most high-power motorcycles, but low-power motorcycles still don't have ABS. Motorcycles really need to improve in order to be safer and attract new users.

We are seeing some concepts such as motorcycles with wheels on the front axle that give more stability and we need more of this from the motorcycle manufacturers. They cannot continue producing the same concept, they

have to bring in more technologies that increase dramatically the safety of the vehicle.

If they don't evolve they will never become the real king of urban mobility because we are seeing cycling and even personal electric devices becoming popular in many cities. Those are real challengers for the motorcycle industry because people switching from cars to another option looking for lower costs and to avoid congestion may well switch to cycling or scooters instead of motorcycles.

There are challenges ahead, so it is unlikely that motorcycles will become the main option in the future, but they have the potential to become part of the solution to deal with important challenges like congestion, urban pollution and global warming.

GEORGE YANNIS

PROFESSOR ON TRAFFIC SAFETY AND MANAGEMENT, NATIONAL TECHNICAL UNIVERSITY OF ATHENS

Two-wheel transport is indeed the future of urban mobility due to its clear time and cost benefits vis-à-vis other urban transport modes. Bicycles and motorcycles are already the preferred solutions to increasing city congestion problems, providing an ideal alternative for independent, fast and cheap transport. In addition, two-wheel transport is having a better environmental and health footprint, and is gradually being placed higher in urban mobility policies.

During the past two decades, cycling has steadily expanded in all modern cities around the world. More cycling infrastructure, bicycle sharing schemes and electric bicycles are making city

George Yannis



cycling more accessible to all. In parallel, powered two-wheel traffic continues to grow, especially in large and congested cities. Inevitably, all these developments are leading to increased two-wheel traffic congestion and parking problems.

However, the major drawback of two-wheel transport is safety, as their vulnerability towards other heavier vehicles results not only in a significantly higher probability of traffic accidents but also much higher severity of these accidents. According to the World Health Organization, 54 per cent of all road fatalities involve motorcyclists, cyclists and pedestrians. Not only are two-wheelers often taking more risks, but also the drivers of other vehicles do not always pay the necessary attention and the difference in speed between them leads to a significantly increased frequency of accidents, mostly more serious for the two-wheelers.

Two-wheel traffic can certainly be much safer, but never as safe as in the well-protected cabins of other vehicles. Cities are implementing low-speed schemes in urban areas with dense pedestrian and cycle traffic as the fundamental measure for two-wheelers' safety. Furthermore, the more two-wheelers are on the roads, the lower their accident risk as they are better perceived by the remaining traffic; a phenomenon called safety in numbers. Wearing helmets is fundamental for the safety not only of motorcyclists but also of cyclists, and any effort to increase helmet wearing rates would be highly beneficial. In addition, the vehicle industry is making available several new driver assistance technologies that prevent the risk and decrease the severity of accidents with vulnerable road users. Connected and automated vehicles are expected to boost two-wheel traffic safety, but this is not for tomorrow.

Two-wheel transport is certainly the future of urban mobility, but its safety depends on a new mindset for road users, the authorities and the industry towards more protective infrastructure, slower traffic and smarter vehicles.

Lluís Puerto



03

IN THE FOOTSTEPS OF GIANTS

Mick Schumacher's inspired march to the 2018 FIA F3 European Championship title and his decision to step up to Formula 2 in 2019 puts him on the cusp of a grand prix career. He tells AUTO how his stunning rise came about...

Congratulations on winning the 2018 FIA Formula 3 European Championship title. Have you had time yet to reflect on the victory?

Indeed it took me some time to digest it, to understand what has happened. It was such a big sensation to cross the finish line and finally have done it, to have achieved what we were working so hard for. I am still not sure I've understood the long-term meaning of that title, but I know one thing: it is a very good feeling!

In the first half of the season you didn't have the easiest time, with just two podiums, but then you took eight wins from the final 16 races and four other podium finishes. It's clear you unlocked something in yourself and the car. Can you pinpoint the changes you made in your approach to qualifying, the races and the car?

I see from people's reactions that it is hard to understand and it's also hard to explain, but really I think it was the outcome of a lot of hard work since before this season and also during the first season in F3. Going into 2018, the pace was really good and pre-season testing had gone well, and I was three-tenths ahead in the first practice session in the first race. So we were there already and we kind of knew it. But then in qualifying the suspension broke and it did not go well – and neither did the rest of the weekend. To be honest, I found myself

in a bit of a hole after that and it took a lot of hard work to get back on track. It really was working among ourselves, trying to find every little thing we could do better, believing in ourselves and developing a better routine. And then in qualifying at Spa everything we had defined as being important worked out – and there it was.

Was there a key moment in the championship you felt was a turning point – a moment where you thought 'now we're up and running'?

It started in Spa and then in Nürburgring, where I won all three races, it was clear that the title was in reach. In hindsight it may sound strange, but throughout the season I never thought the title was out of sight, I was always convinced it was still possible to win it. As I said, we had the pace, but there always seemed to be something that didn't go right, but I firmly believed we would sort that out.

'I am happy to be the son of the greatest F1 racer of all time. And even if sometimes it can be a bit difficult, it is what it is'

There is an old saying in motorsport regarding winning championships that a driver needs 'a season to learn, a second to win it'. Is that how you view your time in European F3 and how would you assess your progress across the two seasons?

It seemed to have developed for me like this in F3, absolutely. The first year was quite important for me and it really took a while to have a full understanding about everything that was going on.

I love the way you work closely with the team and the way you work with your engineer in order to develop your car, your approach and your driving, but if I'm honest it took me a bit [of time] to understand that, too.

What were the highlights for you across the season – the races you particularly enjoyed?

Probably Spa the most, as it was such a relief. But then Nürburgring was great with three victories. In the end, I really enjoyed a lot of the races, especially the victories, but also some of the others because of the racing.

Your former team boss Frits van Amersfoort says you have a very meticulous approach to your racing. Would you agree with that and, if so, is that something you learned from studying your father's approach to racing?

For me, everybody has to find his own way of approaching a race weekend, everybody has to find out for himself what is best for him, what he needs to go into a race or what information he needs to develop. It is better finding your own way than just copying. Personally I am convinced as well that this is important, but it would not mean that you cannot do it differently and still be successful.

Going back to your first steps in motor racing, did you always feel it was your destiny to race, or did you have to push your parents to be allowed to compete? Many racing parents don't necessarily want their children to be involved as it's such a tough career choice.

Racing and karting is quite a normal thing in my family and I always loved to go karting with

New F3 European Champion Mick Schumacher is preparing to step up to F2 with Prema Racing in 2019.





my father. It was big fun sharing that with him, and I remember him asking one day if this would be a hobby for me or if I wanted to do it as a professional. I told him straight away I wanted to do it professionally. I never wanted to do anything else.

Is your road made harder by being the son of perhaps the greatest Formula 1 racer of all time? Does the weight of expectation feel tough sometimes?

I am happy to be the son of the greatest F1 racer of all time. I'm happy that he is the greatest F1 racer of all time, and I admire him for that. And even if sometimes it can be a bit difficult, it is what it is. There are good sides to it and there are bad sides. Having the support I have from a lot of people all over the world can't be a bad thing. I am thankful for that.

Given the inevitable media attention does that make you all the more determined to take things at your pace and not to be rushed into anything?

Again, everybody has to find out for himself what's best for him. We always said that we wanted to take time for me to develop as a racing driver in the best possible way, and we were good in doing it the way we did.

You drove your father's Benetton B194 at Spa last year. How was that? What did it tell you about what grand prix racing was like in the early phase of Michael's career?

Unfortunately I couldn't race that car, just drive it for a lap, and even a kind of cautious one. So I can't really answer the question. But clearly this was very special. I felt the emotions from everybody in the paddock and also the grandstands. It was not only emotional for me, and that was nice to see.

Your most recent racing was in the F3 Grand Prix at Macau. The event there is one of motorsport's real classics and it's a race your dad won in 1990. Can you describe the experience of competing at the Circuit Guia, the sense of history and just what a challenge it is?

You know, that circuit is somehow unbelievable and absolute fun to drive. It is so tight, you really have to find your limits and sometimes even slightly touch the barriers; it is just so special.

This year, however, we had that big accident of Sophia [Floersch] and I am just happy to see her nearly OK again. That is just proof of how good the safety standards of the cars are nowadays.

You recently announced that you're moving up to Formula 2 for next season and staying with Prema Racing as you do so. Are you excited by the prospect?

I am very eager to learn more, improve my skills both in driving the car but also in working with the team, and I am really looking forward to that new adventure. ◀



04

TECH FOR ALL

Safety researchers are ensuring that technology developed for top-level championships cascades down to grassroots racing and beyond

TEXT

/

MARC CUTLER

The F1 Halo is famous for its much-discussed introduction into motor sport's biggest championship this season. But the safety device has become a success story for another reason – its rapid integration into other series.

Already appearing in Formula 2 and Formula E, the Halo is set to filter down to F3 and eventually national F4 championships as well as international series such as Japan's Super Formula, demonstrating that top-level safety technology can quickly become accessible for the many, not just for the few.

This is a key aim of the FIA and its safety research department. "We always have the lower formulas in mind when developing safety at the top level," says Senior Research Engineer Andy Mellor. "The FIA has a road map for safety delivery, covering all of the FIA and national championships from single-seaters to closed cars, cross-country and karting. The road map shows what is planned for the years ahead in terms of delivery and cascade. With the Halo, the cascade was built into the plan."

Another case in point is the new 8860-2018 standard helmet, featuring an ultra-protective structure together with additional ballistic protection, which will be mandatory in F1 and F2 from the 2019 season. It will then become required equipment in Formula E from the 2019/20 season and in F3 from 2021.

However, it was not intended that this technology would be mandated in grassroots racing, clarifies Mellor. This is because the main issue for lower-level series is not the integration of technology but the cost of doing so. This is why safety technology must be adapted to meet smaller budgets while still delivering on performance.

"Affordability is critical," explains Mellor. "If the rules require a club-level driver or independent team to use a €3,000 helmet many competitors may choose not to compete. So we need to be extremely sensitive to this." ▶

The Halo safety device has quickly been adopted beyond F1, in series such as Japan's Super Formula.

Continued on p30

CASCADING TECHNOLOGY

A number of safety devices that made their debut in Formula 1 have filtered down to other championships. A few key examples are explored here:

ACCIDENT DATA RECORDERS

Essentially the 'black box' in a Formula 1 car, the Accident Data Recorders (ADRs) measure the external forces on the driver in a crash. A high-speed camera (see separate panel) that faces the driver and miniature accelerometers fitted inside the driver's earpieces supplement the information captured by the ADRs. This device stores data for researchers to examine after the race and help them understand how the car's safety features work in a crash. ADRs support a strong understanding of crash kinematics to help ensure that safety can be optimised. In the case of a serious accident, the analysis can determine whether each of the safety elements in place to protect the driver performed as it should.

Leading championships like Formula 1 and world rallying have been running ADRs for many years, but initially cost restricted its introduction into lower series. However, research has been conducted to help cascade the technology at an affordable price and in 2015 it became mandatory for all F4 cars to run this device. To help further, the first-ever FIA standard for ADR systems will be introduced in 2019, with the intention of providing a technical reference for the manufacturers to satisfy while encouraging more championships and race series to implement them.

ANTI-LAUNCH NOSECONE

The anti-launch nosecone was developed to prevent a car from being launched into the air by reducing the risk of the nose being lifted off the ground by the rear wheels of the car in front. The development of this technology was initiated after Mark Webber's 2010 European Grand Prix incident where, after making contact with the rear tyre of Heikki Kovalainen's Lotus, he was launched into the air. The nosecone design was reviewed in 2014 after the technical regulations changed. With such a radical new design that saw the teams make many adjustments to the nosecones, there was concern that they would incur a scoop effect in an incident, with more cars rolled over. This was something that was seen in the 2014 Bahrain Grand Prix as Pastor Maldonado flipped Esteban Gutiérrez over when his front wing came into contact with the side of the Mexican's car. Ahead of the 2015 season, the FIA safety department worked to refine this design to prevent airborne crashes. The new designs were implemented in 2016. This design has since been incorporated into the Gen 2 Formula E car as well as Formula 2, F3 and F4 national championships.

Modern F1 cars are fitted with an array of systems to monitor the driver and protect them in the event of an accident.

BIOMETRIC GLOVES

New for 2018, biometric gloves are the most recent step forward in technical development. They give medical insight never tapped into before, tracking a driver's vital signs during the race through 3mm sensors sewn into the palm of the gloves. Importantly, this records the pulse rate and oxygen levels in the driver's blood, which gives trackside medical teams access to data on the driver if their incident means they are having trouble talking or breathing. Having this in-depth knowledge of a driver's condition before arriving at the incident could have a massive impact on the speed in which the correct treatment is carried out. This live, instant data means drivers can be monitored from the moment of the incident right up until they are in the custody of the medical team. After just one year

of having this technology, the FIA is looking to filter it into other championships. The gloves are making their debut in Formula E this season and will be mandated for all drivers during each round and at all tests that are attended by more than one team. The FIA is now planning to implement more sensors into the gloves so that respiratory rates and temperature can be recorded. The more vitals from the driver that can be monitored after an incident and ahead of getting to them, the sooner the correct treatment can be started.





SIDE-IMPACT STRUCTURES

If you peel back the sidepods of a Formula 1 car you will see an array of carbon fibre tubes that form an advanced protection system. Introduced into F1 in 2014, this was the result of a two-year study to develop a side-impact system that works just as well in a T-bone crash as it does in an acute-angle incident.

The previous side-impact system used deformable cone structures attached to the side of the chassis. But sometimes the base attachment could snap early in the accident meaning that the cones, which were designed to absorb the force, became redundant.

The new solution is a structure that does not shatter on impact but rather progressively fails and decelerates the car in a controlled manner. In testing it absorbed the force of a 780kg sled running at a speed of 10 metres per second – that is the equivalent of 15 tonnes trying to squash the chassis and another 11 tonnes trying to tear off the crash test tube.

This system has since been incorporated into the Gen 2 Formula E car as well as Formula 2 and F3.

HIGH SPEED CAMERA

The High Speed Camera is one of the newer pieces of safety technology in F1. Introduced in 2016, the camera sits in front of the steering wheel, giving researchers an invaluable picture of what happens to the driver's helmet and head during an accident by providing information about any movement or contact. The High Speed Camera shoots 350 frames per second, providing unprecedented detail. To prevent any loss of footage, the video is recorded in two locations: on the camera and backed up on the car's Electronic Control Unit. The High Speed Camera is being introduced to Formula E and NASCAR, and there are plans to run it in the World Endurance and World Rally championships.

HALO

With the purpose of preventing large objects from entering a single-seater cockpit and bringing another level of protection to the driver's head, the Halo made its debut in the 2018 F1 season.

The Halo was put through its paces before being brought in as a mandatory feature in F1. As part of its research the FIA examined 17 different serious incidents and looked at how the outcome would be different with the Halo. It found that in 15 cases there was a better result for the driver involved, while the other two had no negative or positive impact.

The FIA plans to have the Halo safety device on all single-seaters by 2020, with F1, F2, the new F3 and Formula E already implementing the device ahead of their upcoming seasons.

REAR-IMPACT PROTECTION

This structure is positioned behind the gearbox, giving protection to drivers in a rear-end incident. Similar to the side-impact structure, the rear protection works by dissipating the energy of an incident while minimising the loads on the survival cell around the driver, thus subjecting them to as little force as possible. When an impact occurs, these lightweight safety devices begin to crush from the tip towards the root, absorbing energy and mitigating the forces imparted on the driver. Made of carbon fibre composite, they are extremely optimised and efficient structures. Incidents like Billy Monger's 2017 horror crash show not only why it

is so important that these safety measures are cascaded down to the lower series, but also that safety concepts can be initiated and delivered first to the lower levels. A new front-bulkhead anti-intrusion system has been developed and delivered to Formula 4.

In 2016, the rear-impact structure became a mandatory feature in all FIA-endorsed go-karting championships. A little less sophisticated than what is seen on the modern F1 car due to the cost of fitting such a structure to a go-kart, the CIK-FIA karts must now all be equipped with a hollow plastic rear structure that is moulded around the rear wheels.



This is why the FIA developed the 8859 helmet standard, which incorporates many of the features of the Formula 1-level 8860 helmet but at a small fraction of the price.

"In our thinking we aim to apply the 80/20 rule, where you target 80 per cent of the performance for 20 per cent of the cost. This helps define the engineering goals," adds Mellor.

The Halo is also a working example of this. While the F1 Halo is made of titanium and costs €15,000 each, the F3 Halo for 2019 will be made of steel and costs close to one fifth of the price. In this case, however, the performance requirements are actually the same as the titanium part and the compromise was weight – it weighs in at 12.5kg compared with 7kg for the titanium part. This may have a bearing on the performance of the car but without compromising the safety for the driver.

For protective equipment, the cascade route is clearly working. However, for high-tech safety devices such as Accident Data Recorders (ADR) there is a need to match the systems to the availability and capability of the resource at the track.

"In this case the cascade can require a different approach because in the top championships technology systems can be run that are complex and rely on very capable guys at the track who can manage and operate them," says Mellor. "Whereas down at grassroots level,

the systems target a more 'fit and forget' approach, requiring less trackside technical support. This can require a design brief with a quite different range of considerations."

SAFETY INCENTIVES

Despite obvious benefits there is still often resistance from grassroots championships to embrace newer safety technology because the costs can be prohibitive. This is why the FIA has launched the Safety Homologation ASN Reward Programme, which incentivises National Sporting Authorities to introduce the latest safety tech to their championships.

The objectives of this programme are to increase the safety of drivers worldwide through the deployment of state-of-the-art motor sport safety protection, particularly at a national level. And to improve safety at the grassroots level, which has historically been a significant market in terms of driver injury.

To help achieve this the FIA rewards ASNs that comply with the FIA safety equipment regulations in 10 specific categories: helmets, frontal head restraints, drivers' clothing, seats, belts, fuel tanks, wheel tethers, racing nets, fire extinguisher systems and karting overalls. Each ASN following this programme is entitled to receive a reward amount of €1,000 for each safety category, up to a maximum of €10,000. Each must also commit

The FIA is striving to filter single-seater safety systems down through the motor sport ladder.

to provide information to the FIA's World Accident Database for any accident that falls into one of three categories – Fatal Accident, Serious Accident and Significant Incident.

In addition, the funding must be used solely for safety projects and each ASN that receives a reward is required to report on their use of the funds. The programme has already proved to be a great success. Nuno Costa, FIA Head of Safety Equipment Homologation, says: "We launched the programme in 2017 for the first time and 16 ASNs applied. This year was the second edition and 35 ASNs applied for the programme."

GRASSROOTS SUPPORT

The ultimate aim is to ensure that relevant safety tech filters down to grassroots championships and that a local racer can receive a substantial level of the protection afforded to an F1 driver. This is an achievable goal, according to Mellor.

The FIA's philosophy for safety is to offer 360 degrees of protection to the driver in any type of accident, whether a frontal impact, side impact, rear impact or roll-over.

"We will be targeting ways to achieve an extremely high level of protection into the lowest category cars that you might race on a Sunday for a very modest budget," says Mellor. "It need not be expensive to follow this philosophy of protection." ◀

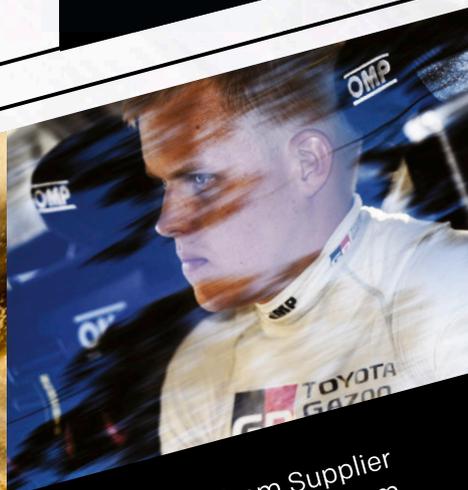
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05

FANFARE FOR CHAMPIONS

TEXT

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LUKE SMITH

From a historic F1 title triumph and a white-knuckle ride to glory in WRC to a supremely dominant World Rallycross campaign and a nail-biting fight to the finish in Formula E, the motor sport season just gone was a classic. AUTO looks back at the remarkable achievements of the FIA's 2018 champions and the glittering celebration staged in their honour at the St Petersburg Philharmonia in Russia







FIA Formula One World Championship

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WINNING DRIVER:

Lewis Hamilton

WINNING CONSTRUCTOR:

Mercedes-AMG Petronas Motorsport

Lewis Hamilton may have considered his 2017 Formula 1 title victory over Ferrari rival Sebastian Vettel as the toughest of his career at the time, yet it proved to be just a taster for the even greater challenge the Mercedes driver would face in 2018 as he battled to become just the third driver in the history of F1 to reach five world titles.

Despite Ferrari's pace advantage for much of the season, Hamilton's dominance through the second half of the year allowed him to claim his fifth – and most impressive – F1 crown, taking eight victories across the last 11 races (to Vettel's single win in the final run) to clinch the championship with two GPs to spare.

Victory at Round 11 in Germany from 14th on the grid lit the blue-touch paper for Hamilton's march to the title, while Vettel – who crashed out while comfortably leading at Hockenheim – suffered a downturn in form, making costly errors at Monza, Singapore, Austin and Suzuka.

Hamilton ended the year with a total of 11 wins and a record F1 points total. Most importantly, he also had an 88-point margin over Vettel, making 2018 his most comfortable title success to date – on paper at least.

And thus, Hamilton joined grand prix legend Juan Manuel Fangio as a five-time title winner. Only the great Michael Schumacher, with seven titles, stands ahead of the imperious Briton.

Mercedes too celebrated a quintet of titles, the German marque wrapping up the constructors' championship in Brazil, with Hamilton's efforts aided by team-mate Valtteri Bottas who scored eight podium finishes.



Lewis Hamilton
receives his F1
drivers' silverware
from FIA President
Jean Todt.

FIA World Rally Championship

/

WINNING DRIVER/CO-DRIVER:

**Sébastien Ogier and
Julien Ingrassia**

WINNING CONSTRUCTOR:

Toyota Gazoo Racing WRT

Sébastien Ogier and co-driver Julien Ingrassia have spent much of their WRC career as the crew to beat and entered 2018 off the back of their fifth straight title success. But their second year with M-Sport Ford saw them take an underdog role for much of the season.

Three victories from the first four rallies allowed Ogier to open up a solid early lead, but then a run of six events without a win turned the title tables and Thierry Neuville and co-driver Nicolas Gilsoul moved into the ascendancy for Hyundai.

Victories in Sweden, Portugal and Italy put Neuville 13 points clear of nearest rival Ott Tänak – the Toyota ace thrust into title contention after three straight wins – with three rallies remaining, with Ogier sitting a further 10 points behind.

But the pendulum swung once more in the final rounds of the season. Ogier took victory on Wales Rally GB and P2 in Spain to lead a three-way showdown in Australia, where Neuville and Tänak were both forced to retire, making Ogier a six-time world champion.

Tänak did spearhead Toyota's run to its first WRC manufacturers' title since 1999, clinched after a season-ending win for team-mate Jari-Matti Latvala in Australia.



Tommi Mäkinen enjoys success for Toyota, alongside six-time champs Sébastien Ogier and Julien Ingrassia.









Swede Johan Kristoffersson dominated WRX in 2018, helping the PSRX team to a second title too.



FIA World Rallycross Championship

WINNING DRIVER:

Johan Kristoffersson

WINNING TEAM:

PSRX Volkswagen Sweden

It is hard to find a more dominant racer in their discipline than Johan Kristoffersson in 2018.

The 30-year-old Swede set records en route to his maiden WRX title in 2017, yet he surpassed them with comfort this year, taking 11 wins from 12 races to secure a second crown in remarkable fashion.

The only blot on Kristoffersson's copybook came at Mettet in Belgium, round three of the season, when his car almost rolled after contact off the start-line, allowing Sébastien Loeb to take the victory. Kristoffersson still managed to finish the race in fifth.

After impressive wins at Trois-Rivieres and Lohéac, Kristoffersson clinched the title in Austin amid a nine-race winning streak to the end of the season. He finished almost 100 points clear of closest rival Mattias Ekström, who bowed out of WRX after four years.

Kristoffersson's dominance helped team-mate Petter Solberg's PSRX Volkswagen Sweden squad secure the teams' championship for the second year running, beating EKS Audi Sport by 83 points.

There was further Swedish success in the WRX2 support category as 19-year-old Oliver Eriksson claimed his maiden title thanks to wins in Great Britain, Canada and France, finishing 19 points clear of Guillaume de Ridder.





FIA ABB Formula E Championship

/

WINNING DRIVER:

Jean-Eric Vergne

WINNING CONSTRUCTOR:

Audi Sport ABT Schaeffler

Consistency was the key to Jean-Eric Vergne claiming his maiden Formula E crown, as he became the all-electric championship's fourth winner in as many seasons.

Having only scored his first Formula E win at the Season 3 finale in Montréal, Vergne started Season 4 strongly, with pole in Hong Kong coming ahead of wins in Santiago – where he and Andre Lotterer delivered Techeetah the first one-two in Formula E history – Punta del Este and on home soil in Paris, which put him in control of the title race.

While Audi Sport ABT Schaeffler appeared to have a pace advantage, reliability woes in the early part of the season cost Lucas di Grassi the chance to defend his title. A run of five second-place finishes and two wins from the final seven races was not enough to deny Vergne the crown, secured with one race to spare. Vergne scored points in every round, finishing outside the top five just once.

Audi did manage to bounce back to claim its first Formula E teams' title, edging out Techeetah by just two points after a dramatic final race in New York that saw both di Grassi and team-mate Daniel Abt finish on the podium.

Formula E winners Jean-Eric Vergne (r) and Audi Sport ABT Schaeffler team boss Allan McNish.





Italian Lorenzo Trivisanutto's OK championship win was his first major title.



OK Junior winner Victor Bernier used pace and strategy to claim his title.



FIA World Karting Championships

WINNING DRIVERS:

**Lorenzo Trivisanutto (OK),
Victor Bernier (OK Junior)
Patrik Hajek (KZ)**

At the FIA's OK class final in Kristianstad, Sweden, Italy's Lorenzo Trivisanutto took his first major title, racing for the team set up by 2016 F1 world champion Nico Rosberg.

Trivisanutto, 19, headed the field for much of the meeting, topping both practice and the qualifying heats, only to lose his lead early in the final race to Hannes Janker.

Trivisanutto kept European champion Janker in his crosshairs for much of the race, eventually reclaiming the lead with two laps remaining before keeping his rival back all the way to the chequered flag, becoming OK world champion for the first time.

In the OK Junior class Frenchman Victor Bernier displayed superlative race management and impressive pace to win the 2018 crown.

Starting from fifth on the grid, Bernier steadily made up ground and after just seven laps the VDK Racing driver caught and passed Britain's Taylor Barnard of the Rosberg Racing Academy for the lead. With first place secured, the young French driver never looked back, expertly managing the gap back to Barnard, and later Brazil's Gabriel Bortoleto and eventual second-place driver Gabriele Mini of Italy to win with a second in hand.

In the KZ category, two-time world title runner-up Patrik Hajek claimed glory after a dominant display at September's final in Genk, Belgium.

Racing in a 30-strong field, Hajek took pole for the Kosmic Racing Department team before pulling clear early in the race as incidents held back many of his rivals.

Hajek led from lights to flag to secure his KZ world title, beating Rick Dreezen and Fabian Federer. The 28-year-old became the first Czech to win the championship.



Winners: Victor Bernier, Lorenzo Trivisanutto and Patrik Hajek with their trophies.

Czech Patrik Hajek finally won the KZ title having twice finished as runner-up.



Briton George Russell showed his F1 credentials by winning the F2 title with ART Grand Prix, right.



F2 winner and Mercedes F1 development driver George Russell celebrates with the team's Andy Cowell and Toto Wolff.

FIA Formula 2 Championship

WINNING DRIVER:
George Russell
WINNING TEAM:
Carlin

The FIA Formula 2 Championship proved to be a 'battle of Britain' for much of the season as Lando Norris and George Russell fought at the front of the pack. Momentum swung Russell's way through the middle of the year thanks to two wins and three podiums at the rounds in France, Austria and Great Britain.

A late-season surge from Alexander Albon saw him emerge as Russell's closest rival, but sprint race wins at Monza and Sochi put Mercedes F1 junior Russell on the brink of overall triumph, and he clinched the championship in style with a dominant victory from pole in Abu Dhabi.

Norris was able to recover to P2 in the points at the final round ahead of Albon, as well helping Carlin take the teams' title in its first year back in the category alongside team-mate Sérgio Sette Câmara.

FIA Formula 3 European Championship

WINNING DRIVER:
Mick Schumacher

WINNING TEAM:
Prema Theodore Racing

Mick Schumacher may be the son of one of Formula 1's all-time greats, but he proved this year the interest surrounding him is not based on his name alone after fighting back to clinch the FIA Formula 3 European Championship crown in style.

Schumacher sat 10th in the standings prior to his first win of the year at Spa, yet it proved to be the catalyst for an imperious march to the title through the second half of the season.

A stunning run of seven wins from 10 races, including five in a row at the Nürburgring and the Red Bull Ring, saw Schumacher overhaul Daniel Ticktum in the standings with five races remaining. The German eventually clinched the title on home soil at Hockenheim.

Schumacher played a part in Prema Theodore Racing claiming its sixth straight teams' title as it won 17 out of 30 races in 2018. Schumacher's tally of eight wins was joined by four for Ralf Aron, two for Guan Yu Zhou and Robert Shwartzman – who was also crowned rookie champion – and one for Marcus Armstrong.



Germany's Mick Schumacher was a deserving F3 European champion. Left: with Prema Team Manager Rene Rosin.



BEST OF THE REST:

Selected FIA Driver Champions 2018

/

FIA Formula 3 World Cup
Daniel Ticktum

F4 Nacam Championship
Certified by FIA
Moisés de la Vara

F4 US Championship
Dakota Dickerson

F4 Spanish Championship
Certified by FIA
Amaury Cordeel

F4 UAE Championship
Certified by FIA
Charles Weerts

F4 South East Asia
Championship Certified
by FIA 2017-2018
Daniel Cao

F4 South East Asia
Championship
Certified by FIA
Alessandro Ghiretti

F4 Italian Championship
Certified by FIA
Enzo Fittipaldi

F4 German Championship
Certified by FIA
Lirim Zendeli

F4 British Championship
Certified by FIA
Kiern Jewiss

F4 North-European
Zone Championship
Certified by FIA
Konsta Lappalainen

F4 Japanese Championship
Certified by FIA
Yuki Tsunoda

F4 Chinese Championship
Certified by FIA
Jordan Dempsey

F4 Australian Championship
Certified by FIA
Jayden Ojeda

F4 French Championship
Certified by FIA
Caio Collet

FIA Karting European
Championship – OK
Hannes Jancker

FIA Karting European
Championship – KZ
Jorrit Pex

FIA Karting European
Championship – OK Junior
Paul Aron

FIA Karting European
Championship – KZ2
Adrien Renaudin

FIA Karting European
Championship – Superkart
Peter Elkmann

FIA Karting
Academy Trophy
Jose-Maria Navalon-Boya

FIA World Touring
Car Cup
Gabriele Tarquini

FIA GT World Cup
Augusto Farfus Jr

FIA GT Nations Cup
**Salih Yoluc/
Ayhancan Guven**

FIA African Rally
Championship Driver/
Co-driver
**Manvir Baryan/
Drew Sturrock**

FIA Asia-Pacific Rally
Championship Driver/
Co-driver
**Yuya Sumiyama/
Takahiro Yasui**

FIA Codasur Rally
Championship Driver/
Co-driver
**Gustavo Saba/
Fernando Mussano**

FIA Nacam Rally
Championship Driver/
Co-driver
**Ricardo Triviño/
Marc Martí**

FIA Middle East Rally
Championship Driver/
Co-driver
**Nasser Al-Attayah/
Matthieu Baumel**

FIA WRC2 Championship
Driver/Co-driver
**Jan Kopecký/
Pavek Dresler**

FIA WRC3 Championship
Driver/Co-driver
**Enrico Brazzoli/
Luca Beltrame**

FIA Junior WRC
Championship Driver/
Co-driver
**Emil Bergkvist/
Johan Johansson**

FIA World Cup for
Cross-Country Rallies
Driver/Co-driver
**Jakub Przygonski/
Tom Colsoul**

FIA World Cup for
Cross-Country Rallies
2WD Trophy
Cyril Despres

FIA European Rally
Championship Driver/
Co-driver
**Alexey Lukyanuk/
Alexey Arnautov**

FIA ERC2 Championship
Driver/Co-driver
Tibor Erdi Jr/Gyorgy Papp

FIA ERC3 Championship
Driver/Co-driver
**Mārtiņš Sesks/
Henrik Appelskog**

FIA RGT Cup Driver/
Co-driver
**Raphael Astier/
Frédéric Vaclare**

FIA European Rally Trophy
– Final Driver/Co-Driver
**Alexandre Camacho/
Rui Rodrigues**

FIA European SuperCar
Rallycross Championship
Reinis Nitiss

FIA European Super1600
Rallycross Championshi
Rokas Baciūška

FIA European TouringCar
Rallycross Championship
Steve Volders

FIA European Autocross
Championship –
SuperBuggy
Bernd Stubbe

FIA European Autocross
Championship –
Buggy1600
Petr Nikodem

FIA European Autocross
Championship –
TouringAutocross
Vacláv Fejfar

FIA European Autocross
Championship –
JuniorBuggy
Jakub Novotny

FIA International Hill
Climb Cup
**Reinhold Taus (I),
Vaclav Janik (II),
Ronnie Bratschi (III)**

FIA European Hill Climb
Championship
**Lukas Vojacek (I),
Christian Merli (II)**

FIA Hill Climb Masters
**Lucio Peruggini (I),
Christian Merli (II),
Roger Schnellmann (III),
Will Hall (IV)**

FIA European Drag Racing
Championship – Top Fuel
Anita Mäkelä

FIA European Drag
Racing Championship -
Top Methanol Dragster
and Funny Car
Dennis Habermann

FIA European Drag
Racing Championship -
Pro Modified
Jimmy Alund

FIA European Drag Racing
Championship - Pro Stock
Bengt Ljungdahl

FIA European Truck
Racing Championship
Jochen Hahn

FIA Intercontinental
Drifting Cup
Georgy Chivchyan



Veteran racer
Gabriele Tarquini
won the first
edition of the
FIA World Touring
Car Cup.

FIA Masters Historic
Formula One Championship
(Stewart & Fittipaldi Classes)
Gregory Thornton

FIA Masters Historic
Formula One
Championship
(Head & Lauda Classes)
Nick Padmore

FIA Masters Historic
Sports Car Championship
(Post-65 cars)
**Julian Thomas/
Calum Lockie**

FIA Masters Historic
Sports Car Championship
(Pre-66 cars)
**Keith Ahlers/
James Billy-Bellinger**

FIA Lurani Trophy for
Formula Junior cars
Colin Nursey

FIA Historic Formula 3
European Cup – Cat. 1
(1971-1978 cars)
Marcel Biehl

FIA Historic Formula 3
European Cup – Cat. 2
(1979-1984 cars)
Christian Olsen

FIA Historic Hill Climb
Championship
**Vladimir Konicar (I),
Jaroslav Mikes (II),
Jiří Kubíček (III),
Uberto Bonucci (IV),
Miroslav Ciliak (V)**

FIA European Historic
Sporting Rally
Championship,
Driver/Co-driver
**Antonio Parisi/
Giuseppe d'Angelo (I),
László Mekler/
Edit Mekler-Mikó (II),
Karl Wagner/
Gerda Zauner (III),
Valter Jensen/
Erik Pedersen (IV)**

FIA Trophy for Historic
Regularity Rallies –
Driver/Co-driver
**David Nogareda/
Sergi Giralt**

FIA E-SPORT CHAMPIONSHIPS

FIA Certified
GranTurismo
Championships
Manufacturer Series
**Tyrell Meadows
Vincent Rigaud
Kanata Kawakami**

FIA Certified
GranTurismo
Championships
Nations Cup
Igor Fraga



Jan Kopecký won
the WRC2 title for
ŠKODA Motorsport
with two rounds
remaining.

After a hugely successful Formula 1 career, grand prix great *Felipe Massa* has embarked on two new challenges – leading the development of motor sport's entry-level discipline as President of the FIA's International Karting Commission and racing in the future-focused Formula E Championship. Both, he insists, are defined by the same motivation – the joy of competition

06

The pursuit of purity

TEXT

/

JUSTIN HYNES

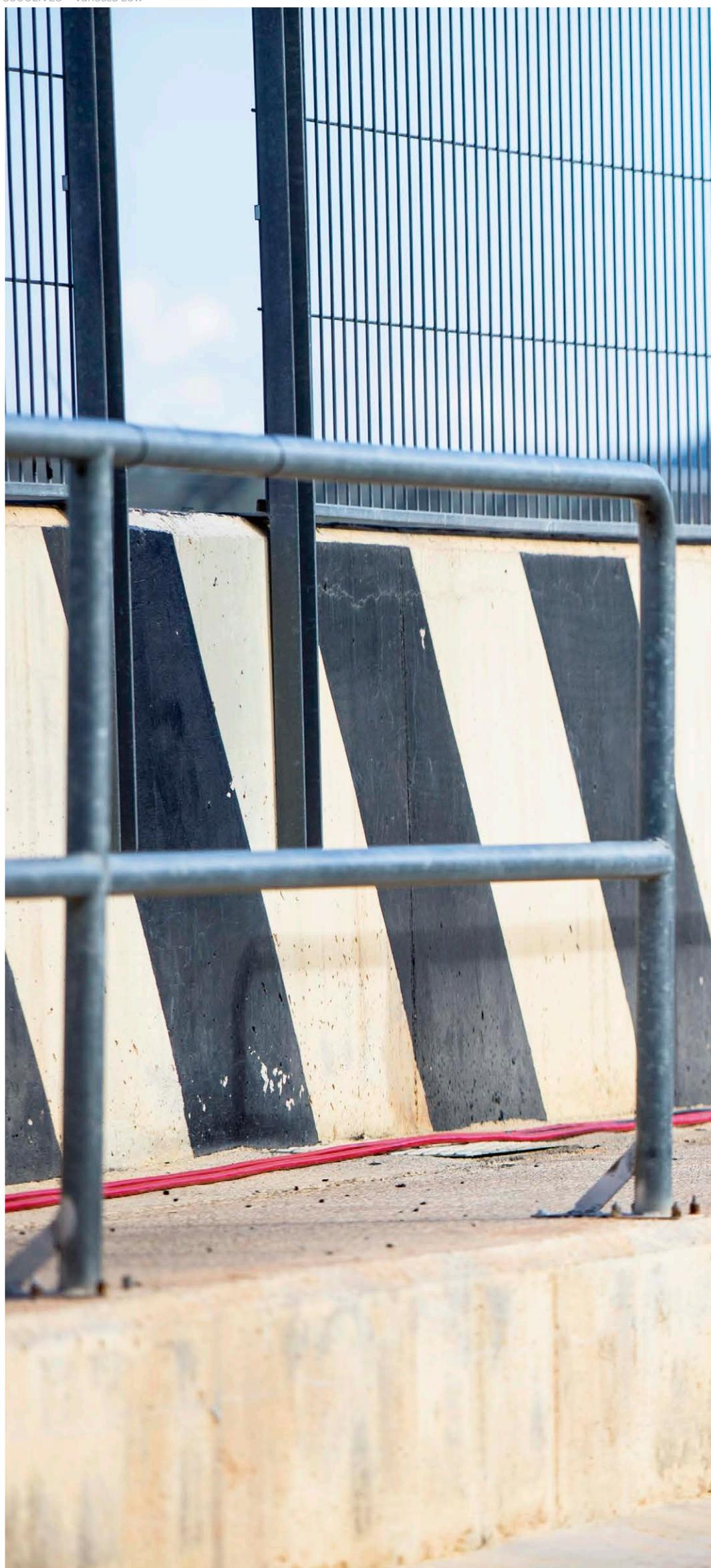
Take a quick straw pole among the ranks of drivers from across the racing disciplines regarding their favourite form of motor sport and the overwhelming majority will come down in favour of one – go-karting. And almost inevitably the reasoning behind that choice focuses on a few key words: purity, competitiveness... joy.

It's no different for Felipe Massa. The Brazilian ex-Formula 1 driver and current Formula E racer might be a veteran of 269 grand prix starts, with 11 wins and 41 podium finishes to his credit across a 16-year career, but the word 'karting' still has the power to make him break out in a broad grin.

"I started when I was eight years old and I raced karts from eight to 16," he says. "Before that I had a little motocross bike but I think I was a bit too crazy on that so my father said 'OK, maybe it's better on four wheels'. We were living in the countryside, two hours from São Paulo, but he brought me to the city and I did a school in what I guess were mini-buggies and after that I started karting properly.

"The guy running it said I was quite good and so my father bought a kart," he continues. "My father would put the kart inside the car and I'd sit in it, the go-kart, for two hours and 30 minutes, all the way to São Paulo. That gives you an idea how crazy I was for it. And when I started racing... You know, as a driver, karting is your school; you learn everything from it. When I moved to cars the sequence continued, but in karting you learn order, you get the experience and the mentality you need to have to be a driver. It is a very pure form of competition." ▶

F1 veteran Felipe Massa is relishing his new roles as FIA International Karting Commission President and Formula E driver.





Massa's love for karting has endured throughout his career – he still frequently races with his own team in his home country – and following his retirement from grand prix racing at the end of the 2017 season, the former Ferrari driver converted his passion for the discipline into a deeper commitment by taking on the role of President of the FIA's International Karting Commission.

Since his appointment in December 2017, Massa has attended kart events around the world, sampling the current state of the sport and formulating his own vision for its future. And while he believes there are changes to be made, he is certain that the core spirit of the sport – the purity of competition – is in rude health.

“I see exactly the same feeling I had in the past when I was racing in go-karts,” he says. “When I go to the race tracks I see the reaction of the drivers, I see the reaction of the parents, how they look at me, thinking ‘man, hopefully one day I can be where you are’. The dream is the same for kids now as it always has been.

“However, I see that the difference now is maybe it's a bit too expensive. OK, that is true of every category, and it was the same when I was young, especially as I didn't have money, but while the feeling is the same I think we definitely need to reduce the costs and make it even more accessible. Also, we need to make the competitions simpler. It is a very complex sport

‘There are many countries where karting is not as developed, but things are growing in the right way’



Massa says work to clarify karting's categories through the introduction of the OK classes has been a success. ▶

and sometimes it is hard for kids to know where they should be racing and in what category.”

Massa believes that the process of simplification and cost reduction is already well underway, largely thanks to the introduction of new direct-drive engines, the OK powerplants, in 2016, and the creation of the OK and OK-Junior classes raced at European and world level.

“A few years ago there were so many different categories that even I didn't understand what was what, but with the introduction of the OK engines things have become a lot clearer,” he says.

“Now you have OK-Junior, which is for kids aged 12-14, the OK category itself, which is 14 years and up, the KZ class which has a gear shift, and then we have KZ2 which is a shifter kart but the category features lot of professional drivers, even drivers my age. Then there are Superkarts, which are very fast, a very different category.

“With the OK categories, the price of the engine is capped at around €2,000, so the costs are being reduced and the categories have already been simplified,” he adds. “I'm quite happy because things are clearer and the OK engine is working really well, so now the target is to push other countries to follow that path.”

GLOBAL REACH

While a vibrant karting scene exists in many countries around the world, Europe remains the sport's most competitive arena. However, with the success of the OK category, Massa is keen for the model to reach further.

“There are so many countries where karting is not as developed as in the countries we know, so it's taking time, but I'm sure things are growing in the right way with the idea to raise the profile or implement these categories in different regions. The problem is that sometimes you implement the categories, or there is a strong desire to do so, but they just don't have the drivers. We need to improve the culture of karting in many countries.”

Part of the commission president's vision for spreading the popularity of international karting is to take the world championship finals event beyond the sport's European heartland.

“We need to go to the other countries, in America, South America, Asia,” he says. “We need to go to the important places for growth and we need to understand the how karting is perceived in those regions and what we can bring to them.”

Massa would also like to review the format of the world championships finals, believing that settling the title over a single event results in a competition that due to circumstances may not reward the best driver.

“Why does it have to be a single event? Why can't we have the world championship decided over several events? I know many world champions, but to be honest some were maybe not supposed to be world champions, but they were lucky because the guy that was leading, his engine broke or they were involved in a collision they did not start. ▶





“So maybe we could have four events,” he explains. “It’s possible, and in amazing places. I am sure there are countries that are ready to host the event. I don’t think it would require enormous amounts of money – maybe a million and a half and perhaps that could be raised through sponsorship.”

A parallel issue that has arisen in recent times is what might be termed ‘the Verstappen factor’, a culture of all-too-rapid progression from karting to single-seaters, as young racers and their families seek to emulate the stunning, if unusual, progression of drivers such as Max Verstappen. Massa is aware of the problem and adds that the swift transition to single-seaters is exacerbated by the rising cost of karting competition at international level.

“It’s a very important issue,” he says. “It’s a big thing and it was one of the first things I mentioned to the FIA. We need to be strong on age limits and we need to discuss what else we can do to protect the young.”

One aspect of the karting landscape that Massa believes could bring an influx of new competitors to grassroots motor sport is electric karting. He was enthused by the presence of electric karts in a

demonstration event at the Youth Olympic Games held in Buenos Aires in October 2018.

“Electric karts are definitely part of the future – not only for the European or world championships, but also for the idea to bring karting to the Olympic Games. That’s a really amazing thing and we are pushing hard for it. It can be possible because with karting, especially electric, it is not so dominated by manufacturers,” he explains.

“However, there is still a lot of development to do, particularly with the batteries, because they are still too heavy. They are much heavier than a regular engine and from a safety point of view we are still some way off. We, as CIK-FIA, can’t accept any risk of a kart flipping and landing on a driver. But I know that there is some amazing work being done on making the batteries lighter, so maybe we will see electric karting at a high level in the not too distant future.”

NEW TERRITORY

Massa’s fascination with the possibilities provided by electric racing extends to his own track activities, and after calling time on his F1 journey,

‘I’m really interested in Formula E because it’s a new show for the future. Electric cars are going to be part of our DNA’

the former Ferrari man is now embarking on a new racing career – in The FIA ABB Formula E Championship.

“I’m very happy to be part of it,” he says. “I wanted to find a championship to race, to do what I love to do, which is racing. I checked DTM and sports cars but for me this is the championship that you can stay with for longer. I’m really interested in Formula E because it’s a new show for the future. Electric cars are going to be part of our DNA and Formula E is how electric cars will race. It is growing so fast. You see that in how many sponsors they are signing, how many manufacturers are involved. It shows that electric racing is the future.”

Massa has joined the Venturi Formula E Team in a three-year deal, racing the new Gen 2 car for Season 5.

In May, Massa joined the Venturi Formula E Team on a three-year deal starting with Season 5 and the debut of the championship’s exciting new Gen 2 cars. That’s a development the rookie FE star feels might help his transition.

“It’s a new car for everyone, one car for the whole race and the mentality of the championship has changed a lot,” he says. “So while a lot of things will be similar, it’s quite difficult to say who will be in front. It’s a new challenge for the teams and for me that’s a good thing.”

Massa is not the only new blood being injected into Venturi, with the Brazilian’s former colleague at the Williams F1 Team, Susie Wolff, taking the reins at the Formula E squad as team principal. As such, Massa sees Season 5 as a new start for the Monaco-based squad.

“Venturi has been in Formula E for some time and they have been growing with the sport, but this is definitely like a new beginning. There’s a lot to understand and we need to see how competitive we are over the first races. But testing was good, we were competitive. BMW were very strong, Audi too at the end, so we need to wait and see.”

The F1 veteran admits that jumping from grand prix cars to Formula E has required a change of approach, but he is relishing the challenge.

“It’s a completely different car to drive, so everything you have in your brain from F1 you need to learn again in Formula E,” he says. “There’s a lot less downforce, very different tyres and the power management is very, very different. Also the tracks are completely different. It’s like racing in Monaco every weekend, which is amazing, but it’s quite new for me, so I need to learn. It’s a big challenge but that’s what I love. I’m looking forward to it and who knows what it could lead to in the future.”

It’s that voyage into new territory that has sparked Massa’s interest, in both Formula E and karting. It’s the opportunity to forge new paths, to explore a wide-open landscape that excites, and the only requirement is that the journey comes with competition, pure and simple. ◀





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Racing through the revolution

06

Toyota President *Akio Toyoda* is guiding the Japanese giant towards uncharted territory on the road and into track success unvisited for many years. But for the forward-thinking automotive boss, the tools used to explore both are born of the same will to win

TEXT

/

EDOARDO NASTRI



Toyota President Akio Toyoda has achieved commercial success with the company but also has his sights set on future mobility.

The automobile industry is going through a seismic change, a revolution that in the space of a few years will alter the shape of cars, the way they move from one place to another and the habits of drivers and passengers. This paradigm shift is predicated on four key points: electrification, autonomous driving, connectivity and sharing, and involves everyone from users to local and national government and constructors.

Toyota is one of the most involved manufacturers in this area, making hybrid power accessible and successful. Since its Prius model was launched in 1997, 10 million hybrid cars have been sold, producing around 77 million tonnes less CO₂ than the same number of conventionally-powered cars. Hybrids are now a Toyota mainstay, helping the Japanese company to sell 10.4 million cars in the most recent fiscal year with net profits of \$US20 billion.

Since June 23 2009, the man defining the Toyota Motor Corporation's trajectory, as its president and member of the board of directors, has been Akio Toyoda. Apart from being a huge motorsport enthusiast, Toyoda also loves driving and can often be found at the wheel of the Japanese company's more extreme vehicles. In 2007 he entered the Nürburgring 24 Hours under the pseudonym Morizo Kinoshita, racing a Lexus Is, the first to bear the name Gazoo Racing, the team he set up. He did it again in May 2009, this time in a Lexus LFA.

The grand-nephew of Sakichi Toyoda – inventor, industrialist and father of the Japanese industrial revolution who is known in Japan as

the 'King of Japanese Inventors' – Akio is also the grandson of Toyota founder Kiichiro Toyoda, who started Japan's famous Takashimaya department stores as well.

In 1972, having finished studying jurisprudence at Tokyo's Keio University, Akio went to the United States where, in '84, he took a masters degree in finance at Babson College in Massachusetts. Two years later, he joined Toyota, working in various roles from production to marketing to new products. In '98, he moved to California to become Executive Vice-President and board member of the New United Motor Manufacturing Inc, a joint venture between Japanese constructors and General Motors, which folded in 2010. NUMMI's only facility was taken over that same year by Tesla, which now produces its electric cars there.

In January 2000, Toyoda returned to Japan and joined the Toyota board that June. He was appointed Managing Director of the Asia and China region in 2001 and in '05 became Executive Vice-President taking on responsibility for the Intelligent Transport System, quality control, product management, procurement and sales for the brand. In the days when the internet was in its infancy, he set up the gazoo.com platform and had the foresight to promote online sales of the group's used cars. He is known for his sense of innovation and that theme continues to be the cornerstone of his company policy.

FUTURE FOCUS

In March this year, Akio announced the investment of around \$US3bn into the engineering, construction and development of software for autonomous cars and future technologies.

"We are at an epochal turning point, everything is changing," he explained in a letter to employees. "The comparison is simple: in the last century, it is estimated that in the USA 15 million horses were replaced by the same number of cars. Now, we are on the verge of a similar or possibly even greater change. Day after day, the auto industry is going through a period of profound transformation. Themes such as electrification, autonomous driving, connected and shared cars are now well developed and have been looked at in depth, so that technological innovation in these sectors is advancing rapidly.

"Everything is new and a race has begun against new rivals and new rules of competition," he concluded. "Those who cannot keep up will not survive."

It is a stark assessment, but one that has informed Toyoda's vision as he leads Toyota into a new era, transforming it from a company that not only builds innovative vehicles such as the hydrogen fuel cell-powered Mirai but supplies mobility as a service as well. ▶

Since its launch in 1997 (below), Toyota's hybrid Prius has achieved sales of around 10 million units and continues to be popular today (right).



'A race has begun against new rivals and new rules of competition. Those who cannot keep up will not survive'



Toyota is exploring the idea of shared mobility through its e-Palette Concept, launched in Las Vegas at the start of 2018.

The manufacturer has also ventured into hydrogen fuel cell technology with the Mirai.





'We'd never won Le Mans before, but we didn't rest. We developed new technologies and to this we added team spirit'

"I intend to personally take on the responsibility, fighting every day not to survive but to grow," he said. "Toyota will supply all types of service to do with the transportation of people all over the world. We have the serious intent of making our company a reference point for mobility of the future. Therefore, we have to look outside the current framework, making the most of our strong points and continuing to look to the future. I have sat behind the wheel on roads all over the world, and I've spent my life developing safe, reliable and attractive cars. Emotion counts a lot for me and it's passion that will drive our company in the future."

Toyoda understands, however, that success can sometimes be the enemy of growth. "It's possible that the biggest obstacle to reform and innovation in Toyota has been the commercial success we have enjoyed these past years," he said. But one solution has been found: last year, Toyoda began to divide the company into smaller units, with each one authorised to act autonomously.

The aim is to render decision-making quicker and more effective. "We concentrated our attention on markets that are already developed over that which are still emerging, focusing more on cars than on commercial vehicles," he explained. "These priorities are based on past sales volume and profit, and so there is no guarantee of future growth."

The innovative dimension of the projects was applied everywhere with positive results, including in the world of motorsport. For the unabashed racing fan, "the fact that Toyota has been active in motorsport for over 60 years shows the passion that drives the whole

company and is the key point of the marque's development in the future."

But how to blend the supremely functional mobility of tomorrow with automotive enjoyment? "At the start of 2018, we presented the e-Palette Concept in Las Vegas and the GR Super Sport in Tokyo," he explained. "Two apparently very different vehicles: the first is designed with mobility in mind, the second is meant to be 'fun to drive'. Both, however, use the very latest technology and represent the future. We have different companies that look after tomorrow's mobility, including Toyota Connected and Toyota Research Institute, the latter specialising in autonomous driving vehicles."

In June, after no fewer than 20 attempts and five second places, Toyota won the LMP1 category at the Le Mans 24 Hours. The drivers were Fernando Alonso, Sébastien Buemi and

Left: the new GR Super Sport concept combines speed with technology. Above: the Le Mans-winning crew of Fernando Alonso, Kazuki Nakajima and Sébastien Buemi.

Toyota's motorsport success has extended to the WRC, where it won this year's Constructors' title following a long absence from rallying.

Kazuki Nakajima at the wheel of a TS050 Hybrid, a thoroughbred fitted with a 2.4-litre V6 internal combustion engine putting out around 500bhp, coupled to two electric motors, one per axle. The full eight Megajoule hybrid system was thus able to generate around 1000bhp in a car weighing less than 900 kilos.

As a racing enthusiast, Akio enjoyed watching the French success from the company's headquarters in Japan. "We had never won Le Mans before, but we didn't rest. We concentrated our efforts on developing new technologies, believing that if we could produce a faster car, we could win," he said after the victory. "To all of this, we added team spirit, a factor that can really make a difference. Thanks for allowing us and our drivers to give it their best; that's what I want to say to all the fans who supported us, to our partners and suppliers who fought alongside us, and to all the members of the team and people linked to it."

More motorsport success was to come when after 19 years Toyota took the 2018 Constructors' title in the World Rally Championship, bringing its total to four to add to four drivers' titles.

The Japanese company had returned to the WRC with the Yaris in 2017. "As president of the team, I am very pleased," said Toyoda at the end of the final event in Australia. "We have obtained an important result in just our second year back, after an 18-year absence from the WRC. I am grateful to Tommi Mäkinen, who continued to work hard to win this title, and to all the members of his team. The win is also down to the six drivers and co-drivers, who drove, tested and raced the Yaris WRC to help us achieve this important goal." ◀





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Matters of Trust

06

The United Nations Economic Commission for Europe (UNECE) has been appointed as the host organisation of the UN's recently established Road Safety Trust Fund. The body's Executive Secretary, *Olga Algayerova*, explains the fund's origins, its future goals and how the US\$19 million already raised will help reduce the number of deaths on the world's roads

The UNECE has been selected to host the United Nations Road Safety Trust Fund. Can you explain the thinking behind the Fund's creation, the goals associated with the Fund and why you feel it is needed to advance the cause of global road safety?

Every single year, an estimated 1.34 million lives are lost in road traffic crashes and up to 50 million more people are injured. This also causes significant economic losses to individuals, communities and societies, keeping millions of people in poverty and creating an estimated \$1.85 trillion burden on the global economy annually. The need to improve road safety has been widely recognised, especially through the efforts of the Decade of Action for Road Safety 2011-2020. However, there is a major gap in the resources available to finance much-needed action at the local, national, regional and global levels. This is why, following the call from member states and at the request of the Secretary-General, the United Nations Road Safety Trust Fund was launched in New York in April 2018. The Trust Fund aims to serve as a catalyst for global efforts on road safety and focuses on bridging the gaps in the mobilisation of resources and on ensuring the effective coordination of action at all levels. Delivering on these two dimensions will be crucial to ensure real and lasting impact in saving lives on the roads.

The idea to create such a resource sounds simple in theory, but how complex a process has it been to put the fund into operation? What was the role of UNECE in the Fund's establishment and what have been the major milestones since its creation was mandated in April of this year?

To transform the global road safety situation, we need to strengthen the involvement of a wide range of partners and enhance coordination of global efforts. We must bring all key actors – from governments, donors,

the private sector, civil society, research institutions, multilateral development banks and the United Nations – around the table and work towards a common set of objectives. This includes developing a shared understanding of the Fund and its operational framework. And it includes finding innovative solutions to accommodate the interests of such diverse constituencies while abiding by the rules of the United Nations. As the organisation hosting the secretariat of the Trust Fund, UNECE has been working hard to construct a base for the Fund that really brings all these different perspectives together. We strive to make the Fund a game-changer that improves global road safety in the most inclusive way possible. A major first step was to build up the necessary governance structure. Immediately after the launch of the Fund, UNECE established an inter-agency interim secretariat to help form the Advisory Board and the Steering Committee, and prepare the essential founding documents required for their operation. In August we held the first meeting of the Fund's Advisory Board and Steering Committee, setting the Fund's overall direction and building the consensus needed for this joint endeavour. Shortly afterwards, the work of the interim secretariat was handed over to UNECE to continue preparations for the full functioning of the governance structure and the launch of a call for pilot projects. The dedication of staff of the secretariat who volunteered for this work ensured that a difficult logistical task was completed swiftly. The UN Secretary-General's Special Envoy for Road Safety Jean Todt and I worked closely with them to support these efforts.

How did you design the governance architecture of the Fund and what criteria were applied?

The governance architecture was developed during a consultation process that took place from November 2016 through to August 2018.

TEXT
/
JUSTIN HYNES

The structure and composition of the governing bodies follows the guidelines of the United Nations Development Group and good practices of other UN multi-donor trust funds, and aims to engage a wide range of road safety stakeholders. This ensures that resources contributed to the Trust Fund are administered transparently and are used to maximum impact.

Most recently there was a meeting of the Advisory Board and Steering Committee of the Fund in Geneva to finalise operational aspects. What was the outcome of the meeting?

In November, the Fund's governing bodies gathered to complete the final steps in making it operational, which I consider a success. The Fund's rules of procedure, fundraising strategy and policy, and operations manual were adopted, as well as the Global Framework Plan of Action for Road Safety. The framework adopts the holistic 'safe system' principles, integrating and building on the pillars of the Decade of Action for Road Safety; namely safe users, safe vehicles, safe roads, effective post-crash response and good management across these areas. Further, it strives to achieve the United Nations global voluntary targets for road safety. A significant milestone reached at the November meeting was the approval of five pilot projects, for which a total of approximately US\$1m was allocated. These projects will address key components of national road safety systems in a number of low- and middle-income countries. UNECE is proud to see these projects adopted just a few months after the Fund's launch and we look forward to working with all partners to support their implementation.

'To transform the global road safety situation, we need to strengthen the involvement of a wide range of partners'

So far, some US\$19 million has been pledged to the Fund. Can you detail where that funding has come from and how funds are being solicited and generated?

The Fund was launched with a very promising start, with important pledges from the FIA Foundation, Total Corporate Foundation and 3M. Over the last few months momentum has been building fast, with Pirelli coming on board and the first contribution being received from a member state, France, through Agence Française de Développement. The European Commission and the Russian Federation have since joined in pledging contributions to the Fund, together with Michelin.

It is encouraging to see such strong support coming from a wide range of sources. We are constantly working to mobilise additional support for the Fund. The Secretary-General's Special Envoy for Road Safety plays a particularly important role in this regard, through his high-level advocacy to build political support and secure contributions to the Fund from governments and partners from around the world, including in the automotive sector, and through the FIA High-Level Panel. We are also working to mobilise resources from governments and private sector stakeholders, and to develop innovative fundraising approaches in partnership with relevant industries. All this will further unlock the Fund's financing potential.

The Fund is aligned with the goals of the SDGs regarding road safety improvement. What do those goals involve and how far away are we from reaching those targets?

The adoption of the Sustainable Development Goals in 2015 was a landmark for road safety, which was for the first time explicitly included in the world's development agenda. The SDGs

include specific targets on road safety under Goal 3, which aims to improve health and well-being, and Goal 11, which focuses on sustainable cities and communities.

Although the SDGs' target is to halve the number of road traffic deaths by 2020, the latest status report still shows a continued growth in road fatalities.

Now, the international community must accelerate its efforts to improve road safety and step up efforts to achieve the SDGs. We must learn from challenges and achievements so far. We must redouble our efforts to reduce the alarming numbers of road casualties. And we must renew our commitment and take concerted action to guarantee results where it counts most – on the roads.

At the meeting in Geneva the Steering Committee approved the Fund's first five pilot projects. What do these projects involve?

The Fund's first five pilot projects address the key components of national road safety systems: safe roads – scaling safe street designs in Ethiopia; post-crash response – improving road traffic fatality data in Cote

d'Ivoire and Senegal; safe user (legislation) – strengthening legal frameworks for road safety in Arab countries; safe user (enforcement) – strengthening speed management in the Philippines; safe user (education for vulnerable road users) – capacity development on child responsive urban planning and sustainable urban transport in Paraguay, the Philippines and South Africa.

Finally, what are your hopes for the Fund and its impact over the coming years?

We hope for and need high-level political support for the Fund, in order to guarantee its impact in saving lives. We also hope to see national actions in key low- and middle-income countries in the coming years that strengthen weak areas of their national road safety systems and close remaining gaps. We hope to address the huge financing gaps faced today by capitalising on the Fund and leveraging resources to another level. We have a unique chance to make a sustainable difference for road safety. I am confident the Fund will deliver on this potential. ♣

**Road Safety Trust Fund
Executive Secretary
Olga Algayerova is
promoting global action.**



06

THE LAST LINK IN THE CHAIN

TEXT

/

MATT YOUSON

After years of careful construction the FIA's single-seater pyramid will be completed in 2019 with the launch of a new Formula 3 Championship. And it has been tailor-made to hone the skills of the F1 champions of the future

Talk to anyone about the FIA Global Pathway for open-wheel racing, and the conversation almost inevitably develops an architectural cast. There's the concept of the pathway itself, then the construction of foundations and stages, all forming a pyramid to ascend – a carefully defined structure, built to an exacting blueprint.

The final building block in the global pathway was dropped into place recently, with the announcement of a new FIA Formula 3 Championship to form the most junior category on the undercard of Formula 1 race weekends.

The development will bring Formula 3 back to grand prix weekends on a regular basis and will provide the link between the lower rungs of the FIA's single-seater racing ladder and the final step before F1, Formula 2. After a long period of construction, there is now clarity in the direct route that takes drivers from karting to the pinnacle of single-seater, open-wheel motor racing.

"With the arrival of this new Formula 3 Championship, the pyramid is complete," says FIA Single-Seater Commission president Stefano Domenicali. "We have taken incredible steps in the last few years and have Formula 4, Formula 2, the Formula 3 Championship and also there is Formula Regional, which forms the middle step between F4 and the new Formula 3 Championship. ▶



The new Dallara-built F3 car, which was launched at the 2018 Abu Dhabi Grand Prix. The new 2019 championship completes the FIA single-seater ladder to F1.



“In terms of opportunities for drivers, there is now a clear, complete path that can be taken step-by-step. There is a right way to move forward, and each car has the right level of downforce, the right level of power and, of course, all sharing the highest specification of safety.”

The principal of slotting two distinct versions of Formula 3 into the ladder is based on the belief that the gap between F4 and F2 is a wide one. The global pathway needed a specification of car that would provide a natural stepping stone to F2 – but it was also accepted that even then the step might require too much of some F4 drivers. As Bruno Michel, CEO of the promoter of the Formula 2 and F3 Championship, says: “I am sure some drivers will graduate directly from F4 to the FIA Formula 3 Championship, but the FIA has decided that the gap between F4 and FIA F3 might initially be too big for some. Therefore, they might go through regional championships first before coming to our championship.”

“The regional cars will have less power,” clarifies Domenicali. “The power-to-weight ratio of each car is designed to allow drivers to grow. The F3 Championship car will have a power-to-weight ratio of 2.0, whereas regional cars are about 2.5.”

The new Formula 3 Championship car, unveiled at the Abu Dhabi Grand Prix, represents something of a blend of the new and the old GP3 car. Built by Dallara, constructors of both the Formula 2 and GP3 chassis, a sensible cost-reduction exercise sees it carry over much of the powertrain from the GP3/16 car – but in a package with very different aerodynamic performance and squarely aimed at giving young drivers the best preparation for the next rungs of the ladder towards F1.

‘In terms of opportunities for drivers, there is now a clear, complete path that can be taken step-by-step’

STEFANO DOMENICALI



FIA Single-Seater Commission President Stefano Domenicali says being in an F1 environment can only help F3 drivers develop.

RACING EDUCATION

The one element that very obviously doesn't carry over from previous machines is the Halo safety device. The regional Championships in Asia and the Americas already use the Halo and, like them, the F3 Championship will use the steel variant, rather than a titanium construction.

“Those are different cars, but they both use the Halo,” says Charlie Whiting, head of the FIA technical department. “The steel Halo obviously weighs a little more than the titanium equivalent but costs a fifth of the price. It is homologated to the same standard as the titanium model and the cars using it have to pass the same crush test as an F1 car – that's how strong these have to be.”

One additional positive aspect of the change is that the presence of the Halo and the changes that brings has allowed the technical working group behind the design of the new car to increase downforce levels and thus improve cornering

Below: The new car was launched at the final Grand Prix of the 2018 season in Abu Dhabi.



performance. The result should be lap times similar to those seen in GP3, but delivered in a manner deemed more advantageous to driver development.

Indeed, the message from the architects of the car and the format is that the new championship has been carefully designed to provide young drivers with a proper racing education, while at the same time giving spectators thrilling racing to enjoy. The advantage of a one-make championship is, of course, that the cars and rules can be engineered to provide the desired outcome and, in this regard, the new Formula 3 championship features something of an unusual tweak.

"We're going to limit the downforce of the cars for the races," reveals F3 technical expert Didier Perrin. "For free practice and qualifying, the drivers can use the full potential of downforce, but for the race we will reduce it by limiting the angle of the rear wing to make sure the braking distance will be slightly longer."

Having the drivers qualify with one level of downforce and race with another ticks many boxes: for spectators, it should provide the opportunity to see drivers push to the limit in qualifying, followed by exciting wheel-to-wheel racing. For the drivers, it is hoped the format will provide a good grounding in the skills required to race close in powerful cars but also the additional experience of high downforce. Essentially, part of the skill set required to be competitive in Formula 2 and, ultimately, Formula 1.

If recent grands prix are to provide any salutary lessons, however, it should be that more downforce and lap records do not necessarily produce a dramatic racing environment. The F1 cars of the 2017-2018 regulations are the fastest to ever grace the sport – but they struggle to race closely. The much-vaunted aerodynamic packages have performed badly following in the wake of another car.

The F3 Championship will not suffer in a similar fashion. "Teamwork has designed the car," says Domenicali. "Teamwork between the technical working group, the organiser, the suppliers. It's been a joint project because between us, we needed to ensure we were creating the right foundation for the championship.

"This is the starting point, and from this solid start the championship will be able to evolve naturally," he continues. "Dallara paid a great deal of attention to what happens when one car follows another competitor. While we have added downforce, every part of the bodywork has been checked to make sure it will not create a wake that prevents another competitor following closely."

THE COMPLETE PACKAGE

There is, however, more to a racing education than driving the car. By adding the Formula 3 Championship to the F1 support card, it is to be hoped young drivers will be exposed to, and thus better prepared for, the wider role a racing driver occupies. Operating on a grand prix weekend will be an experience quite different to that which the drivers have sampled before.

"This is part of the learning curve," continues Domenicali. "Learning is not purely about the technical side of the sport and working with their team. They need to live in the atmosphere and adapt to the environment. They will learn to cope with the people, with the media and with all the activity and pressure that is there on a grand prix weekend. I think having the Formula 3 Championship alongside F2 and F1 is the perfect pattern. It should ensure the young drivers have everything they need in order to grow."



FIA technical boss Charlie Whiting says the Halo device will provide a safety boost in F3.



The new F3 will complete a logical progression for drivers, says F1 MD of motorsport, Ross Brawn.



F3's Didier Perrin says limiting downforce after qualifying will create closer racing.



F2/F3 promoter Bruno Michel says regional series will bridge the gap from F4 to F3.

Driver education was a strong impetus for the creation of the new championship – but not the only impetus. Replacing GP3 with a 30-car, 10-team Formula 3 Championship was perceived to be beneficial to both teams and fans alike, and thus actively encouraged by Formula 1's commercial rights holder.

"I think it's important for us to bring Formula 3 into the progression of drivers," says Formula One managing director of motorsport Ross Brawn. "It's really good for fans to see young drivers coming through Formula 3, Formula 2 and into Formula 1. It creates a complete and logical package of racing series that compliment each other, with a natural succession that's easy to understand.

"It also helps support those formulae: it's great for the Formula 3 teams but also the F2 teams, because the synergy between them is going to lead to greater exposure. Already we give [F1] paddock passes to each Formula 2 team, so their drivers and key sponsors can spend time in the F1 paddock, and we'll do the same with Formula 3, so they can come into the community of Formula 1 and take the benefits of that. In my view, it's a very positive outlook for F3 teams in the future."

The advantage of any single-make championship – but particularly one with a bespoke car – is that the architects of the series can decide the ultimate aim and then create the conditions to ensure they get what they want.

In the case of the new Formula 3 Championship, the aim shared by the FIA and Formula 1 was to create an environment in which fans could see exciting racing, teams could take advantage of a stronger commercial platform and, most of all, young drivers could develop the skills they would need to progress up the racing ladder. It delivers the best possible opportunity to progress, by creating the correct environment and the right tools with which to exploit it. Natural talent, as always, will out – but in the modern era, few get by on talent alone: successful racing drivers are a construction, not a naturally-occurring phenomenon. ◀

New Car, New Tyres

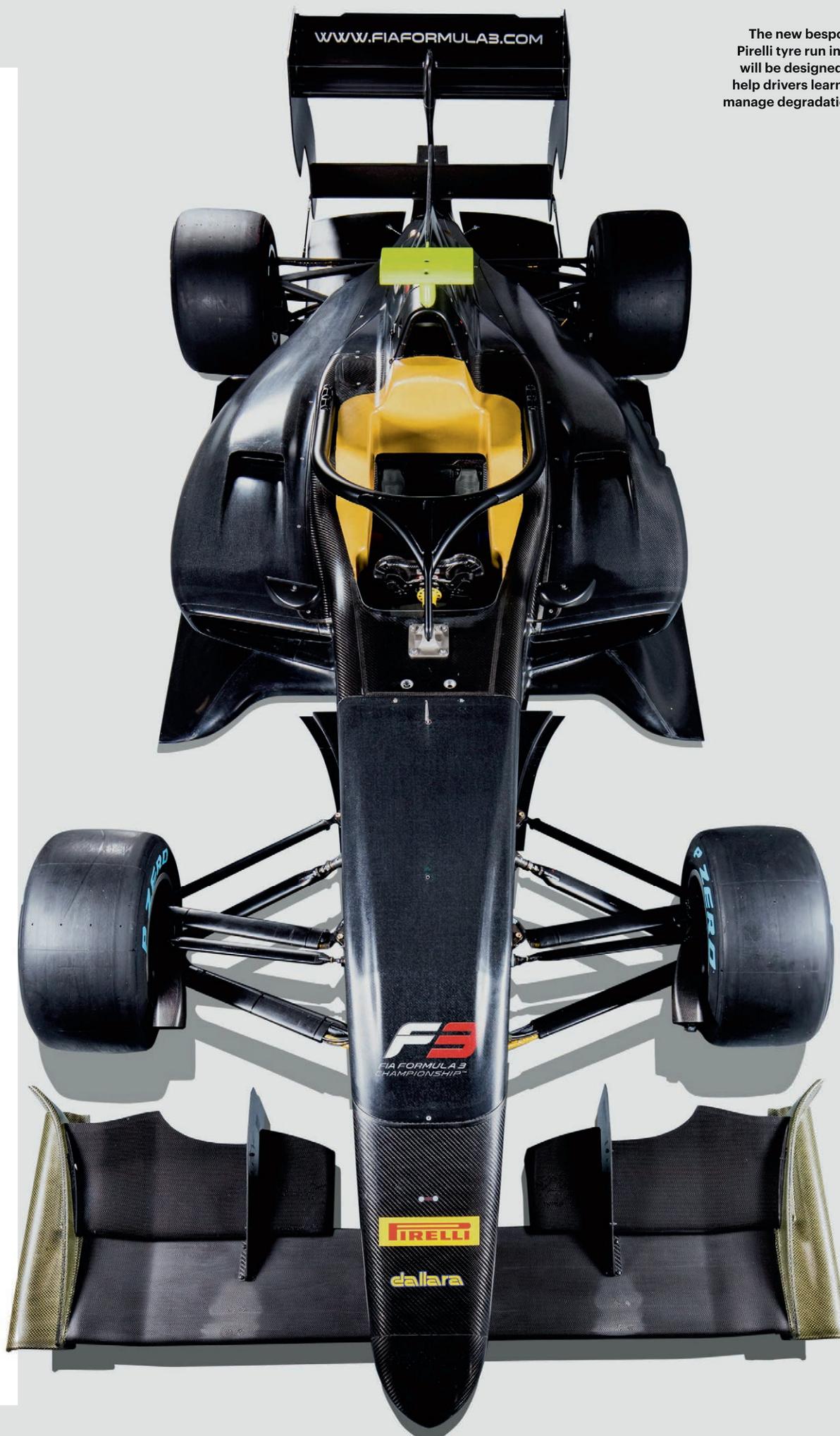
The new car for the FIA Formula 3 Championship will race on a bespoke set of tyres, developed for the series by Pirelli. In microcosm, the tyre reveals a lot about the aspirations for the championship – and also where it fits on the global pathway.

“There will be a new product for the F3 Championship, developed as usual as a joint programme together with the car,” confirms Mario Isola, Pirelli’s Motorsport Racing Manager. “There has been a request from the FIA for a tyre with a bit more degradation. This will create better racing, enable more overtaking and also teach the drivers how to drive the car in a way that will conserve the tyres.

Tyre conservation and coping with a rapidly degrading tyre will be a new experience for most of the drivers in the series. According to F3 tech chief Didier Perrin, this is the correct rung on the ladder at which to introduce the concept. “At each stage of their career, young drivers have something new to learn. In F3, the two things they will face are the challenges of high downforce and tyre degradation. This was something we wanted for the series: it’s the thing they need to learn at this level.

“In Formula 2, we introduce the drivers to tyre strategy, they have to deal with two different compounds and manage the degradation.

We’ll only have one compound per weekend in Formula 3, which is more straightforward, but they will have to learn to cope with degradation. In comparison to what they’ve done in their career previously, in Formula 4 or karting, they will have to learn how to preserve their tyres during the race: they will have to gain the knowledge of how to take the benefit of the best of the tyre at the beginning of their life and then progressively manage the tyre after that.”



The new bespoke Pirelli tyre run in F3 will be designed to help drivers learn to manage degradation.

Eddie Stobart Proud supplier to the FIA



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Fast-moving images

Once restricted by broadcast schedules, event timetables and defined by decades-old technology, the manner in which motor sport is broadcast to fans around the globe is changing rapidly. Welcome to a world where the pace of development matches that of racing's top teams and where the watchwords really are any time, any place, anywhere

TEXT

ADAM COOPER

The world of motor sport television is changing rapidly, largely because of the march of technology and the impact it has had both on production and how content is delivered to viewers.

Major series like the FIA Formula One World Championship and the FIA World Rally Championship now have their own OTT ['Over The Top'] portals that bypass traditional broadcasters and stream viewers hours of uninterrupted content, all in high definition.

"We can reach our fans directly," says the WRC's director of media rights Chris Synott. "Our OTT platform has been up and running for four years, so we are a little bit ahead of the curve. We can provide the consumer with a different kind of product than they get on television. It would be very difficult to put that volume of content on a traditional broadcast platform."

Much like the motor sport teams they cover, those involved in TV production face huge challenges and put enormous effort into developing the systems that keep them at the cutting edge. So how is technology impacting on three FIA championships? ▶



FORMULA ONE

The 2018 season saw the arrival of F1 TV, the sport's own OTT platform. Potentially a significant source of future revenue, it was rolled out only in countries where contracts have recently been renewed with traditional broadcasters, who no longer have exclusive rights to show Formula 1 live.

It was a bold initiative. But as F1 CEO Chase Carey has admitted, it was not without technical issues, indicating just how difficult it is to get these things right. Indeed, he has described 2018 as a "beta testing" year and stressed that the real launch will be in 2019.

"To me, there are three steps in building this out," Carey noted at the end of last season. "First there are the technical platforms, they've got to be reliable, customers don't tolerate glitches. Second, we've got to define the content offering. People buy the content, they don't buy technology. Then we've got to sell and market it. We didn't really do that [in 2018] because we focused on getting things done sequentially."

On Liberty Media's watch there have been significant changes on the content side, benefiting those who watch traditional coverage as well as early F1 TV subscribers.

"We've got really dedicated viewers," says Dean Locke, F1's Director of Broadcast and Media. "But we're also in the business of attracting new audiences to the sport in a competitive marketplace.

"In the past we were social media limited. Now there's a lot of really good content out there which is a bit more bite size. It's been hugely popular, having content on those platforms. Delivery is changing and hopefully we're in front of it.

"Last year was a big year for developments. The new owners have a different take on the sport – provide more entertainment – and wanted to develop the broadcasts. If we look back at 2017 it's incredible, what we rolled out for 2018.

"We had new graphics – they looked a little staid before. We took influences from gaming online, all areas, to brighten them up. Without patronising more learned viewers we wanted to make sure people could tune in halfway through the race and understand what's going on."

One clever move saw the space occupied by the halo in onboard shots used for telemetry graphics.

"It was a light-bulb moment. This negative space, as the graphics guys call it, why can't we change that to a positive? That was really strong, the halo graphic, it freshened it up a bit."

There's much more to come in graphics thanks to an alliance between F1 and Amazon Web Services, whose Sagemaker machine learning tool opens up all kinds of possibilities. F1's Managing Director of Motorsports Ross Brawn, the man who really put a focus on strategy in his Ferrari days, is a big supporter of this development.

"By further integrating telemetry data like car position, tyre condition, even the weather, Sagemaker can be used to predict car performance, pit-stops and race strategy," Brawn explained at a recent AWS event.

Locke and his colleagues will continue to pursue innovation into 2019. For example, there'll be a much better view "through" the halo thanks to the repositioning of cameras that had to wait for an FIA rule change.

"As you can imagine creating new onboards, and having them connect to our systems, you're working pretty much a year in advance. We should bear some fruits of that in 2019 with some interesting angles.

"You saw a couple of little teasers in Abu Dhabi – the Fernando Alonso face shot – and also the thermal overlays onto normal onboards. So we're pushing really hard on that."

The work that has gone into ensuring hybrid power units sound good in people's living rooms mirrors car development pursued by teams.

"It's a challenging environment, F1 audio," says Locke. "The onboard camera team designed some microphones that go around the engine, mostly the exhaust, to get some of that visceral sound. Parts around the engine are extremely hot, so finding something that didn't just catch fire was a challenge!

"There's a lot more refining what we've done in 2018. When you look back to 2017 and at what the races look like now, it is quite different."



WORLD RALLY CHAMPIONSHIP

Rallying is not just the most difficult form of motor sport to cover, it is probably one of the toughest environments faced by any form of outside broadcast. And yet on event weekends the World Rally Championship produces 10-12 hours of content a day for its well-established OTT platform, with every stage covered live. A decade ago that would have been unimaginable.

"We do it 14 times a year on four continents in completely different settings," says Florian Ruth, the WRC's Director of Content and Production. "From minus 20 degrees in Sweden to plus 40 in Sardinia or Mexico, rallying is one of the hardest outdoor TV productions there is.

"To produce the whole championship, every stage live, that was the vision since I came here and it's what the sport needed – and what the fans really deserved to see.

"Our big step in 2018 was to produce every P1 car on every stage, and communicate to the fans what's happening via our own OTT on every stage. This was basically made possible through technology."

The WRC has an impressive TV infrastructure. A plane picks up live signals from cameras, including one on a helicopter that follows the stages, and relays them to the broadcast centre at the service park.



F1 has found new ways to relay content to viewers, with telemetry transmitted from the halo device, for example.



New technology has allowed WRC TV to follow competitors on every stage of a rally for its OTT platform.

FORMULA E

From the start the Formula E Championship has been bold in the way it uses TV and social media, and that philosophy has continued with the new Gen II car into the 2018-19 season, which kicked off in Saudi Arabia in December.

"Formula E is very exciting because they've always been innovative and supportive of mad ideas," says Formula E TV Executive Producer Mike Scott. "They've tried to be new and different, which is the whole ethos of the championship."

104 different camera angles – there's a lot of choice! Even when they go around corners and change to the next camera, the graphic will follow and point.

"Using ghost racing technology, we'll have something called Virtual Director, so we can take an animated environment of the cars and use it as a replay," says Scott. "It's instant, it records it as live. We take that source as if it were a camera into a replay machine. We can use it as an analysis tool if we want to see something from



Formula E camera technology is built into the Gen II car, providing a unique view of the action.

Graphics are a key element of FE coverage, not least because they show power usage. There's now an extra twist.

"A whole set of augmented reality graphics go with the new 'Attack Mode.' Drivers go off line and trigger some loops and they get more power to use. Our graphics are superimposed onto the track, which the drivers then drive through, or actually go over, and we have audio effects that go along with that."

That's not the only innovation: "In NASCAR they have pointers, so the graphic can point at which car is which. That's simple enough to do on an oval, where you can use one camera. When you have a multi-camera shoot – and we have

a different angle that we didn't have, or couldn't see."

And Formula E continues to try to get new shots, helped by the fact that cameras can be fully integrated into the car design.

"Uniquely, we have fairings on the front wheels, so we can put a camera just behind them and we can see the wheel moving," explains Scott. "And when they go close to a wall, the camera is almost dragging along it. I've got them made out of titanium so they might actually spark, which will be pretty cool, before they break or get knocked off."

"These are things which we are pushing out this year that will be pretty mad if they all work as well as we hope!" ◀

"It took us two years to get this set-up to a level where we can go with the rally, and we're not static and stuck on one stage, having to move huge trucks and cables to the next stage. We have a very versatile and mobile production set-up."

Technology is at the heart of it, specifically the programme that encodes the data signal.

"The key is the codec we work with. It has been developed to such a level where it can transport either full HD signals or 4K signals in a very efficient bandwidth, which is also doable over those distances which we cover. We have stages up to 200-220kms away from our IBC [broadcast centre], so we had to work on technologies to bridge those huge distances."

Around 80 cameras are in play at each event, including drones. One recent innovation is the use of LiveU backpacks by crews shooting the

action on the ground, which stream live. Previously that footage had to be manually rushed back to the IBC, typically by a biker carrying memory cards, so a quick exit route had to be planned from every stage location.

Like other categories, graphics are a key area of WRC development: "This season we'll launch a real-time distance analyser for the cars. That makes it way more touchable for the fans – during a stage we can display the actual car on the stage racing against the ghost of the quickest."

At present the WRC TV group takes around 100 people to each event, but technology developed by Tata will soon change that, cutting costs by allowing post and live production staff to work from a permanent home base: "They can be on the other side of the world where we can have the same feed with just a 300 milliseconds delay, which is absolutely acceptable."

06

The thrill of the old

TEXT

/

BEN BARRY

Away from the ultra-glamorous world of hypercars, a growing band of enthusiasts are harking back to a more elegant time by restoring and modifying or simply re-imagining the legendary sports cars of yesteryear. AUTO investigates the obsession, passion and unflinching eye for detail behind a new generation of classics

Upgrading older cars is nothing new, whether you picture roof-chopped hot rods cruising post-war LA, or hot hatches with leather interiors and audiophile stereo systems in the '90s and Noughties. But recent years have witnessed a new phenomenon: the 'restomod', a fusion of restoration and modification.

Often referred to by the businesses involved as reimagined, remastered or reborn classics, a small but significant industry has developed around this growing and highly lucrative niche. Specialists often focus on one iconic classic – a Porsche 911, an original Mini, the Jaguar E-type – and give it their own unique signature.

Typically, these cars are treated to so-called 'zero-miles' restorations, with bodyshells stripped back to bare metal and components overhauled or replaced, with the goal of making everything as good as new with no expense spared. The difference versus traditional restorations is in the modernisation and willingness to diverge from original specification: parts either taken from newer models, sourced from aftermarket specialists or specially crafted for each project.

It's a trend that's developed in line with booming classic car values and taps into a sense that while modern cars are safer, cleaner and more technologically advanced than ever before, a degree of driving appeal and purity of design has been lost along the way.

David Brown Automotive specialises in both its own take on the original Mini and a very different approach inspired by the Aston Martin DB5. CEO David Brown sums up the philosophy: "We take a car from a period of time in the past and re-imagine it in a contemporary way. These are iconic designs often let down by unreliability and a lack of performance. The original Mini, for instance, was brilliantly engineered but badly manufactured." Based at Silverstone, customers include ("not-British") royalty and "the owners of very recognisable manufacturing companies"; build slots are at capacity for the next 12 months.

While David Brown has made headlines in more recent years, Eagle was one of the pioneers of the restomod. Based in Sussex, it has been restoring E-types since 1984, but began modernising them in 1991 following a customer request. ▶

David Brown Automobile's Speedback GT is inspired by the Aston Martin DB5 but based on a Jaguar XKR model.





At a glance, an Eagle E-type looks much like an immaculate original car, but they are often significantly upgraded during builds that are tailored to each customer and can take 4000 hours. Enhancements include improved electrics, heating, ventilation and headlights, all designed to make the car more usable and reliable.

The driving experience can also be improved, with an uprated chassis and new 4.7-litre, straight-six engine. Finally, the interior can be overhauled with new sports seats, stereo systems, luxurious leather and carpets, even tailored luggage. Jaguar design director Ian Callum summed up the Eagle Speedster as “just how I would have designed it”. Prices start from around £15,000 to add the ‘classic’ upgrade package to an existing E-type, but examples of Eagle-restored and improved E-types are advertised for over £500,000.

FRESH APPROACH

Alfaholics offers a similar service for classic Alfa Romeos. Based near Bristol, its workshops are packed with restoration projects and historic racers. But over the car park from the main workshop, a warehouse devoted to its mail order business heaves with bespoke carbon fibre parts, thinner glass, uprated brakes and suspension components. All can be bought individually or combined to create Alfaholics’ own take on the Giulia Sprint GTA – the GTA-R. Customers as far afield as Los Angeles have commissioned GTA-R builds, so too F1 designer Gordon Murray.

One GTA-R owner who’d prefer to remain anonymous describes himself as ‘a man of leisure’ after selling his digital marketing business in 2015. His garage includes a new McLaren 720S, Caterham 620R and Porsche Macan.

“I didn’t have any regular classic cars on my shortlist,” reveals the 47-year-old, “but I still wanted a car that went well, stopped well and was reliable enough, and I didn’t think any original classic would have enough performance. I also wanted something that was the opposite to the McLaren – a car that was fun at the speed limit and small enough for country lanes.

“When I drove a GTA-R, I fell in love. It just looked right, sounded incredible and was so involving, plus the noises and smells remind me of my early cars and driving. It was also a challenge – I knew I’d need to spend time to learn how to get the most from it – and on track, it genuinely holds its own against the Caterham and McLaren.”

Perhaps the best known of all restomod specialists is LA-based Singer. Founded by Briton Rob Dickinson, who previously enjoyed a successful career as singer/guitarist with indie rock band Catherine Wheel, Singer Vehicle Design grew from an interest generated by Dickinson’s own modified classic 911.

All Singer’s cars are based on the Porsche 964-era Porsche 911, produced from 1989 to ‘94. These were the last of the air-cooled 911s to retain the classic bodyshell, but the first to enjoy



improvements to safety and equipment such as optional all-wheel drive, side-impact protection and suspension that replaced the earlier torsion bars with steel springs.

It’s a model that Singer can easily ‘back date’ to look like a 1960s or ‘70s classic while also being upgraded with carbon fibre bodywork, carbon-ceramic brakes, 17-inch forged alloy wheels and a flat-six engine rebuilt and tuned to 390bhp. While Singer’s 911s are evocative of a previous era, there is no attempt to produce a



UK-based Eagle has been modernising E-types since the early ‘90s. The enhancements include a new 4.7-litre engine and luxurious interior.



Jaguar Land Rover offers customers a fully-electric version of the classic E-type.

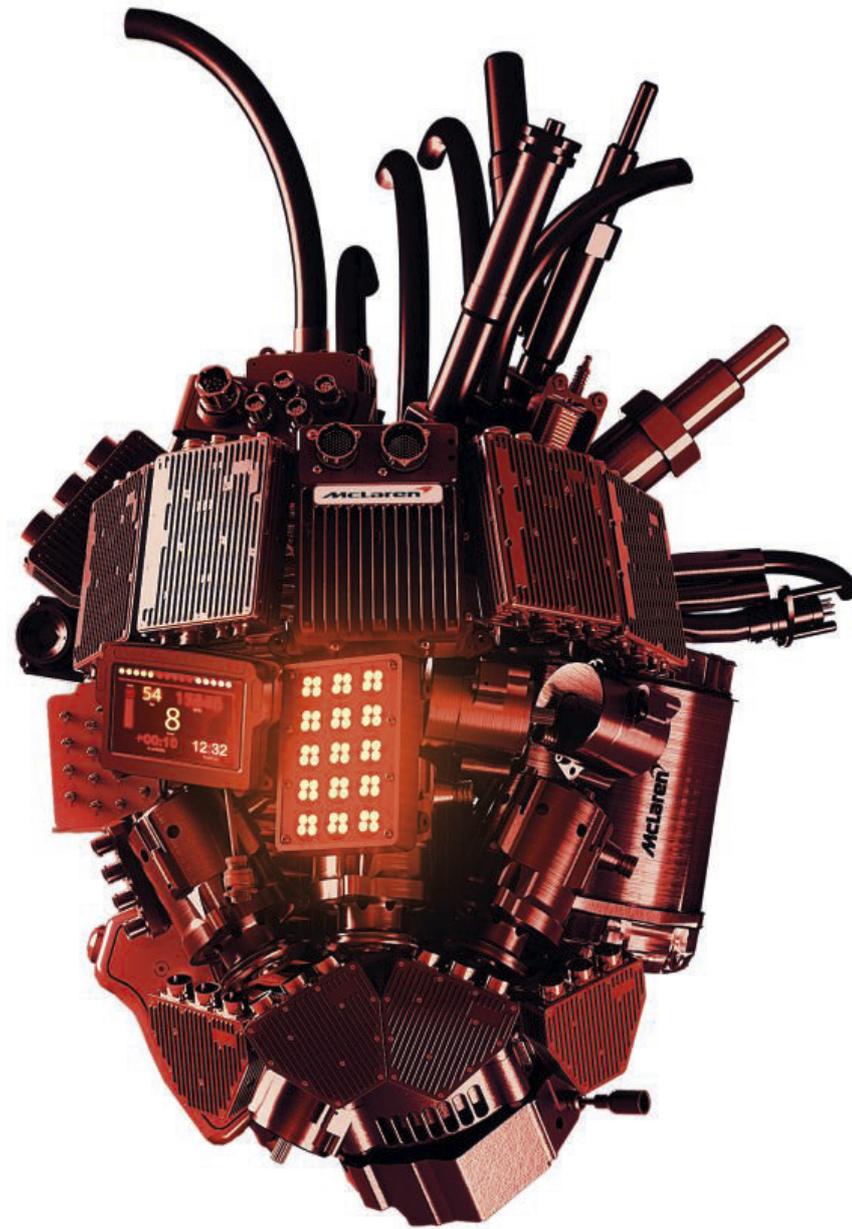
replica. The attention to detail is breathtaking, with new parts such as modern Recaro seats upholstered to recall retro models but with a depth of quality that goes far beyond the cost-constrained original car.

But the most ambitious project of all is Singer’s most recent: the Dynamics and Lightweighting Study, the centrepiece of which is a 4.0-litre, four-valve, flat-six developed with Williams Advanced Engineering. Production is limited to 75 units, with each costing upwards of \$1.8 million – but even the cheapest Singer 911s cost \$475k.

David Brown Automobile’s Speedback GT approaches the market from a different angle. Its bodywork is clearly inspired by the 1960s Aston Martin DB5 but no original Aston Martins are harmed during its creation. Instead, the Speedback is based on 2007-2014 Jaguar XKR underpinnings, while the bodywork is replaced with hand-crafted aluminium panels.

“People sometimes call it re-skinning, but this is a new body that is in effect completely stand alone,” says Brown. Either new or very low-mileage Jaguars are disassembled, their engines and transmissions remanufactured, the electronics modified and the bespoke interior created. The idea is to provide performance and safety features – including ABS, stability control and airbags – in a package that references the best of the past. “Our customers are global but they all admire tasteful, beautifully-manufactured products that are predominantly British,” says Brown.

Trusted suppliers are contracted for much of the work, but the cars are assembled on site at the company’s 18,000 square-foot Silverstone headquarters, which employs 40 full-time staff. Brown cites his background in low-volume manufacturing as contributing to the quality of the finished product, and also new technology that allows classics to be digitally scanned with great and repeatable accuracy. ▶



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Five Speedback GTs are scheduled to be produced over the next 12 months at the company's Silverstone headquarters, each costing from £520k.

Brown's Remastered Mini taps a different market and is more of a traditional restomod. An astonishing 80 cars are scheduled for completion in the next 12 months, with prices from £75,000. Each car begins with a new heritage bodysheet, de-seamed, strengthened and treated to better anti-corrosion than original Minis, then fitted with a remanufactured drivetrain, new wiring harness with water-proof connectors, plus air-conditioning and power-steering to ensure reliability and ease of use. Luxurious touches include full-grain leather upholstery, knurled aluminium switchgear and Bluetooth/USB connectivity.

"Our customers are not going to be doing the Monte Carlo rally or a track day," says Brown. "They want classic style with extra luxury and comfort – it's why our engines are tuned for more low-down torque."



David Brown's Remastered Mini has proved hugely popular, with 80 cars set for completion within the coming year.



MANUFACTURER INTEREST

The growth in the classic car industry in general has not been lost on major manufacturers. Jaguar Land Rover offers ground-up restorations of existing classics as part of its Reborn series, which can be sympathetically upgraded with OEM parts from later models – the brakes

'Our customers are not going to be doing the Monte Carlo rally. They want classic style with extra luxury and comfort'

from a 1975 E-type fitted to a 1961 model, for instance. But it too has experimented with restomod projects.

Customers can order fully-electric versions of the classic Jaguar E-type, while Iron Maiden drummer Nicko McBrain commissioned a thorough re-working of his 1984 XJ6. Requiring 3500 hours' labour, it's inspired both by McBrain's career and the 50-year history of the XJ. Upgrades include bespoke bodywork, modern door seals and sound insulation, LED headlights and guitar amplifier-inspired control knobs machined from aluminium.

"We don't have a 'stock' restomod programme as such," says Mike Goodburn of Jaguar Land Rover Special Vehicle Operations, "but we don't give a flat 'no' to any requests either, however unusual they may be. That said, Nicko's XJ was very much a one-off with an exceptionally high level of bespoke content."

Other manufacturers have toyed with restomod projects too. Porsche Classic recently presented Project Gold – an air-cooled 911 Turbo inspired by the current model – and Dodge unveiled the Super Charger Concept at the SEMA tuning show. The latter is a heavily but beautifully updated 1968 Dodge Charger equipped with a new 1000bhp Hemi 'Hellephant' crate engine – like Project Gold, the Super Charger is said to be a one-off, though the engine will be available early in 2019 for enthusiasts to slot into other restomod projects. It's also worth noting that manufacturers rarely focus PR efforts on such projects if they don't contribute towards a bigger-picture masterplan.

At a time when OEMs are moving fast towards electrification, it's reassuring that so many corporations can see the benefit of celebrating and updating their back catalogue as much as the regular car enthusiast. ◀



Singer's Porsche 911 combines the looks of a classic with carbon fibre bodywork and a rebuilt 390bhp engine.



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06

A new role for road safety's leading lady

Renowned screen actress *Michelle Yeoh* has been at the forefront of the campaign to improved road safety for more than a decade with the FIA, FIA Foundation and the United Nations. Now, she's extending her commitment even further, as a member of the Foundation's Board of Trustees

Ten years ago, actress Michelle Yeoh stood at the side of a road in Hanoi, Vietnam, trying to cross through the unending stream of motorcycles. On the other side, a film crew, camera rolling, encouraged her forward. There was nothing for it. Taking a deep breath, she stepped out into the traffic, and somehow made her way across unscathed.

Michelle was in the country with the FIA Foundation to advocate for children to be included within the provisions of a recently-approved motorcycle helmet law, and to make a documentary on global road traffic injury for the BBC.

For Michelle, who had already lent her name and support to a range of social issues, including HIV/AIDS awareness, it was the start of a committed association with road safety and the FIA Foundation, which strengthened the following year, 2009, when her partner Jean Todt was elected President of the FIA. Today, Michelle is a Goodwill Ambassador for the United Nations Development Programme, promoting the Sustainable Development Goals; the spokesperson for the FIA High Level Panel on Road Safety, one of a group of 12 global celebrities fronting the FIA's #3500Lives road safety awareness campaign – and she has just been elected as a member of the Board of Trustees of the FIA Foundation.

Here is a road safety ambassadorial journey that has included addressing the first Global Ministerial Conference on Road Safety, in Moscow in 2009, and the United Nations General Assembly in 2010 and 2014. On behalf of the

FIA and the FIA Foundation she has met with presidents, ministers and the heads of major development agencies to press the case for greater action on road traffic injury, a global epidemic responsible for the deaths of almost 1.4 million people a year and many millions of serious injuries.

CALL TO ACTION

Yet, it is one of the earliest memories that stays with Michelle and drives her on. "On that first trip to Vietnam, I met a mother, Diem, who had lost her nine-year-old daughter in a motorcycle crash," she explains. "Her daughter, Han, hadn't been wearing a crash helmet, and Diem was overcome with grief and guilt. I had to interview her for the documentary and by the end we were both in tears. Later, I visited a trauma ward and met some of the parents of children who had been injured by traffic. It really brought home to me the horror and appalling waste of life. I resolved then to do all I could to help promote the cause."

Juggling her busy film and television career with a desire to advance road safety, Michelle embarked on a whirlwind tour of countries. She launched the successful call for a Decade of Action for Road Safety, supported automobile clubs and road safety NGO campaigns across the world, spoke at many high-level conferences and sat down with officials to argue the case for new legislation, greater funding commitments and more focus on safe road design. She strongly believes that the best

way to advocate on behalf of people is to see the issue through their eyes.

"In South Africa, in a very poor settlement outside Cape Town, I was up before dawn to walk to school with children, to better understand how they experience the roads, the traffic," Michelle explains. "Joining young kids as they try to cross these roads, in the dark, with speeding traffic bearing down on them, can be terrifying. But it is something every policy-maker should do, at least once, because then they would see what these children have to cope with just to get an education and maybe they would have different priorities afterwards."

These are experiences Michelle now recalls in her role as a UN Goodwill Ambassador. "I promote a broader range of issues, but they are all linked by the Sustainable Development Goals. So if I'm supporting a health issue or education, I can connect it back to the need for safe roads. This broader perspective is useful for my work with the FIA and High Level Panel, and the FIA Foundation."

Lord Robertson of Port Ellen, Chairman of the FIA Foundation, who recommended her nomination for the board to the Foundation's recent AGM in St Petersburg, says: "Michelle is a star of the movie screen and the unrivalled star of the global road safety community. She combines a fierce passion for righting wrongs with an intuitive understanding of how to engage with anyone and everyone, from a recently-injured child to a traffic engineer to the Secretary General of the UN. We have been fortunate to work so closely with her for more than a decade now, and I am delighted that she is joining the board of the Foundation." ◀

Below: Michelle Yeoh addressing the global road safety issue in China and at the UN. Left: a frightening journey to school with children in South Africa.

"Joining young kids as they try to cross these roads, in the dark, with speeding traffic bearing down on them, can be terrifying"



Taking safety to the streets

06

Rapid urbanisation combined with poverty is contributing to major road safety deficiencies across Latin America and the Caribbean. The FIA Foundation is taking steps to address the issue through a new programme, the Child Health Initiative – and the positive effects are already being felt...

TEXT
/
KATE TURNER

Latin America has become the planet's most urbanised region with 85 per cent of people living in cities. It is predicted that by 2050, the proportion of people in urban spaces will triple to 90 per cent, a rate of urbanisation seen nowhere else in the world. All of this growth will be matched by a spiralling increase in motorisation rates.

Modern cities rising up across the continent offer the promise of bright, metropolitan futures away from the isolation of rural life. And it's not just the cities that are young; almost half the population of Latin America and the Caribbean is under 24. But there is a gap between the dream and reality: the speed of change has led to negative impacts on health and development in the region.

On city streets across the region, tragedy is never far away. From the ages of five to 14, road traffic injury is the leading cause of death – almost double the global average. It's the second leading cause of death for those aged 15-19 and the fourth for those aged one to four. Around 20,000 children die on the region's roads each year, the equivalent of more than two whole classrooms disappearing each day. Countless more are permanently injured – road traffic crashes are the leading cause of injury-related child disability.

Throughout the region, a clear trend has been established that links poverty with road traffic-related injuries. ▶

Road traffic injury is the leading cause of death for children aged five to 14 in Latin America.





Long-term trauma

Ronald grew up in a poor household in Costa Rica with his four siblings. His mother, Katia, worried about the journey to school and made him walk or take the bus. Running late one day, she allowed him to make the journey by bike to save time. She then received a call from hospital to inform her that Ronald had been hit by a vehicle and was going into surgery. The operation lasted eight-and-a-half-hours and during surgery Ronald's body began to shut down. Doctors warned Katia that if Ronald ever woke he could be mute, blind or paralysed. He survived but head, leg and hip injuries meant Ronald required constant care and multiple hospitalisations, placing enormous financial strain on his family.

"There are no words to explain the pain you feel, the explosion of heartbreak, knowing you're on the brink of losing a child," says Katia. "Danger is always present and not enough money is invested in safe roads, sidewalks and pedestrian crossings. Many politicians have their own cars and enough money to transport their children safely, they won't see things the way we do. Although we have limited resources, we're human and we feel pain too. You can prevent this from happening in the future. You can stop the pain we feel every day."



Ronald Montero was knocked off his bike as he rode to school in Costa Rica.



Jamaica makes its mark

The success of a pilot safety project being rolled out in Jamaica is a key example of how countries from across the region can scale up schemes to protect every child on their journey to school.

Children in the region aged five to 14 are more likely to die as a result of road crashes than any other cause – and those on the journey to school are especially vulnerable, particularly in poorer urban and peri-urban or hinterland neighbourhoods. Through the 'X Marks The Spot' programme, collaborations have been forged between the government, global road safety practitioners and Child Health Initiative (CHI) partners Amend and iRAP, as well UNICEF, and local organisations Jamaica National (JN) Foundation and the National Road Safety Council. The initiative is part of a globally-funded partnership between the FIA Foundation and UNICEF.



Programme activities include an in-depth review of gaps in policies and legislation, as well as infrastructure improvements around pilot schools to demonstrate the impact of reducing the road traffic injury risk to children. High-risk schools were selected in collaboration with the Ministry of Education, and the Star Ratings for Schools project was carried out to assess the risk on the roads. "To see the first safe road infrastructure being implemented in low-income communities and then scaled up across Jamaica shows what kind of impact is possible," says FIA Foundation Deputy Director Avi Silverman. "We hope the government and its partners can continue to build on this work serving as a leading example worldwide."

Jamaican Prime Minister Andrew Holness unveiled the completed pilot infrastructure at Hazard Primary School at the end of 2018. Throughout the year, infrastructure was built around the school including a safe crossing, speed humps and a safe sidewalk. It now is the first of 18 schools to be upgraded. "The truth is that we could reduce our fatal accidents to almost zero if we were to take into consideration good design practices," Holness insists. "We are trying to ensure that our roads are safe for pedestrian traffic, but more so for our children. I'm happy to see the investment being made around our schools, to make school safer for our children."

The FIA's Avi Silverman and Jamaican sprinter Shelly-Ann Fraser-Pryce (top) are campaigning for safer journeys to school.

Although poverty halved between 2003-2013, inequality in Latin America and the Caribbean is still higher than in other developed regions, and is one of the most inequitable in the world. Urban areas, in particular, have become more unequal, evidenced by the rise of informal settlements. Close to a third of children and adolescents in these areas live in severely deprived households, with poor-quality urban environments including unsafe roads.

Millions of children suffer not only from the visible killers on the road, but invisible ones too. Vehicle emissions contribute to air pollution in urban space, the fourth leading cause of death globally and a serious public health issue for children. This is exacerbated by city development, which often fails to provide adequate public transport, forcing more people into personal vehicles on dangerous roads.

Not only are the children of low-income families more likely to suffer a road traffic injury, they face longer-term impacts in the wake of a crash. Particularly in low-income families, young people contribute to the household income. Injuries and chronic illnesses prevent them from going to school and getting the education necessary to climb out of poverty, leaving families destitute.

TACKLING THE RISKS

These health burdens are unacceptable, predictable and preventable. Established by the FIA Foundation, the Child Health Initiative has been working with a range of global partners to draw together best practice from around the world, sharing knowledge and expertise from projects that can be used to develop scalable solutions to road traffic risks.

Two-time Olympic champion sprinter Shelly-Ann Fraser-Pryce joined the initiative to call for a safe journey to school for every child worldwide. "We need to focus on the rights of our children beyond the classroom as well as within the school gates. It's vital that we start with the journey to school," says the Jamaican.

"Far too many are exposed to severe danger – our children are simply trying to go to school and we are failing in our duty to keep them safe and healthy. I call for action for the children of my country, of our region and the world. We cannot stand by and allow them to face threats and danger when all they are doing is trying to go to school."

FIA Foundation Deputy Director Avi Silverman adds: "Through the Child Health Initiative and its partners, we have been calling for safe and healthy school journeys for children everywhere. The message from the children we are working with around the world is clear: policy-makers need to do far more to protect young people from the dangers of road traffic. There's simply no excuse for inaction." ◀

"Our children are simply trying to go to school and we are failing in our duty to keep them safe and healthy"

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06

AUTO looks back on the successful road safety exhibition and electric karting experience that took place at the Youth Olympic Games in Buenos Aires, assessing its impact and what it means for the future of motor sport

TEXT

/

KATE WALKER

Games changer

The FIA's ongoing co-operation with the International Olympics Committee (IOC) reached new heights in Argentina in October, when the Federation launched a successful interactive road safety exhibition and electric karting experience at the Youth Olympic Games held in Buenos Aires.

Attended by more than 20,000 people, the road safety exhibition featured electric karting alongside a host of interactive and educational safety installations. Then, to properly showcase the appeal of karting as a sport, a demonstration of the potential of electric karts was staged at a nearby race circuit by young local racers.

Speaking at the launch of the road safety exhibition, FIA President Jean Todt said: "For me, it is essential to continue this work with the Youth Olympic Games to raise awareness and to encourage safer mobility. It is also exciting to be able to complement this [work] with an electric karting experience. This is something that I think will become increasingly popular in the coming years, and will be a fun way for people to engage with what they learn from our exhibition and to introduce them to motor sport in a safe and sustainable environment."

A long-time supporter of the FIA's road safety work, IOC President Thomas Bach praised the Federation's decision to use the Youth Olympic Games as an educational opportunity.

"Every day, the health and lives of thousands

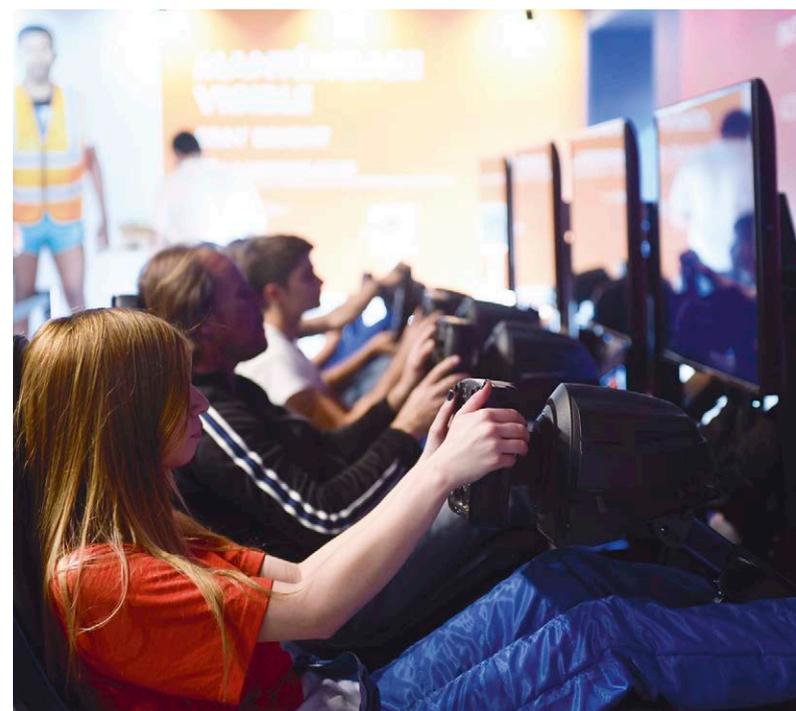
of children and young people are put at risk through road accidents around the world," he said. "Road accidents are in fact among the leading cause of death for children and young people. Many of the children and youngsters are on their way to do sport or training when these accidents happen.

"This is why we joined forces with the FIA to support this global campaign to make the roads safe for young people, because we want to be part of the solution for road safety. Through its universal appeal and global reach, sport is in a unique position to raise awareness on this important issue. This is why the Youth Olympic Games is a perfect occasion to reach young people and teach them about the importance of road safety.

"This exhibition is a great example of the power of our partnership with the FIA," concluded Mr Bach. "Making the world healthier and safer for all is a team effort. The world of sport can make a difference in raising awareness about the importance of road safety. Together, we can make the world a better and safer place for our young people."

TWIN BENEFITS

By combining sporting experience with road safety education, the Buenos Aires event provided a seamless demonstration of the twin pillars of the FIA: mobility and sport. ▶



The FIA staged a successful interactive road safety exhibition attended by thousands of people at the Youth Olympic Games...





...Which was coupled with an electric kart demonstration at a local track in Buenos Aires.



“The Youth Olympic Games is a perfect occasion to teach young people about the importance of road safety”





In Argentina the FIA used a sporting experience to help educate some of those most vulnerable to road traffic incidents, as Peter Bayer, the FIA's Secretary General for Motorsport, explains.

"The Youth Olympic Games is a concept that combines sports and education, and on the road safety side we definitely felt we had a valuable contribution to make to the educational programme as the Youth Olympic Games are for 14 to 19-year-olds and in that age group road fatalities are the number one cause of death.

"As such, we thought that through the partnership we have with the International Olympic Committee [the FIA has been fully recognised by the IOC since 2013] we could contribute in a positive way, showing also our aspiration to do more with the Olympics. When we presented the concept, the IOC was extremely happy with it, and so was the organising committee of the Games. The city of Buenos Aires, who was the partner in this, does a lot of work with young people on road safety education. So from the start, it was a perfect match."

As Secretary General for Motorsport at the FIA, Bayer says the inclusion of an electric karting demonstration was a logical next step.

"We said, 'look, we are not only a road safety organisation, we are a sports organisation, so let's bring electric karting to the event'," he says. "Electric karting offers a clean experience. There are no emissions, no noise, you can put it

anywhere. It's safe because you can tune up and down the parts with controls, and we could introduce this fabulous sport to an Olympic audience, to the International Olympic Committee members, to National Olympic Committees and to the more than 3,000 young athletes competing there."

With both streams of the event – the road safety exhibition and the electric karting demonstration – marked down as 'mission accomplished', Bayer now wants to advance the cause of motor sport at Olympic level further by pressing for the sport to be included as a discipline at the next Youth Olympic Games in Senegal, Africa, in 2022.

The opinion is one shared with the FIA's Deputy President for Sport, Graham Stoker, who was instrumental in bringing the Buenos Aires event to fruition and who oversaw the funding of the concept via the FIA's Innovation Fund. Now, he

FIA President Jean Todt with IOC President Thomas Bach at the Youth Olympic Games.

"The response in Argentina was huge – more than 20,000 people visited testing, the whole programme"

says, is the time for FIA Member Clubs to engage with national Olympic committees in order to forge closer ties with the Olympic movement.

"The situation of motor sport has never been better with the IOC," he says, "and if we start to get this community together then the aspiration of having motor sport at the Youth Olympics in Africa might well come to pass."

The road to Senegal will not be easy to navigate, however. To establish any sport as an Olympic discipline, certain standards must be met. There are current bans on sports dependent on mechanical propulsion for the Olympic Games, while the Olympic Charter says that to be considered for inclusion 'a sport must be widely practiced by men in at least 75 countries and on four continents, and by women in no fewer than 40 countries and on three continents'.

But Bayer believes the dream is still attainable. "I think we do have an opportunity," he says. "We are offering something which is very attractive. We saw the response in Argentina, it was huge – we had more than 20,000 people visiting testing, the whole programme. We were fully booked from early in the morning until late in the evening.

"There is a huge attraction," he concludes. "It's fun, it's safe and it's offering simply a way to reach out to new target groups, combining it with a strong, educational message. In my eyes, it's a perfect opportunity to grow motor sport worldwide." ◀

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Golden girl, golden rules 06

Vanessa Low's journey from a life-changing injury to Paralympic gold is an inspiring tale of determination, self-belief and vision. Now, she's bringing that commitment to the FIA's #3500LIVES campaign to reduce road fatalities, with the message that in a world full of distractions, focus is everything

TEXT

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JUSTIN HYNES

Why do you believe that a campaign such as this, which seeks to bring simple road safety messages to a global audience via available billboard space, is important?

It's so easy to get caught up in routines, performing tasks on autopilot, that we lose awareness for the world around us, which can be very dangerous in the world of traffic. I believe the billboards have the power to catch our attention and remind us of those simple rules that may save the life of the people around us as well as our own.

The message you promote as a #3500LIVES ambassador is for drivers to 'Always pay attention'. Is this message more relevant than ever due to mobile phones, increasing levels of distraction in cars and the greater numbers of pedestrian and vulnerable road users?

A significant portion of our lives happens on the phone these days. We all seem to be getting busier and having a hard time keeping up with our workload, appointments and deadlines. The thing lots of people forget is that no email or phone call could ever be more important than a life, which we put at risk when we

get distracted while driving. When we get stuck in traffic jams and feel the urge to access this seemingly wasted time we need to remember that paying attention to the task of driving is essential to making sure we arrive safely. And that is always more important than anything that may currently be happening on the phone, on an email account or on social media.

Athletes are used to finding intense focus during events, developing an ability to concentrate on the task at hand to the exclusion of all else. Are there techniques you could apply to driving or is it simply a case of minimising outside influences?

Being mindful and in the moment is essential to compete at my best. When I line up for my next jump, often in front of a huge crowd and surrounded by noise, I have to be able to detach myself from anything that happened in the past, like past injuries and past failures, and anything that may happen in the future, such as missing out on a medal, losing funding and all the consequences that failure or success bring. Being mindful is something that needs to be trained just like any muscle in our body. I participate in yoga and meditation classes



where I learn to focus on my breathing, turn off the noise in my head and be in the moment. It's truly amazing to see how the world changes when you learn to be in the moment, and not just in sport. We get to experience life at a far deeper level. I learned to structure my day more efficiently so that I no longer have the need to multi-task, but rather put my full attention towards one task at a time.

Have you had personal experience of the other safety issues outlined by the campaign – Belt up, Respect the highway code, Wear a helmet, Obey the speed limit, Drive sober, Always pay attention, Protect my children, Stop when tired, etc?

When I was young I almost lost my father in a severe car accident. He had pulled over with a technical issue in his car and a tired truck driver left his lane and crashed into my family's car with my dad lying underneath it trying to fix the issue. This accident could have left my mom, my sister and I without a dad, and that shows the extreme danger of driving while tired.

You suffered a life-changing train accident when you were just 15. Are there parallels between what happened to you and what happens to the victims of road traffic accidents in terms of the effect such severe injuries can have on the lives of those hurt and those close to them?

I lost my legs through an accident that could have been prevented if people had paid

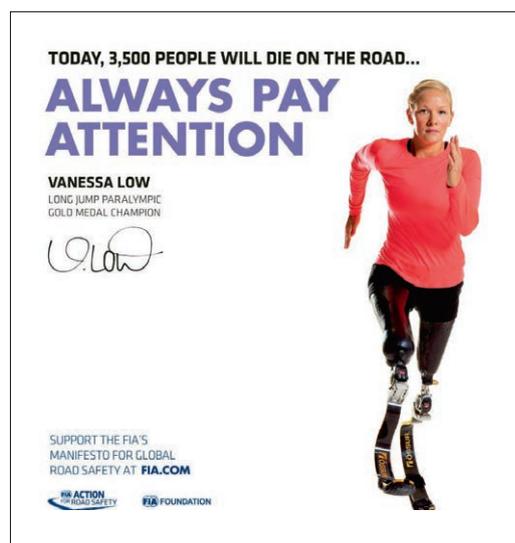
'Road safety and obeying rules means giving everyone the best chance of returning home safely to loved ones'

attention. The accident not only had a huge effect on my own life but everyone around me, such as family and friends. While I had to suffer the physical consequences on my own, those around me had to adjust their lives to support me while dealing with their own emotional pain. Road safety and obeying simple rules means giving everyone the best chance of returning home safely to their loved ones.

What gave you the desire to take up athletics, how difficult was it to undertake that process and what were the major challenges you faced along the way?

For me, sport has always been a major part of my life, it has always been about being healthy, physically and mentally. After losing my legs and spending months in hospital my biggest desire was to return to normal life, participate in society again and become a healthy me. I had to find my way there step by step, finding belief in myself and my own abilities again, and sport turned out to be an amazing tool to not only gain physical strength, but also confidence and a healthy relationship with my new body.

Paralympic champion Vanessa Low is urging road users to Always pay attention through the #3500LIVES campaign. Left: winning gold in Rio.



Athletics gave my life a direction and a purpose, something to work for and it was something I was good at. The biggest challenge has always been – and still is sometimes – access to the technology that is necessary to not only run at a competitive level, but which is essential to participate in everyday life. Prosthetic legs are still very expensive and often not covered by insurance, even in most western countries.

Can you describe what it was like to win the gold medal in the long jump at the 2016 Paralympic Games in Rio?

To win a gold medal in Rio was truly special in so many ways. When I picked up running after my accident, nobody truly believed it was ever an option for me with the great physical impairment I had, let alone being competitive in a field of athletes who are all missing a leg less than me.

I went through a lot of losses along the way, both on the track and in private, and made the life-changing decision to move to the USA to be a full-time athlete. I had to live off my savings for several years, crowd-fund my running legs, and surround myself with a group of people who believed in me and my vision as much as I did.

This step wasn't just life-changing for me as an athlete, but changed my life in so many ways. I learned to believe in myself as a person and to trust my own decisions. Winning gold after all the sacrifices I had made was truly amazing and shows how important it is to be the author of your own book, allowing yourself to move beyond perceived limitations, stand up for what you believe in and reach for your full potential. I always say that my story has never been about my adversities and circumstances but the choices I made along the way. My gold medal in Rio is a symbol for that.

You also won long jump gold at the previous year's World Championships in Doha and scored silver in the 100 metres in Rio and Doha. Which event is your favourite – long jump or 100m?

Both events have their positives. I love the thrill of the 100 metres – one chance to show

everything that you've been training for in less than 15 seconds – but I also love the mental resilience and strong mind you have to show throughout a long jump competition – refocusing after every jump, whether you're leading or are currently dead last. My love really lays in the sport as a whole. The Paralympic Games is unique. Every single person there has a story of great adversity but even greater courage. It truly shows the power of sport of any kind, bringing people together beyond language barriers, political and religious differences and different abilities.

You chose to miss out on the World Para Athletics Championship in London in 2017 in order to focus on the Olympics in Tokyo in 2020. How are your preparations going?

After Rio, I knew that in order to keep going in my career I had to do a proper rehab on a stress fracture in my lower back. The problem had built up over many years and therefore I took a full year to change my walking and running patterns and build muscles in different areas to achieve a balanced system that supports my back. After my rehab I can finally enjoy running and training again, being pain-free.

I had the chance to build a solid foundation and gain back a healthy body that will carry me to Tokyo 2020, but also through the rest of my life, post-sport. It was great having a year to get my body right and make progress in my training while not having to worry about competition. I now feel in the best space I've ever been in, both mentally and physically, and really can't wait to go out there to show what I am capable of, and push some limits. Next year's World Championship in Dubai will be a good trial for me on the way to Tokyo 2020, after being away from major competitions for a while, and I'm ready for it.

There is an emphasis on creating greater accessibility for disabled drivers in motor sport and the FIA recently established a Disability and Accessibility Commission. What advice would you give with regards to empowering disabled competitors who may be struggling to be accepted in their chosen sport?

I believe communication is crucial in situations where people with different abilities aim to work together. Being open about your individual needs, difficulties and current limitations lay the foundation for a satisfying relationship on both sides. It's important to keep in mind that everybody involved wants the same thing, a challenging but fair competition. After all, sport is there to bring people together, no matter what individual abilities they have.



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Download the free Unitag app at unitag.io/app and scan the code to discover more about #3500LIVES





07

Enduring legend

Tom Kristensen's truly exceptional record of nine Le Mans wins stands as a benchmark unlikely to be surpassed any time soon. But as the greatest driver of the world's greatest sports car event reveals, it all pivoted on a single phone call in the summer of 1997...

TEXT

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GARY WATKINS

They call him 'Mr Le Mans', and for good reason. Tom Kristensen has won the French 24-hour endurance classic no fewer than nine times. The moniker was one he assumed from the previous record winner, Jacky Ickx, whose six wins many believed would never be beaten. But chance is everything in motor racing, and the Dane, now 51, got his completely out of the blue 21 years ago.

It was one of the turning points of a phenomenal career that made him much more than just the most successful driver in the history of the Le Mans 24 Hours. He holds the same record at the Sebring 12 Hours blue-riband race in the USA — with six victories — and he can also call himself a world champion. He won the FIA World Endurance Championship with long-time driving partner Allan McNish and Frenchman Loïc Duval in 2013. But he knows he owes it all to one phone call in the summer of 1997.

The caller was Ralf Juttner, team manager of the Joest Racing squad. The previous year's Le Mans winner had a seat free in its Porsche WSC95 prototype alongside former Ferrari Formula 1 stars Michele Alboreto and Stefan Johansson. Kristensen was the driver they wanted to fill it. ▶

Kristensen swapped his F1 dream for a record-breaking career in sports cars – and has no regrets.



His first Le Mans in a Joest Porsche involved a quadruple stint and a new track record, resulting in win number one for Kristensen.

‘That phone call changed everything for me. I went home and packed, and then on Monday I flew down to Le Mans’

The only problem was that Le Mans practice was due to start in a week and there would be no time for testing, and this, remember, was in the days before simulators.

“That phone call changed everything for me,” recalls Kristensen. “It all happened so fast. I went to see the team and had a seat fitting. I went home and packed, and then on Monday I flew down to Le Mans.”

And flew out again on the Thursday. Kristensen owed his place in Joest’s privateer Porsche to his successes in that year’s FIA Formula 3000 International Championship. He was due to test his F3000 car on the day of second practice.

“I only did 17 laps in practice, but I knew before the start that this was my chance,” he says. “My team-mates had a lot of experience at Le Mans and I was the young boy, so I knew I had to dial myself in. My first two stints in the car on Saturday evening were nothing spectacular.”

Kristensen started to make his name in sports cars at the race that defines him in the small hours of Sunday morning. He climbed aboard the car for a second time and began what turned into an amazing quadruple stint using just a single set of tyres. He clambered out of the car after posting a

sequence of fastest race laps that included a new track record.

“That’s when I really started to fall in love with Le Mans,” he explains. “At one point Ralf came on the radio in German and said, ‘*schnellsten runde, schnellsten runde, fastest lap, fastest lap*’. The next time he spoke to me he said, ‘lap record, lap record’ in English. I thought to get a German to talk to me in English, I must be doing something right.”

STAR PERFORMANCE

Kristensen undoubtedly was. Juttner was back in communication shortly afterwards, asking his driver if he felt capable of staying out on track for an unprecedented fourth stint on the tyres. It was the turning point of the race. Kristensen and then his team-mates started putting pressure on the leading factory Porsche, which would retire with less than 90 minutes of the event remaining.

“That was when we started to think we could win,” says Kristensen. “The factory Porsche in the lead ahead of us had problems, and the fact that we were pushing them hard played a part in that.”



Above: Kristensen's winning run with Audi started in 2000 – the marque's first victory at La Sarthe. Left: on the podium with Stefan Johansson and Michele Alboreto in '97.

This amazing Le Mans debut set Kristensen on course for stardom. He was picked up by BMW for the following year and two years later began a relationship with Audi that despite his retirement from the cockpit at the conclusion of the 2014 FIA WEC season continues to this day.

Kristensen already knew that motor sport is about seizing opportunity. Few remember that he didn't contest his first full season of car racing until he was 23. He might have been a successful karter, finishing second in the 1987 Formula K world championship, but his efforts to move onwards and upwards were frustrated by a lack of finance. By the time he got his big break with Volkswagen Motorsport in the 1991 German F3 Championship, he'd only contested a handful of car races.

"I was working as a bank clerk. My mother was happy, but I wasn't fulfilling my dream," recalls Kristensen. "I'd done a few races, tested a few cars, but didn't have the money to progress. But there were four or five people who had seen what I could do and believed in me. They were telling Bertram Schaefer, who ran VW's F3 team, that he should take me.

"That drive in German F3 was the launch pad of my career. I did a few tests and then won the first race at Zolder in Belgium. It's perhaps more important than anything else that has ever happened to me. Everything followed on from that. Without that drive, I would probably still be working in the bank."

His decision to go to Audi for the 2000 season was another turning point. The German make had an inauspicious maiden season of sports car racing in 1999, but Kristensen decided to sign up after he was shown sketches of its forthcoming car.

"People were asking me if I was crazy going to Audi," he says. "But Dr Wolfgang Ullrich [Audi's motor sport boss] showed me the drawings, I liked what I saw and we did a handshake deal right there. The first time I drove the car, I knew they were onto something good." ▶



The 2001 win was tough physically and emotionally – run in heavy rain and following Alboreto's untimely death.

Kristensen went on to score a hat-trick of victories driving the Audi R8 prototype together with Emanuele Pirro and Frank Biela in 2000-02. The first win was special simply because it was Audi's first at Le Mans, but victory in 2001 was probably the most emotional of the nine. Alboreto, who had joined Audi in 1999, had died in an accident in testing less than two months before Le Mans.

"There's no doubt that in terms of pure driving that was my most challenging Le Mans," explains Kristensen. "It was a tough race because we had something like 19 hours of rain.

"The stint I remember most came early on Sunday morning. I was put onto intermediate tyres and endured the most frightening 20 minutes of my life. It was 20 minutes of near-misses because I couldn't get any heat into the tyres.

"I complained to our engineer, but he remained very calm and told me to stay out. It was the right decision and by the time of the next pit-stop we had extended our lead. At the time I felt that it was too much weight for my shoulders to bear."

The emotions came out on the podium. Kristensen, his team-mates and Ullrich all broke down in tears.

"We'd all been to the funeral and Dr Ullrich had told us that if we didn't want to race, we didn't have to. But we raced to



Above and below:
Kristensen describes
the Bentley Speed 8 as
the 'coolest' racing car
he's ever driven –
Le Mans win number
five followed.

show respect to Michele. There was something inside all of us that said, 'goddam, we're going to get on with this and try to win the race'. You deal with the emotions afterwards."

Le Mans victory number five for Kristensen, when he was loaned out to Audi sister marque Bentley in 2003, is special for different reasons. "The Bentley Speed 8 was the coolest and most elegant racing car I've ever driven," he says.

Most regard Audi's against-the-odds triumph in 2008 with the R10 TDI turbodiesel as one of the greatest editions of the Le Mans 24 Hours. Audi wasn't given a chance against Peugeot, but Kristensen, McNish and Rinaldo 'Dindo' Capello somehow kept a slower car in contention and then excelled when rain came early on Sunday morning.

"People were telling us we couldn't win that race, but that became part of our will to win," says Kristensen. "We had the perfect race, and I'm not just talking about Allan, Dindo and myself. The same goes for the engineers and all the mechanics at Joest. Dindo summed it up best when he said it was the race where the men beat the machines."

There was one more Le Mans win in Kristensen's world title season of 2013 with Audi's R18 e-tron quattro, though he came close to rounding up his tally into double figures the year after.



A 'perfect race' earned the Dane an against-the-odds win for Audi over Peugeot in 2008. Below: There was one last Le Mans success in 2013, in the Audi R18 e-tron quattro.



‘The FIA Drivers’ Commission has given the drivers a voice for the first time, and we have to thank FIA President Jean Todt for that’

“At lunchtime on Sunday we had one sweaty hand on the trophy, but it wasn’t to be, but we still came back to finish second,” he says. “I said to Dr Ullrich on the podium that I couldn’t wait for the following year, but later during the summer I started to think that maybe it was time to stop. I think it was good timing on my part.”

STILL IN DEMAND

Kristensen is busier than ever four years after hanging up his helmet. He retains a deep involvement with Audi: his ambassadorial duties with the marque take him all over the globe and he also helps run its pre-season training camps for the drivers. His insight is in demand in the world of television, too. He’s an expert Formula 1 commentator on Danish TV and joins the Eurosport roster for Le Mans each year.

Then there’s his role with the FIA as President of the Drivers’ Commission and his duties in race control as a drivers’ steward in Formula 1. He is particularly enthusiastic about the Drivers’ Commission.

“Our job is to advise the other FIA commissions,” says Kristensen of a body that also counts Pirro, Derek Warwick and Karun Chandhok as members. “The FIA Drivers’ Commission has given the drivers a voice for the first time, and we have to thank FIA President Jean Todt for that. It has been very well received by the drivers, and I think our input has been well received too.”

Somehow, Kristensen still finds time to keep his hand in as a driver. He’s raced — and won — at the Goodwood Revival historic meeting in a variety of machinery.

Kristensen has no regrets looking back on his career. He didn’t race in F1, but we wouldn’t want to swap a brief stint at the pinnacle of the sport for any of his successes at Le Mans.

“I would love to have done it,” says a man who tested multiple F1 cars in his time, “but only if I’d had the chance to fight for the championship, no *championships*. When you are young you set out with the aim of having a career in F1, but I believe my career was better.”

Le Mans provides the “ultimate form of racing”, according to Kristensen. He came to that realisation sometime during the night back in 1997. ◀

Since its foundation in 1904, the FIA has followed and helped influence the development of the automobile in all its road and racing forms. Tasked with celebrating that incredible history, the Federation's Founding Members Club each year awards the FIA Heritage Cup to events and individuals displaying an exemplary passion for the preservation of motoring's rich record

07

PROTECT AND PRESERVE

At the end of the second decade of the 21st century, the automobile stands at a crossroads. The world of mobility is changing with stunning rapidity as alternative energies affect the nature of the vehicles we drive – and as the development of autonomous vehicles calls into question the very need to drive at all.

And as the automobile, or whatever it might one day become, continues its relentless forward march, left behind in our desire to construct a better, brighter, more technologically advanced future is over a century of incredibly rich motoring heritage.

Weighed down by the opprobrium being heaped upon the internal combustion engine due to its environmental legacy, and dismissed as the pastime of either moneyed dilettantes or fusty enthusiasts, the history of the automobile as societal game-changer, technical marvel and object of desire is in danger of being subsumed by the very desire the car first engendered – to keep moving forward.

In order to raise awareness of the deep history that exists within the Federation and to celebrate the preservation of automotive heritage, the FIA turned to its Founding Members' Club (FMC).

As the name suggests, the club harks back to the origins of the FIA and the early years of the automobile's rise to dominance.

As interest in motoring grew, the natural extension of that passion was racing and at the start of the 20th century one of the major motor sport events was the Gordon Bennett Cup. Instituted by the millionaire owner of the *New York Herald* newspaper and administered by the Automobile Club de France (ACF), the Cup was awarded at the end of long races, often city-to-

city events, contested by entries from a variety of national motoring associations.

Hugely successful, the races drew large entries and enormous crowds of spectators, and by 1904 required more formalisation and regulation. At the Gordon Bennett race in Bad Homburg, Germany the members representing the race's competing national motoring organisations met to form an international federation of motoring club, which became known as the Association Internationale des Automobiles-Clubs Reconnus (AIACR), the body that eventually became the FIA.

CELEBRATING HISTORY

More than a century later, the 13 clubs (or their successors) from Austria, Belgium, Denmark, France, Germany, Great Britain, Holland, Italy, Portugal, Russia, Spain, Switzerland and the USA that came together in Bad Homburg constitute the members of the FMC, with the club's primary goal being the preservation of automotive heritage.

"In a world where we are constantly talking about change, about the arrival of increasing hybridisation and the rise of autonomous cars, it is incredibly important to celebrate where we came from, to properly mark the evolution of the automobile, its pioneers and to keep alive the historic vehicles still in existence," says FMC President Carlos Barbosa, also President of the Automóvel Club de Portugal (ACP).

"In today's automobile world it is justifiable and important to look at heritage and the history of the car," adds FMC Vice-President Franz Graf zu Ortenburg, also Vice-President of Germany's Automobilclub von Deutschland e V (AvD). ▶

TEXT

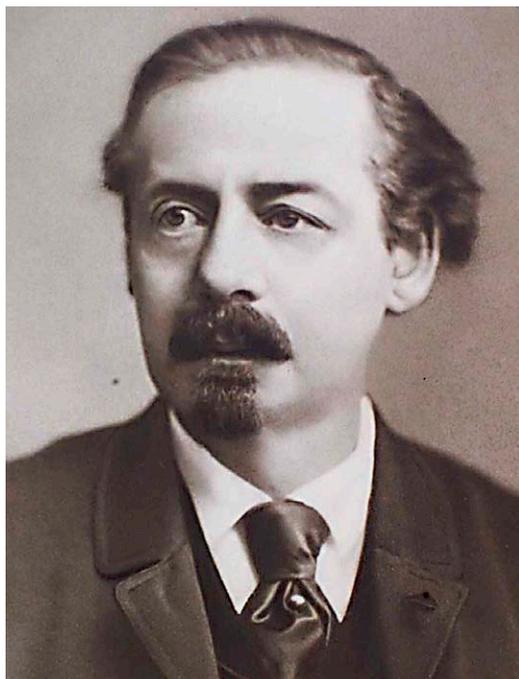
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JUSTIN HYNES

Receiving the 2017 FIA Heritage Cup was important to the organisers of the Rolex Monterey Motorsports Reunion, which regularly features over 550 historic race cars.







Siegfried Marcus is believed to have developed the first automobile in Austria between 1864-1875.

"If you walk around any city the automobile is so dominant and it has utterly defined the shape of the landscape. The automobile has changed the way we live and if you look at it from that angle alone – as well as the engineering and technical point of view, the design element – then it is so important to recognise the automobile's influence and its impact on society, and the people who made it so."

To advance that cause the club each year awards The FIA Heritage Cup. Presented at the Federation's December Prize Giving ceremony, the cup is a special award designed to celebrate the efforts of committed organisations, events and individuals to promote and preserve the history of the automobile. Submissions for the prize are solicited from the FIA community around the world, with applications being judged by the panel of FMC members.

"The Cup is the Founding Members' Club's opportunity to get something that we believe in to the top of the agenda at one of the FIA's biggest events – the FIA Prize Giving," says Peter Read, Board Member and Chairman of the Motoring Committee of Britain's Royal Automobile Club. "If we have a heritage award at that prize giving, it suddenly gives great visibility to the automotive history, and everyone exposed to the media surrounding the event understands that there is more to the FIA than just Formula 1. There is a huge world of automotive activity which celebrates past ages of motoring and it's highly important for us to have that platform."

"In choosing the award recipient we need to ensure that it is significant in terms of preserving historic vehicles and what they stand for. It needs to be international. It needs to be inclusive and it should also have a great story to tell."

Launched in 2010, the Cup was first awarded to Britain's iconic London to Brighton Veteran Car Run and in the years since has been given to the Netherlands' Louwman Museum of classic cars in 2011, the reborn Mille Miglia (2012), the AvD's Oldtimer Grand Prix event (2014), the RAC's 1000

Mile Trial (2015) and the Targa Florio (2016).

Last year, the award was handed to the Sports Car Racing Association of the Monterey Peninsula for the Rolex Monterey Motorsports Reunion held at Laguna Seca circuit.

An annual four-day celebration of incredible motor sport machinery from the past and the legends that raced them, the Monterey event now regularly features more than 550 historic cars in 15 different categories doing what they were designed to do – race.

The RAC's Peter Read says the Monterey event is a perfect example of the symbiotic relationship between prize and award winner.

"There is a two-way benefit to the FIA Heritage Cup," he explains. "Being presented at the FIA Prize Giving, the award gives the winner publicity and then, as it comes from such a large and globally recognised motoring and motor sport authority, the Cup winner can use the validity the award gives to promote their event or activity."

"In the case of Monterey, the award was quite important for them because it was the first time that the trophy had gone to the US. Indeed, when we went to Laguna Seca this year, there was the trophy right in the middle of the drivers' lounge, on display to show how important it was."

"It was a similar case with a special commendation we gave to Brooklands last year," Read adds. "We knew they intended to use the FIA logo for their marketing purposes to try to drive attendance at Brooklands and that's exactly what we are trying to do with the Heritage Cup – drive people to experience heritage. Providing Brooklands with the publicity opportunity via the commendation and providing something akin to a seal of approval from the FIA will we hope

encourage that connection with our heritage."

The FMC's desire for submissions to tell a good story is reflected in the 2018 Cup winner – the HTL Steyr Higher Technical Institute from the town of Steyr in Austria.

Nominated by FMC member club the ÖAMTC, the college was awarded the Cup for the painstaking construction by its mechanical engineering students of an exact replica of the Second Marcus car.

Not surprisingly, Siegfried Marcus' is a name that will not be instantly familiar. One of the pioneers of automobile design, Marcus has largely been overshadowed by the prominence given to greats such as compatriots Gottlieb Daimler and Karl Benz.

Marcus, though, can lay claim to being one of the very first men to build what we understand to be an automobile.

A LEGACY REBORN

After moving to Vienna from his native Germany in 1852, Marcus began developing telegraphic machinery and ignition devices before turning his attention to engines. It is believed that sometime between 1864 and 1875, he became the first inventor to gear a combustion engine to a set of four wheels, in the form of a simple handcart, some 10-15 years before Daimler and Benz's more celebrated achievements.

After his initial efforts Marcus constructed a second, much more advanced vehicle in 1888-89. The Second Marcus Car has all the features of the modern automobile, including steering and brakes, a high-speed four-stroke petrol engine (single-cylinder) with spray brush carburettor and

The Second Marcus Car, built in 1888-89, included many features of the modern automobile.



etc. F. A.

“It’s so important to recognise the automobile’s influence and its impact on society, and the people who made it so”



magnetic breakaway ignition. It is this car, owned since 1898 by the ÖAMTC and permanently housed in the Vienna Technical Museum, that the HTL Steyr students sought to recreate.

Explaining the origins of the Austrian club’s nomination of the project, Georg Brown, Head of the Classic Car Department at the ÖAMTC, explains: “In 2001, the Austrian Federal Office for the Preservation of Historical Monuments listed the Second Marcus Car as ‘the oldest petrol car in the world to have survived in its original state’. From our point of view, the project to replicate the car by students contributed significantly to inspiring young people to discover the origins of historical mobility and to preserve the associated technical know-how for future generations.

“The spirit of the project embodies the objectives of the FIA Heritage Cup,” he adds. “Receiving the award is a big recognition not only for the project carried out by HTL Steyr, but also for the significant contribution of Siegfried Marcus.”

Beginning in 2004, the project was laboured over by a total of 118 students for some 20,000 working hours, with close attention being paid to every detail of the car’s design and build.

“The aim was to prove that the car can be operated, even in the cold of winter time,” says Dr Franz Reithuber, Director of HTL Steyr. “Beside the 3D-Laser measurements, which were done at the technical museum in Vienna, all other design, calculation and production work was done in the shops and laboratories of the school. Only casting and the production of the wheels were done outside at partner companies.”

The manufacture of the car’s wooden wheels proved to be one of the trickiest aspects of the project. “Knowledge of how to produce wooden wheels in the traditional way hasn’t been necessary for many decades, so it was hard to find anyone still able to do that. Luckily we found a very senior gentleman who was able to help us in that area. It was similarly complicated to find anyone who knew how to produce the leather straps for the powertrain.”

The painstaking replication of Marcus’ remarkable invention finally reached completion in 2016, and the students’ efforts were rewarded



in April of that year when the then-Austrian Federal President Dr Heinz Fischer completed the first trip in the car. The project was equally commended by then-President of the ÖAMTC Werner Kraus.

The recreation of the Second Marcus, the inspiration it provided to young people engaged in the project and the contribution that the replica makes to the greater understanding of the earliest history of automobile development, made HTL Steyr’s project a fitting recipient for the 2018 Heritage Cup, says FMC President Barbosa. “The story of the Marcus Car and the 12-year project of the HTL Steyr students is simply amazing. To rebuild this incredible machine and shine a light

Former Austrian President Dr Heinz Fischer in the replica Second Marcus Car that HTL Steyr students spent 12 years building. Top: the Founding Members Club exists to preserve the history of the automobile.

on its inventor is what the Heritage Cup is about.”

With the 2018 prize awarded, the FMC’s attention now turns to soliciting submissions for the 2019 prize. It is, says Graf zu Ortenberg, not an easy task. “The Heritage Cup is still relatively unknown,” he explains, “so we want to encourage everyone from the FIA network to consider making a submission if there is an event, project or person they deem worthy of recognition. The Founding Members’ Club exists to preserve our heritage and reward those most involved in that process. The automobile has been part of society for 120 years and deserves to be recognised, protected and most of all celebrated, and the FIA Heritage Cup is our way of doing that.” ◀



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08

The Chinese Way

When the Federation of Automobile and Motorcycle Sports of China's predecessor, FASC, was formed in 1993, just five million cars were in private ownership and motor sport was almost non-existent. Two decades later, China has around 160 million cars and a vibrant motor sport culture. CAMF Vice-President and FIA Vice-President for Sport Wan Heping explains how the federation is dealing with the surge of interest in motorisation

TEXT

GAIA PELLICCIOLI



China is the biggest car market in the world and, despite a slight slowdown in recent months, it is likely to remain so into 2019.

With a total of 300.3 million registered vehicles and 28 million cars sold in 2017 – around a third of the entire global car market (according to the China Association of Automobile Manufacturers) – China's growth remains in double figures.

Despite the mind-boggling figure, however, the number of vehicles per capita figure – 155 vehicles per 1,000 inhabitants – means that China still has a relatively low percentage compared to Western countries. But further

growth is certain, especially with the population of China standing at 1.3 billion.

The Federation of Automobile and Motorcycle Sports of China (CAMF) and its President Guojun Zhan have learned to consider these record numbers as both a challenge and an opportunity.

Adapting to a gigantic market that is constantly changing by concentrating on focused and diversified services for its members is a priority for the federation, which in 2018 completed a significant reform process.

"Currently, the growing number of owned vehicles creates a huge automobile market and suggests

a bright future for the automobile industry," explains Wan Heping, CAMF Vice-President and FIA Vice-President for Sport.

"Before the reforms, CAMF was affiliated to the General Administration of Sport in China. Our revenue mainly came from the financial support of government. In the second half of 2018, we completed the reforms, marking a new start for our federation.

"We are now able to offer more services. We are planning to set up a new company, CAMF Member Club Ltd C, to manage an internet platform for individual members.

"The platform is under construction but the road map

is clear," he continues. "Initially, based on current resources and services, the platform will offer membership registration, racing services, training, auto campsite and self-drive tourism bookings, as well as payment facilities. We will then focus on enriching the platform and developing some functions such as the annual vehicle inspection service, information search functions etc.

"Finally, the platform will offer more functionality, such as a new vehicle shopping guide, vehicle insurance, roadside rescue and vehicle updates. Once the initial stage is completed, the platform will be operational."

China is the world's largest auto market. CAMF is to set up a new company to deal with growing demand.



One of the key areas of the CAMF programme, which sits at the crossroads between sport and cars, tourism and mobility, focuses on services associated with recreational vehicles.

HAPPY CAMPERS

For the Chinese organisation, the camping vehicle sector, combined with outdoor sports (plus sports infrastructure), the tourism industry and equipment manufacture, represents a fundamental resource for the future of the organisation and the development of the country's motor sport industry.

With that in mind, the fifth China Auto Camping Assembly, organised by the CAMF in Wuhu from November 2-5, provided an important opportunity to strengthen local and national business links.

"With more than 200 caravan manufacturers, over 30 self-drive travel clubs from across the country, more than 150 new caravan models on show and over 200,000 attendees, the assembly offered many special activities such as a camping equipment exhibition, a demonstration of national star-level campsites and a number of sporting competitions," explains Heping.

"The assembly fully demonstrated the benefits of the reforms in the fitness and leisure sector," he adds. "We certified 222 auto campsites and 34 five-star auto campsites, which significantly helped to promote the development of the auto camping industry and improve strategic cooperation. We held the Promotion Conference during the assembly, which saw 24 contracts worth RMB 7.8 billion (EUR 990 million) being signed and the collection of 66 contracts worth RMB 15.1 billion (EUR 1.9 billion). This shows the good momentum of growth in the auto camping industry."



This year's China Auto Camping Assembly provided proof of the growth of the country's leisure industry and was attended by FIA President Jean Todt.

Although the speed of motorisation and urbanisation in China provide an opportunity to understand and plan for the main trends inherent in the future of mobility, they have in turn created concerns about road safety and the sustainability of urban development.

China has the highest number of deaths caused by air pollution and, while the government is committed to reducing emissions

by 2030, it is a process that requires collaboration among institutions, associations and citizens.

Fully aware that sustainable public transport can have a positive impact on environmentally-friendly urban development, Heping says that he is in favour of an ever-greater focus on these solutions by the FIA.

"Sustainable urban development is defined as 'making cities and human settlements inclusive, safe, resilient and sustainable' and is one of the 17 UN Sustainable Development Goals," he explains. "Currently, transport systems account for nearly a quarter of the

world's energy consumption and carbon dioxide emissions. In order to reduce the environmental impact caused by transport in metropolitan areas, sustainable transport has been widely agreed as one of the areas where improvement could create healthier and more productive urban centres."

Like other clubs and federations, CAMF is actively involved in promoting road safety across the country.

According to the World Health Organisation, more than 250,000 people lose their lives every year due to road traffic accidents in China – one sixth of the worldwide number of traffic-related deaths. In rural areas, most of those killed are riders of two-wheeled vehicles or pedestrians, while in cities, drivers and passengers of cars and electric bike riders are most at risk.

"People's lives, especially in low- and middle-income countries, are severely affected by road safety and children are the major victims," says the CAMF Vice-President. "As the national federation, we will closely follow the FIA and, based on our national position, take suitable action. We are planning to carry out some education and experience activities during the FIA championships and our national championships in order to enhance people's awareness of road safety. We would like to cooperate with schools, providing regular road safety education to children, who are at most risk from road accidents. ▶

CAMF Vice-President and FIA Vice-President for Sport Wan Heping sees a bright future for both the auto industry and motor sport in China.



'We are planning to carry out some education and experience activities during the FIA championships and our national series to enhance people's awareness of road safety'

“In 2017 CAMF, with the support of the FIA Road Safety Grant Programme, carried out the ‘Little Hands Guiding Big Hands’ initiative as part of the global action of the fourth UN Road Safety Week. The project, aimed at raising road safety awareness among primary school students and encouraging them to teach their elders, had very positive results, engaging with more than 6,000 students, teachers, parents, traffic police officers and community members, each of whom learnt road safety rules while carrying out school and community-based activities.

The other area covered by CAMF, as the National Sporting Authority, is motor sport.

CAMF’s predecessor, FASC (Federation of Automobile Sports of China), was founded in 1993 but in 2015, after approval was granted by the Ministry of Civil Affairs and the General Administration of Sport, FASC merged with CMSA to become CAMF.

With more than 373 clubs across the country, CAMF today organises, directs and coordinates national automobile and motorcycle sporting activities across China, runs major national and international automobile sports events, and carries out international exchanges in accordance with the relevant regulations of the State General Administration of Sport and the regulations and rules of the FIA and FIM.

While CAMF has existed for over two decades, the impetus to push



motor sport into the public consciousness and encourage involvement has been strong.

“The last 10 years have witnessed significant developments in Chinese automobile sports,” says Heping. “In terms of international events we have Formula 1, WTCR, WEC, Formula E and APRC, which

China will host two Formula E rounds in Hong Kong (above) and Sanya as electric vehicles gain popularity.

CAMF President Guojun Zhan leads a group that has adapted to huge change in the Chinese car market.

account for over half of the world championships. Domestically, circuit, rally and off-road events are growing at the same time.

“Last year, we held 99 events – traditional events such as the Chinese Touring Car Championship and the national GT, rally and rallycross championships – which maintain their momentum. The success of the Silk Way Rally provided a good example of how to hold a cross-border event in terms of organisation, marketing, etc. The development of local events is improving and will consolidate the foundation of our event structures.”

Junior racing in China also received a boost with the launch of a Chinese Formula 4 Championship in 2014 and its inaugural season in 2015-16, which made the path for young talent to F1 more transparent.

CAMF’s commitment to bringing through a new generation of racing talent has extended to entering into partnerships in respect of young driver training programmes that the federation has built over the years with other ASNs, such as the MSA and FFSA.

In 2018, there were 37 registered local events that generated positive social and economic effects. These grassroots events, explains Heping, helped to open up the motor sport community in China, where motor sport is still regarded as an activity for the wealthy.

TALENT SEARCH

In this respect, an important initiative that promotes grassroots motor sport is CAMF’s grassroots driver talent search programme, launched in 2018 with the support of the FIA Sport Grant Programme and aimed at finding new talent through basic rental karting activities.

“Karting plays a critical role in promoting grassroots motor sport,” says Heping. “It’s affordable, easy to access and safe. It is not only a form of motor sport, but a recreational and social activity.”

“The event carries out auditions all over the country. Every single round and final is free of charge for teenagers. The teenagers selected at the auditions are offered professional race training, which is a rare opportunity.”



'The success of the Silk Way Rally provided a good example of how to hold a cross-border event in terms of organisation and marketing etc'

Below and right:
China successfully
joined the route for
the cross-border Silk
Way Rally in 2016-17.

At the other end of the sporting competition pyramid, prestigious events like the Formula 1 Grand Prix in Shanghai have kept Chinese motor sport on the world map and have given junior drivers something tangible to aspire to.

According to Heping, the race in

Shanghai, which on April 19 2019 will be the 1000th F1 race, has boosted motor sport's visibility in China and helped to cultivate the motor sport culture. Proof of the impact of such events, coupled with the promotion of a huge variety of domestic events, is reflected in the fact that CAMF now issues more than 3,500 competition licences per year.

Heping also points to the massive growth of the car industry and the rapidly expanding economy as key drivers in motor sport involvement.

"Today, cars have changed from being luxury goods to being a day-to-day means of transport for people in China," he explains. "Now that their basic needs are consistently met, people are starting to demand more from their cars. ▶



Motor sport is a good way for people to learn about cars and advanced technology.

The other great challenge for CAMF is to transform motor sport into a laboratory for technological innovation.

"We would like to develop motor sport into a platform through which car manufacturers can display their new technology and show the future development trends in the automobile industry," says the Federation's Vice-President.

As a result of recent government incentives, new energy vehicles are also becoming more and more popular. "In line with this trend, we will hold two stages of the ABB FIA Formula E Championship in China: one in Hong Kong and the other in Sanya."



Briton Sam Bird was victorious when China staged round one of the 2017-18 FIA Formula E Championship.

Heping has great ambitions for the future. He is focused on developing motor sport and building closer ties with Federation members.

"The fourth industrial revolution is changing our world in an unimaginable way," he explains. "Artificial intelligence and automation will be the development trend of motor sport over the next

five to 10 years. New types of event will be developed, offering people different ways of experiencing motor sport. Technological developments will make sport safer and more exciting."

"The goal is to grow the motor sport industry by developing auto camping alongside outdoor sports, comprehensive sports construction activities, the tourism industry and the equipment manufacturing industry. We will improve the structure of events by consolidating their foundations, improving their quality and providing well-organised racing environments. We will cultivate a motor sport culture and create a motor sport atmosphere. We will maintain close relationships with our members and provide them with improved services." ◀

'The fourth industrial revolution is changing our world in an unimaginable way. Technological developments will make motor sport safer and more exciting'

The Chinese Grand Prix in Shanghai has proved popular since 2004 – and the circuit will host the 100th F1 race in 2019.



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09

CHAMPIONS LEAGUE

TEXT / MARC CUTLER

Analysis of the FIA championships in 2018 reveals that Italy leads the way in driver success for the season

Behind every champion driver is a National Sporting Authority, which not only provides the licence for that driver to compete but also provides support throughout their careers. But which countries are the most successful in producing top driver talent?

Research of the top three places across every FIA championship in 2018, from karting to Formula 1, reveals that Italy is way out in front. Perhaps more surprising is that Czech Republic takes second place, in front of more established motor sport markets such as Germany and Great Britain. And despite having a lot of drivers in FIA championships, countries like Spain, Japan and Australia find themselves down the field when it comes to success this season.

The table below shows the most successful countries in terms of drivers finishing in the top three places in FIA championships in 2018. Points have been attributed based on finishing position (three points for 1st, two for 2nd and one for 3rd) to give an overall score for the table.



WINNER
3 points



SECOND PLACE
2 points



THIRD PLACE
1 point

TOTAL POINTS

Rank	Country	Winner (3 pts)	Second Place (2 pts)	Third Place (1 pt)	Total Points
1	ITALY	4	4	4	46
2	CZECH REPUBLIC	4	3	3	36
3	GERMANY*	4	3	1	32
4	GREAT BRITAIN*	3	3	3	32
5	SWEDEN*	2	4	3	32
6	FRANCE	3	2	3	29
7	BELGIUM	2	2	3	21
8	BRAZIL	2	1	3	17
9	RUSSIA	1	2	3	15
10	LATVIA	1	2	1	13

*When equal on points the country with more 1st places (then 2nd places) ranks higher

Rank	Country	Points
11	Finland	12
12	Mexico	10
13	Spain	10
14	Japan	9
15	Switzerland	9
16	China	7
17	Australia	6
18	Poland	6
19	Portugal	6
20	Paraguay	6
21	Thailand	6
22	Austria	5
23	Kenya	5
24	New Zealand	5
25	Estonia	4
26	Netherlands	4
27	Norway	4
28	Andorra	3
29	Hungary	3
30	Ireland	3
31	Lithuania	3
32	Qatar	3
33	Turkey	3
34	USA	3
35	Bulgaria	2
36	Luxembourg	2
37	Slovakia	2
38	Argentina	2
39	Denmark	2
40	Colombia	1
41	Dominican Republic	1
42	Kuwait	1
43	Malaysia	1
44	Singapore	1
45	Slovenia	1
46	United Arab Emirates	1



FIA CHAMPIONSHIPS 2018**
WINNERS BY NATIONALITY

					FIA Formula One World Championship 1st: 2nd: 3rd:	WTCR - FIA World Touring Car Cup 1st: 2nd: 3rd:
FIA Formula E Championship 1st: 2nd: 3rd:	FIA Formula 2 Championship 1st: 2nd: 3rd:	FIA Formula 3 European Championship 1st: 2nd: 3rd:	FIA Formula 3 World Cup 1st: 2nd: 3rd:	F4 Nacam Championship Certified by FIA 1st: 2nd: 3rd:	F4 US Championship 1st: 2nd: 3rd:	F4 Spanish Championship Certified by FIA 1st: 2nd: 3rd:
F4 UAE Championship Certified by FIA 1st: 2nd: 3rd:	F4 South East Asia Championship Certified by FIA 2017-18 1st: 2nd: 3rd:	F4 South East Asia Championship Certified by FIA 1st: 2nd: 3rd:	F4 Italian Championship Certified by FIA 1st: 2nd: 3rd:	F4 German Championship Certified by FIA 1st: 2nd: 3rd:	F4 British Championship Certified by FIA 1st: 2nd: 3rd:	F4 North-European Zone Championship Certified by FIA 1st: 2nd: 3rd:
F4 Japanese Championship Certified by FIA 1st: 2nd: 3rd:	F4 Chinese Championship Certified by FIA 1st: 2nd: 3rd:	F4 Australian Championship Certified by FIA 1st: 2nd: 3rd:	F4 French Championship Certified by FIA 1st: 2nd: 3rd:	FIA Karting World Championship - OK 1st: 2nd: 3rd:	FIA Karting World Championship - KZ 1st: 2nd: 3rd:	FIA Karting World Championship - Junior 1st: 2nd: 3rd:
FIA Karting European Championship - OK 1st: 2nd: 3rd:	FIA Karting European Championship - KZ 1st: 2nd: 3rd:	FIA Karting European Championship - Junior 1st: 2nd: 3rd:	FIA Karting European Championship - K22 1st: 2nd: 3rd:	FIA Karting European Championship - Superkart 1st: 2nd: 3rd:	FIA Karting International Supercup - K22 1st: 2nd: 3rd:	FIA Karting Academy Trophy 1st: 2nd: 3rd:
FIA GT World Cup 1st: 2nd: 3rd:	FIA GT Nations Cup 1st: 2nd: 3rd:	FIA African Rally Championship 1st: 2nd:	FIA Asia-Pacific Rally Championship 1st: 2nd: 3rd:	FIA Codasur Rally Championship 1st: 2nd: 3rd:	FIA Nacam Rally Championship 1st: 2nd: 3rd:	FIA Middle East Rally Championship 1st: 2nd: 3rd:
FIA World Rallycross Championship 1st: 2nd: 3rd:	FIA World Rally Championship 1st: 2nd: 3rd:	FIA WRC2 Championship 1st: 2nd: 3rd:	FIA WRC3 Championship 1st: 2nd: 3rd:	FIA Junior WRC Championship 1st: 2nd: 3rd:	FIA World Cup for Cross-Country Rallies 1st: 2nd: 3rd:	FIA World Cup for Cross-Country Rallies 2WD Trophy 1st: 2nd: 3rd:
FIA European Rally Championship 1st: 2nd: 3rd:	FIA ERC2 Championship 1st: 2nd: 3rd:	FIA ERC3 Championship 1st: 2nd: 3rd:	FIA RGT Cup 1st: 2nd: 3rd:	FIA European Rally Trophy - Final 1st: 2nd: 3rd:	FIA European SuperCar Rallycross Championship 1st: 2nd: 3rd:	FIA European Super1600 Rallycross Championship 1st: 2nd: 3rd:
FIA European Touring Car Rallycross Championship 1st: 2nd: 3rd:	FIA European Autocross Championship - SuperBuggy 1st: 2nd: 3rd:	FIA European Autocross Championship - Buggy1600 1st: 2nd: 3rd:	FIA European Autocross Championship - TouringAutocross 1st: 2nd: 3rd:	FIA European Autocross Championship - JuniorBuggy 1st: 2nd: 3rd:	FIA International Hill Climb Cup Cat. 1 - Production 1st: 2nd: 3rd:	FIA International Hill Climb Cup Cat. 2 - Competition 1st: 2nd: 3rd:
FIA International Hill Climb Cup Cat. 3 - E1 1st: 2nd: 3rd:	FIA European Hill Climb Championship Cat. 1 - Production 1st: 2nd: 3rd:	FIA European Hill Climb Championship Cat. 2 - Competition 1st: 2nd: 3rd:	FIA Hill Climb Masters - Cat. 1 1st: 2nd: 3rd:	FIA Hill Climb Masters - Cat. 2 1st: 2nd: 3rd:	FIA Hill Climb Masters - Cat. 3 1st: 2nd: 3rd:	FIA Hill Climb Masters - Cat. 4 1st: 2nd: 3rd:
FIA European Drag Racing Championship - Top Fuel 1st: 2nd: 3rd:	FIA European Drag Racing Championship - Top Methano Dragster and Funny Car 1st: 2nd: 3rd:	FIA European Drag Racing Championship - Pro Modified 1st: 2nd: 3rd:	FIA European Drag Racing Championship - Pro Stock 1st: 2nd: 3rd:	FIA European Truck Racing Championship 1st: 2nd: 3rd:	FIA Intercontinental Drifting Cup 1st: 2nd: 3rd:	

**All FIA championships except historic series and the FIA World Endurance Championship (2018-19 season still in progress)



A pioneering voice in motor sport

10

Brought to racing when her father bought the Indianapolis Motor Speedway following World War II, the late Mari Hulman George became the heart and soul of the IMS, presiding over a period of exceptional expansion at America's iconic race circuit

Former Indianapolis Motor Speedway Chairwoman Mari Hulman George, the woman credited with overseeing a huge period of expansion at the iconic US circuit and known to millions of American racing fans as the voice of the Indianapolis 500 start, died recently at the age of 83. She was IMS chairman from 1988 until 2016 and remained on as Chairman of the Board Emeritus.

Mari's father, Anton 'Tony' Hulman Jr, purchased the Speedway in 1945 and saved it from demolition after the Second World War. For Mari Hulman George, it became a life's work.

"She was a quiet pioneer in so many ways, from owning a race team in the 1950s and '60s to overseeing a period of tremendous growth and evolution while chairman of the board at IMS," her son and current IMS chairman Tony George told the Associated Press.

Following her father's purchase of the circuit, Hulman George became immersed in racing, co-founding the HOW racing team and enjoying a successful career as a team owner – a rarity for a woman in the 1950s and '60s.

During her tenure as chairman, IMS prospered, expanding its schedule to include the Brickyard 400 in NASCAR, as well as, for a time, international events such as Formula 1 from 2000-07 and MotoGP from 2008-15. The expansion led to significant development of the Speedway, including the construction in the infield section of the grand prix course used by F1 and MotoGP, a new Pagoda control tower and a new garage complex.

Mari was familiar to most race fans as the voice behind the start procedures of the Indianapolis 500 and Brickyard 400 from the late 1990s until 2015, giving the "start your engines" command to generations of drivers. She was also known as a philanthropist, generously contributing to projects regarding arts, healthcare and animal care.

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