AUTO

INTERNATIONAL JOURNAL OF THE FIA

issue #26

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seidldesign

This edition of AUTO is dedicated to the memory of Charlie Whiting (1952-2019)

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.

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Dear reader,

The cover story for the first edition of AUTO in 2019 is given over to the 1000TH GRAND PRIX in the history of the FIA Formula 1 World Championship, the Chinese Grand Prix, which takes place in Shanghai in April.

It's an important milestone for this series, which has hundreds of millions of fans around the world and which has been a significant driver of technological progress in the automotive world. It is also symbolic that such a landmark in the history of the pinnacle of motor sport takes place in CHINA, a country that more than any other characterises the present and the future of the automobile, due to its size and the opportunities it offers. With that in mind, we also feature a profile of China's latest motor sport hope, GUANYU ZHOU, in the section dedicated to talented youngsters.

Sadly, the world of Formula 1 was dealt a terrible blow just before the start of the season with the sudden death of FIA Director of Formula 1, CHARLIE WHITING. His passing shocked everyone in motor sport and we wanted to honour him with a special tribute.

Road safety and sustainability remain major priorities for the FIA and the Federation recently addressed the topics at the annual meeting of the WORLD ECONOMIC FORUM IN DAVOS. In this edition you can read a report on this year's outcomes, as well as two linked features: one on the work of the FIA FOUNDATION to produce a more realistic framework to deal with air quality in urban areas and another on the new GREEN NCAP programme. This initiative is supported by the FIA and its aim is to rebuild consumer trust in vehicle emission tests.

Also in this issue, our growing collection of profiles of key auto industry figures shines a light on CHUNG MONG-KOO, who has transformed Hyundai and Kia into global brands, while our regular look at motor sport legends features the only driver who can boast of having been and FIA world champion in two different disciplines, rally and rallycross, namely PETTER SOLBERG.

These are just some of the features you will find inside. I hope you enjoy them and, as usual, I invite you to send in suggestions on how we can improve the magazine still further.

JEAN TODT,
FIA President

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Global Tyre Partner

contents

From F1 at 1000, to celebrating the life and work of late FIA Director of F1 Charlie Whiting, to tackling urban air pollution, this is AUTO

FORMULA E

NEW STAR ATTRACTIONS

With Season 5 of the FIA ABB Formula E Championship underway, attention has turned to the future in the shape of the first electric racing car developed by Mercedes. Sporting a 'teaser livery', the Mercedes-Benz EQ Silver Arrow 01 made its debut at the 89th International Motor Show in Geneva ahead of its planned 2019/20 competition entry. Once that happens the German marque will become the only manufacturer in the world to race in both Formula 1 and FE. Preparations are also underway for Formula E's return to London in the summer of 2020, when the UK capital will host the season finale double-header. Competitors are set to race on a 2.4-kilometre circuit based at London's Royal Docks and starting at the ExCel centre.

RISING TO THE ELECTRIC CHALLENGE
"The countdown to our entry into Formula E has now officially begun," said Mercedes motor sport boss Toto Wolff after the Mercedes-Benz EQ Formula E Team's new racer was unveiled in Geneva in March. "Formula E is a new playing field for us but we are looking forward to demonstrating the performance of our intelligent battery-electric drives in motor sport."

WRC, RALLY MÉXICO

OGIER'S HIGH FIVE

Citroën's Sébastien Ogier was on commanding form on Rally Mexico in March, round three of this year's FIA World Rally Championship, to claim his fifth overall victory on the event and challenge early series leader Ott Tänak. The Frenchman took an early lead in the rally and never relinquished it, keeping his Estonian rival at bay to win by 30 seconds. He is now just four points behind Toyota Yaris driver Tänak in the Drivers' Championship, with Hyundai Motorsport's Thierry Neuville a further six adrift after battling through to fourth on the tough terrain and searing heat of the Mexican stages. Ahead of him M-Sport's Elfyn Evans enjoyed a good battle with Tänak on the final day before having to settle for third in his Ford Fiesta.

A MOMENT FOR REFLECTION
Victory in Mexico was Citroën C3 driver Sébastien Ogier's 46th career success on the world's stages. It was his second consecutive win in Mexico, having previously claimed the top spot from 2013-15. "This is special," said the reigning champion. "In 2008 I celebrated my first Junior victory here. It was a dream to be here and it was the launch of my world career. I have a special connection with this rally."

FIA WEC

AMERICAN DREAM

In March, the FIA World Endurance Championship returned to the Sebring International Raceway in the United States for the first time since 2012, this time teaming WEC's 1000-Mile race with the classic 12-Hours event that forms part of the IMSA Weathertech Sportscar Championship. And after taking victory at the 24 Hours of Daytona, Fernando Alonso picked up a second win at a classic American track, as he and team-mates Kazuki Nakajima and Sébastien Buemi continued Toyota Gazoo Racing's dominance of the FIA WEC 2018/2019 Super Season by romping to the top step of the podium ahead of the #7 Toyota TS050 of Mike Conway, Kamui Kobayashi and José María López.

SMASH AND GRAB
On the #8 Toyota crew's way to victory in Sebring, Fernando Alonso smashed the lap record at the Florida airfield circuit as he took pole position for the race ahead of the #7 Toyota. Alonso set a new official qualifying record with a lap of 1min 40.124secs, beating the previous record set by Audi in 2013 by a sizeable 3.762secs.

01

NEWS

In this issue: FIA President hails growth and development in motor sport; Honda aims for all-electric sales in Europe; Abu Dhabi unveils World RX circuit ahead of season-opener; F1's new ultra-protective helmets put to the test; all-female crew to compete at Le Mans

FIA President highlights growth and key 2019 developments at Geneva

FIA President Jean Todt met with heads of the governing body's major championships at the Geneva Motor Show.

FIA President Jean Todt was joined by other motor sport leaders at the Geneva Motor Show to highlight growth and key 2019 developments in their respective disciplines.

"I am delighted to gather the promoters of the FIA's major championships here today to showcase the growth of the respective disciplines and share insights into our future direction," said Todt.

Formula E CEO Alejandro Agag announced that the all-electric series will return to London in 2020 to race at the Docklands' ExCel centre on the first indoor/outdoor circuit.

Chase Carey, CEO and Executive Chairman of Formula One, looked ahead to the 2019 season, talking about F1's global growth and the celebration of the 1000th Grand Prix set to take place this year.

In addition, the FIA also announced a new road safety initiative in partnership with F1, a digital motor sport working group that focuses their commitment to esports, and upgrades to the FIA Centre of Excellence in Valleiry, France, were revealed.

"Opportunity and innovation are the fuel for improvement," added Todt. "I am pleased to announce these exciting new initiatives from the FIA, to enable us to better engage with our audiences and enhance our technical excellence in order to ensure we continue 'racing ahead'."

German makes to invest €60bn in electric cars and automation

VDA president Barnhard Mattes says Germany is committed to reducing CO_2 levels with investment in electric cars, such as the Audi e-tron.

Germany's car industry will invest nearly €60 billion over the next three years on electric cars and automated driving, according to the head of the VDA car industry association.

Speaking at the Geneva Motor Show, VDA president Bernhard Mattes highlighted the investment being made to reach European Union goals on reducing carbon dioxide emissions.

"We will invest over 40 billion euros in electric mobility during the next three years, and another 18 billion euros in digitization and connected and automated driving," said Mattes.

The range of electric car models from German manufacturers would treble to around 100 in that period and Mattes called for appropriate regulatory conditions across Europe.

"The ramp-up of electric mobility is coming in Europe, this also demands the appropriate regulatory conditions right across Europe," he added. "Without it, the EU's CO_2 targets cannot be achieved by 2030."

Mattes said that Germany, together with other major European economies, is set to have a much higher share of electric vehicles among its new registrations than the EU average. He noted that charging infrastructure for electric cars must be expanded and incentives offered to buyers of electric vehicles.

Toyota launches new partnership to bring hydrogen fuel cell taxis to streets of Paris

Toyota is to supply 500 Mirai hydrogen fuel cell cars to form a zero emission taxi fleet in Paris.

Toyota is to partner with French companies Air Liquide, Idex, and the Société du Taxi Électrique Parisien (STEP), to form HysetCo, a joint venture devoted to developing hydrogen mobility in the French capital, Paris.

The collaboration is a landmark in the emergence of a hydrogen-based society in France and in the further development of Hype, the world's first fleet of zero emission, hydrogen-powered taxis, launched in 2015 during the COP21 sustainable innovation forum and operated in Paris and through the Île-de-France region.

HysetCo will make it easier to roll out hydrogen fuel cell vehicles and their refuelling infrastructure in the region and aims to reach the objective of 600 taxis by the end of 2020. Toyota will deliver an additional 500 Mirai hydrogen fuel cell saloons by the end of 2020, completing the existing fleet of 100 Hype vehicles.

The joint venture covers two activities: the distribution of hydrogen and the development of mobility-related applications, with each stakeholder bringing its own expertise to the project.

Hype's taxi fleet will be able rely on a wider network of refuelling stations, following the recent opening of a new location in Roissy, near Paris-Charles-de-Gaulle airport. This joins three existing facilities in Paris region.

Honda to go all-electric in Europe by 2025

Honda wants all of its car sales in Europe to be based on electric vehicles by 2025 in an ambitious announcement at this year's Geneva Motor Show.

The Japanese company said that the new goal builds on its 2017 aim of having at least two-thirds of its sales based on EVs by 2025, with Honda also noting that full-hybrid technology will play a key role in meeting its aims.

The announcement follows on from the closure of Honda's UK factory in Swindon as part of a global reorganisation designed to accelerate its shift towards electric vehicles.

"Since we made that first pledge in March 2017 the shift towards electrification has gathered pace," said Tom Gardner, Senior Vice-President of Honda Motor Europe. "Environmental challenges continue to drive demand for cleaner mobility. Technology marches on unrelenting and people are starting to shift their view of the car itself."

Honda marked its new claims by unveiling an all-electric vehicle for the European market, dubbed the 'e Prototype' Honda. It features a range of over 200km and a 'fast charge' functionality that provides 80 per cent range in 30 minutes. A production version of the car will be unveiled later this year.

The new Honda 'e Prototype' will feature a fast charge function and a range of over 800km.

Bogotá becomes first Vision Zero for Youth city in South America

Bogotá is the latest city to aim for zero road fatalities involving young people, led by Mayor Enrique Peñalosa.

Bogotá's Mayor Enrique Peñalosa and Secretary of Mobility Juan Pablo Bocarejo have committed to Vision Zero for Youth, making the city the first in South America to target fatality-free journeys to school.

Bogotá has joined a network of cities adopting Vision Zero for Youth including Washington DC, New York, Los Angeles, Mexico City and others. The programme is supported by the FIA Foundation and began in Washington through the National Center for Safe Routes to School, expanding to Mexico City via the Institute for Transportation Development and Policy.

Under the Vision Zero for Youth policy, cities are committing to eliminating traffic fatalities and serious injuries. A growing group of these cities is focused on improving safety in school zones.

"We are proud to be the first South American city with Vision Zero for Youth," said Mr Peñalosa. "Good cities protect their most vulnerable citizens, their children. We are making progress, but we have a long way to go."

FIA Deputy Director Natalie Draisin said: "By 2030, over half of urban dwellers will be children. This shift in population, urbanisation and motorisation is a recipe for more injuries and fatalities unless we seize the opportunity to make cities healthier, more livable, walkable and bikeable, starting with our children.

"We commend Bogotá for its commitment to Vision Zero for Youth and its support of the UN Special Summit on Child and Adolescent Health, paving the way for others to join the fight to protect our children."

Multiple Middle East Rally Champion Mohammed ben Sulayem christened Abu Dhabi's World RX track at Yas Marina.

Abu Dhabi reveals FIA World Rallycross track layout

The first round of the 2019 World Rallycross Championship will head to Abu Dhabi, with the Yas Marina circuit layout unveiled ahead of the inaugural event in April.

At an official opening ceremony, the first laps of the 1.2-kilometre rallycross track were completed by 14-time FIA Middle East Rally Champion Mohammed ben Sulayem.

The startline is located on the Grand Prix track, between Turns 4 and 5, and the lap continues up to the Turn 7 hairpin. The drivers will then take a 90-degree left-hander into the purpose-built infield section, onto the first loose-surface area after a double right-hander.

The loop then returns to the F1 circuit, with the separate joker lap section taking drivers through a right-left chicane before returning to the start/finish line.

The owners of Yas Marina are positioning the event as being similar to the SpeedMachine Festival at Silverstone for the British round of World RX last year, with a mix of rallycross and music artists.

"Yas Marina Circuit is always innovating when it comes to hosting thrilling motor sport races that attract fans and entertainment seekers to Abu Dhabi, and the FIA World Rallycross Championship is the latest in our portfolio of world-class events," said Al Tareq Al Ameri, CEO of Yas Marina Circuit.

New ultra-protective helmet makes debut at F1 testing

Ultra-protective helmets based on a new FIA standard have made their track debut during Formula One pre-season testing.

As drivers took to the Circuit de Catalunya to test parts on their newly-built cars, they also wore next-generation helmets that are mandatory for the 2019 season.

The new 8860-2018 standard was created with help from F1 helmet suppliers Stilo, Bell Racing, Schuberth and Arai, and follows decades of research by the FIA that included extensive military ballistic testing.

Arai was last to get its helmet fully homologated by the FIA during the second week of F1 testing having just passed all the vigorous tests, including having a 225g metal disc fired at 250kph at the helmet, dropping a 10kg weight on it from five metres, and an air rifle being shot directly at the visor.

Both Sebastian Vettel and Daniel Ricciardo ran with Arai helmets, while others such as Max Verstappen and Daniil Kvyat switched to the variant made by Schuberth. Half the drivers on the grid, including Lewis Hamilton, have chosen to run with Bell helmets, which was the first to create a helmet to the new standard when it was launched last year.

This year's new F1 helmets, including Kevin Magnussen's Bell example, have undergone rigorous testing.

Child Health Initiative Toolkit launched

A new toolkit to support and enable the delivery of 'safe and healthy journey to school' interventions was launched at the Safety 2018 World Conference in Bangkok.

The conference brought together over 1000 of the world's leading researchers, practitioners, policy-makers and activists to share information and experiences and to discuss solutions. The event was opened by HRH Princess Maha Chakri Sirindhorn of Thailand, Dr Etienne Krug, Director of WHO's Department for Management of Noncommunicable Diseases, Disability, Violence and Injury Prevention, and Child Health Initiative Global Ambassador, Zoleka Mandela.

The Toolkit is a global resource designed to enable safe and healthy journeys for children everywhere. NGOs, international agencies, public authorities and their partners worldwide will be able to find step-by-step guidance to help implement solutions and measure their success. It will support anyone aiming to create a safe environment for children, to protect them from air pollution and prevent child road traffic injury. It has been developed with The George Institute, along with many of the FIA Foundation's partners – including iRAP, Amend, EASST, ITDP and the World Resources Institute.

Ms Mandela said: "The Child Health Initiative launches a set of global tools for giving children safe and healthy journeys. These are the best practice solutions, which are proven to save lives. For our families, our children and the next generation we surely must not fail."

Child health ambassador Zoleka Mandela is backing a new Toolkit to help children travel safely to school.

All-female team to compete in Le Mans 24 Hours race

Manuela Gostner, Rahel Frey and Michelle Gatting are set to race this Ferrari 488 GTE at Le Mans.

An all-female racing team supported by the FIA Women in Motorsport Commission (WIMC) has secured a place on the 2019 entry list for the Le Mans 24 Hours.

Manuela Gostner, Rahel Frey and Michelle Gatting will become the first all-female crew in 10 years to compete in the famous French race, taking up one of the 60 coveted entry spots in their Ferrari 488 GTE.

"This is a dream come true for the mission and objectives of the WIMC," said its president Michèle Mouton. "To have secured this entry to Le Mans is absolutely fantastic and not easy, and a real step towards our goal of getting women on the podium at the most iconic event in endurance racing."

It follows the news that 15-year-old Dorinane Pin has been selected by the WIMC as the most promising and deserving female out of three that participated in the 2019 Volant Winfield.

As part of the WIMC initiative, Pin will participate in one full day of race preparation – including simulator work, physical and mental tuition and coaching – with Winfield Racing School, as well as two official Formula 4 test days with the FFSA Academy at the Paul Ricard Circuit.

Volvo to impose new limit on cars to highlight dangers of speeding

Volvo will limit the top speed of all its cars to 112mph from 2020 to highlight the dangers of speeding worldwide.

This is part of the Swedish company's safety project entitled 'Vision 2020', which aims for no one to be killed or seriously injured in a new Volvo by 2020, with Volvo broadening its scope to include a focus on driver behaviour.

"As humans, we all understand the dangers with snakes, spiders and heights. With speeds, not so much," said Jan Ivarsson, one of Volvo Cars' leading safety experts.

"The problem with speeding is that above certain speeds, in-car safety technology and smart infrastructure design are no longer enough to avoid severe injuries and fatalities in the event of an accident," said Ivarsson. "That is why speed limits are in place in most western countries, yet speeding remains ubiquitous and one of the most common reasons for fatalities in traffic."

"People often drive too fast in a given traffic situation and have poor speed adaption in relation to that traffic situation and their own capabilities as a driver," he added. "We need to support better behaviour and help people realise and understand that speeding is dangerous."

Volvo CEO Håkan Samuelsson is leading the company's drive towards zero injuries in its cars, including the new S60 (below), by 2020.

Half of van drivers use phone while at the wheel

VW's research in the UK has shown that half of van drivers break the law by using their phones while on the road.

According to research conducted by Volkswagen in the UK, more than half the drivers of commercial vehicles admitted to making calls behind the wheel without using a hands-free device.

Van drivers spend an average of 35 minutes on the phone each day in their vehicles, making an average of seven calls. One in 10 spend two hours on the phone while driving during the working day.

Across the European Union the use of a mobile phone while at the wheel is forbidden and the UK has some of the strictest laws in the region. Since March 2017, driving while using a device – including making calls, texting, taking selfies or posting on social media – has carried a fine of £200 and a six penalty point endorsement on a driver's licence. Being caught twice can result in a licence being revoked.

However, according to Volkswagen Commercial Vehicles' research, many commercial vehicle drivers are risking breaking the law by not having a hands-free kit in their vans (23 per cent) or failing to use the technology even if their vehicle is fully equipped (33 per cent). Just over a quarter (27 per cent) said their vehicle was fitted with hands-free and they always use it to make phone calls while driving.

UK Department of Transport statistics have shown that nearly half a million drivers still use their phones behind the wheel, while phone distraction is listed as a contributory factor in more than 30 deaths annually.

First debris fence homologated to FIA standard

All new Grade 1 race tracks must now be fitted with debris fencing that meets a new FIA safety standard.

Swiss company Geobrugg has produced the first debris fences to be homologated to the new FIA standard.

From this year, all newly-built Grade 1 race tracks have to be equipped with homologated solutions, following the new FIA 3502-2018 standard for debris fences.

The introduction of the new standard marks a shift from working to design guidelines, to tested and homologated solutions. In the past only design guidelines existed for race circuits, but these could be interpreted differently worldwide and were not subject to testing.

Geobrugg has spent the past 10 years on research and product improvement by putting its Debris Fence and Mobile Debris Fence through stringent testing procedures defined by the FIA.

"We hope that safety will develop in the future and that more circuits are deciding to use tested and homologated solutions," said Jochen Braunwarth, Director of Motorsport Solutions at Geobrugg. "We are looking forward to further input from the motor sport community to increase safety along race circuits. Good race circuit design and well-maintained safety installations protect drivers, spectators and track personnel."

Race tracks that have already installed Geobrugg permanent Debris Fences meet the standard, while existing Mobile Debris fence solutions can be upgraded.

FIA rally officials seminar highlights safety and regulation

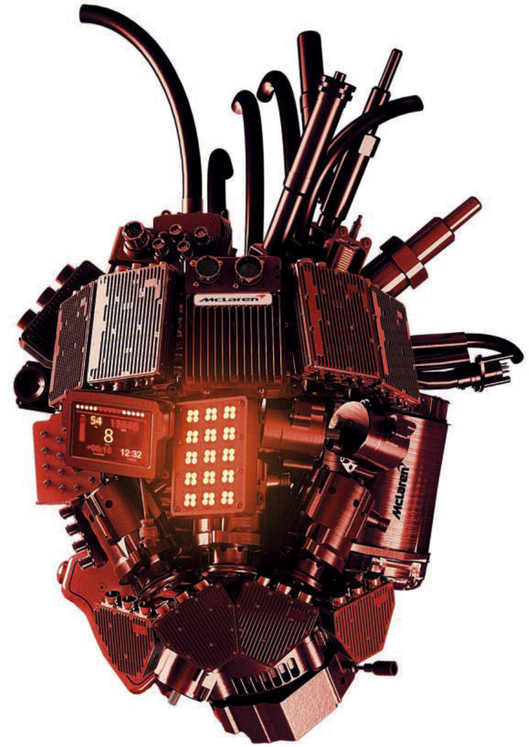
An FIA rally officials seminar in Gran Canaria brought together 80 members of the international rally officials community to discuss key topics relating to safety and regulation.

Over the course of two days in March officials representing more than 30 ASNs, together with experts and speakers, were on hand to discuss implementing further improvements in the aforementioned areas in 2019.

The seminar got underway with a productive small group session, which brought together the organisers of the FIA European Rally Championship. Rally Commission Vice-President Uwe Schmidt presented changes to the International Sporting Code and regional rally sporting regulations.

The main focus then switched to rally safety, starting with a theoretical presentation on safety culture and risk management. FIA Safety Manager Michèle Mouton presented the newly-released rally safety guidelines 2019, including the mandatory measures to be implemented this season. These guidelines highlighted the latest best practice from the FIA World Rally Championship in a format that is also relevant to FIA Regional and National-level rallying.

The last part of the seminar focused on the practical aspects of work done by officials, along with a number of interactive elements and case studies, delivered by FIA Regional Rally Manager Jérôme Roussel and experts from across the FIA's rally championships.



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NEWS New safety tech to become standard in cars across Europe

The European Parliament has approved rules to make advanced safety features standard equipment in vehicles sold across the European Union.

The move could reduce collisions by 30 per cent and save around 25,000 lives within 15 years, according to the European Transport Safety Council (ETSC).

New technology such as intelligent speed assistance, advanced emergency braking systems and emergency stop signals would be mandated in all new vehicles. Other devices to be included in new cars and light-commercial vehicles are alcohol interlock installation facilitation, driver drowsiness and attention warning, advanced driver distraction warning, reversing detection, accident data recorder and lane departure warning systems.

Antonio Avenoso, executive director of the ETSC, said: "This legislation represents a major step forward for road safety in Europe and could save 25,000 lives within 15 years of coming into force."

The move has been welcomed by FIA Region I, which advocated for this ambitious approach to road safety, introducing important improvements for both active and passive in-vehicle safety to the benefit of all road users.

Laurianne Krid, Director General at FIA Region I, said: "These new technologies, provided that users are well aware of their capabilities, should help us to save lives on Europe's roads."

The European Parliament and the Council are now expected to start the process of ratifying these rules so that they are taken up across Europe.

New cars sold with advanced safety features as standard could help reduce collisions across Europe by 30 per cent.

NEWS Leaders set for Sun City

Leading figures from across the world of motor sport and mobility are set to converge on Sun City, South Africa, on April 29 for the first-ever joint FIA conference.

The FIA is bringing together the Sport and Mobility Conferences, in conjunction with the Region I Spring Meeting and the FIA Sport Regional Congress Africa, to an event that has been uniquely designed to address topics of shared interest as well as of specific relevance for Sport and Mobility delegates respectively.

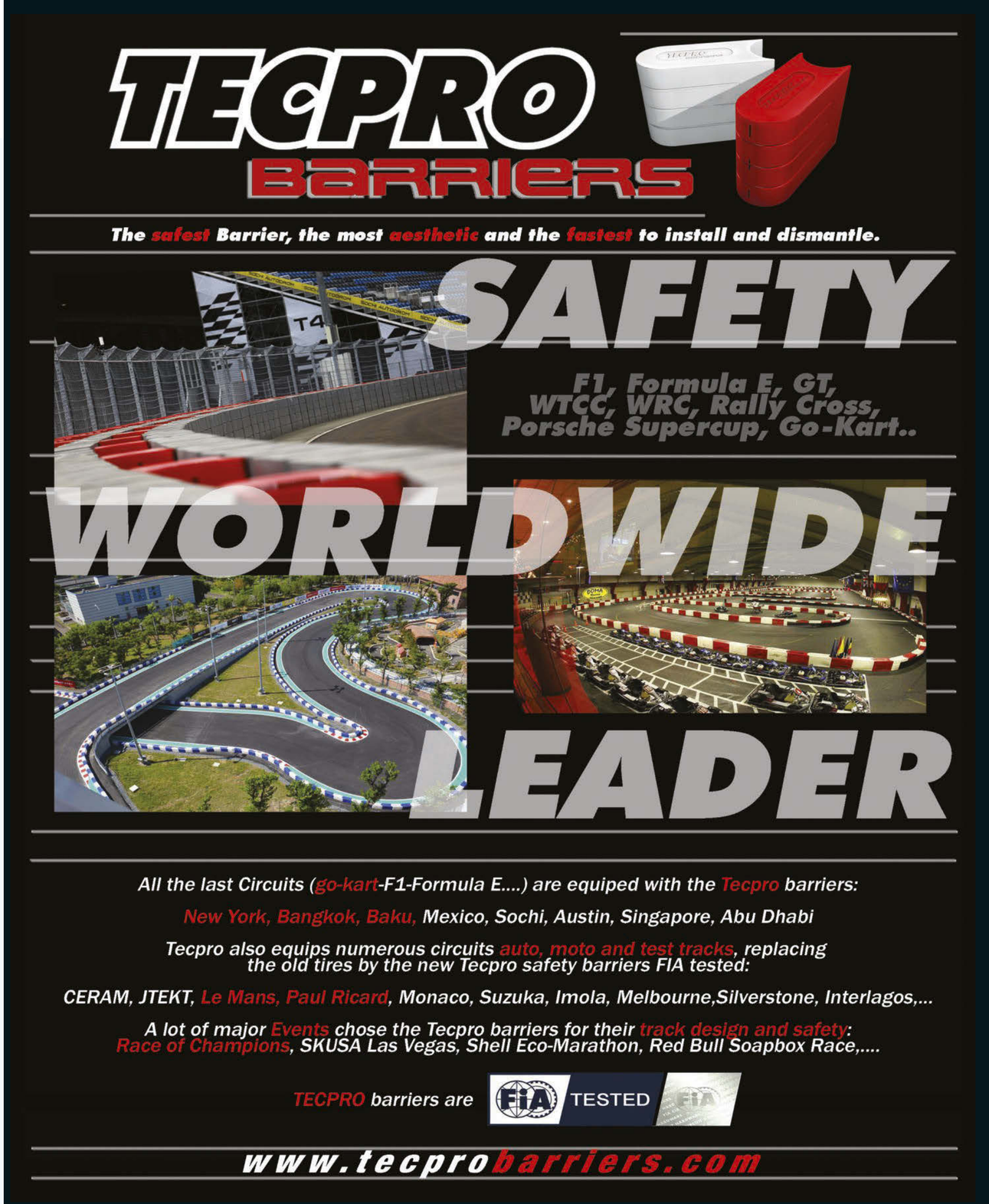
Following an introduction to the event from FIA leaders, the conference will open with a keynote speech from Momar Nguer, President, Marketing and Services, for multi-national oil and gas company Total, who will talk about the future of fuel. This will be followed by a discussion on sustainable and future technology with a panel including Roborace Chief Strategy Officer Bryn Balcombe, FIA Deputy President for Mobility Thierry Willemarck and McLaren Applied Technologies Managing Director, Asia Pacific, Michael Shearer.

The conference will then split into sport and mobility focused sessions. On the sport side, the sessions will discuss the exceptional development of motor sport in Africa, ways to encourage talented drivers to participate in motor sport and help them rise to the top, as well as how sport can be used as a power for good and collaboration.

Delegates from mobility clubs will be engaged in talks on the crucial topic of impactful road safety advocacy, and on how to prepare for the next Urban Revolution and remain relevant in uncertain and volatile environments.

The event will also host the FIA MotorEx, an exhibition area welcoming more than 30 companies and stakeholders from the global motor sport and mobility industries, who will present their innovative products and new services.

"The conference programme will address topics of joint interest to all of us as well as themes of specific relevance for both Sport and Mobility," said FIA President Jean Todt. "The programme will not only offer high-level and strategic perspectives, but also hands-on and practical workshops for staff and specialists in dedicated areas."



China's next major export

TEXT / FRANKIE MAO

02

Guanyu Zhou is not the first Chinese racer to attempt to reach the pinnacle of motor sport, but as he starts his maiden Formula 2 campaign the Renault Development Driver might be the man most likely to make it to F1. The 19-year-old talks to AUTO about the hard road from Shanghai's kart tracks to the top levels of racing and why there's no pressure in being labelled China's next big thing

You took six podiums in the FIA Formula 3 European Championship in 2018, including two race wins. What do you remember about your first victory at the classic Pau street circuit?

I was thrilled. Starting on the front row for Race 1, I knew that as long as I did a good job at the start I could keep the position until the chequered flag. I took the lead after the first corner but then the race became increasingly tough, especially under Virtual Safety Car conditions. So it was a great feeling to manage to defend my position to win through all the difficulties, especially in the opening race of the season.

Actually, my second win in the final round at Hockenheim was more pleasing. I think everyone in the F3 paddock took note of my performance last year, when I remained in the top four of the Drivers' Championship in the first half of the season. Unfortunately, late on my championship position was compromised by something out of my control. Given that, the victory on the last weekend felt more satisfying, not only for me, but also for those supporting me.

How did it feel to be the first Chinese driver to win in the FIA Formula 3 category?

Last year, my goal was winning a race and having a good result every weekend. So ticking the box by winning the opening race made me very happy. I might have done it in 2017, when I was quite close in several races. At the end of the day, having two wins last season was satisfying.

Mentally, how did you deal with the tough moments last season?

Last season was probably the hardest one I've ever had. It wasn't that my rivals were too strong or that I wasn't fast enough. I had the speed, but I felt upset about things I couldn't control. After a difficult weekend in Spa I decided to take a break in the summer to clear my mind and relax. It worked and the win in Hockenheim proved the championship points did not show the whole picture of my season. Overall, last year was still good because I was able to develop as a driver and come back stronger.

What has been the most valuable lesson you've learned from racing in FIA Formula 3 over the previous three seasons?

It was probably the qualifying performance. Because of the margins being so tight among top 10, especially in the top five, you have to pay attention to every detail. If you had a bad qualifying, it would be even harder to overtake in the race, given the high downforce of the car.

Young drivers are always under pressure to perform as early as possible. How do you deal with that expectation, especially when things aren't going in the right direction?

The most important thing is that you never give up. I know the last thing I wanted was to lose confidence in myself. As long as you stay confident, it encourages you to move forward as a driver and improve in all areas. After every race, I took note of where I could have made a difference to try to avoid repeating mistakes.

'Its nice that I'm not just part of the Renault Sport Academy, but also part of the Formula 1 team. It will definitely be helpful'

You have been competing against a very talented generation featuring drivers such as Mick Schumacher, Dan Ticktum and Marcus Armstrong. Do you see it as a great achievement if you beat them?

Beating them is a big opportunity for me. Some drivers have strong family racing roots and some of them probably have greater resources than we have. We've come all the way from China and we're exploring the racing world. Obviously, I would love to beat all of them, and that would show what I am truly made of.

The FIA Formula 2 Championship gets you one step closer to your dream. How did you feel in testing and what's your goal for your rookie season with Uni Virtuosi Racing?

I had a good feeling in testing. It's a new car with a turbo engine – different to any car I've driven before. I did the Abu Dhabi test last year, getting familiar with the car and the team which was good, and we've been making progress over the winter. It's another challenge and we're trying to be as ready as possible before the start of the season. For the first year, I think standing on the podium is a realistic goal, but it would be nice if I could win a race as well.

How much will you benefit from joining the Renault Sport Academy and from your role as Development Driver for the Renault F1 Team? Will it bring more pressure?

To be honest, I don't feel pressure any more. It's nice that I'm not just part of the Renault Sport Academy, but also part of the Formula 1 team. I'll be involved in a lot of their programmes on and off track. It will definitely be helpful. I'll have some simulation work for the Renault F1 team and I will do some related tests. Also, F2 takes place at the same circuits as F1, so I'll have opportunities to closely observe how an F1 team operates.

It is never an easy road to walk to become a racing driver and there are plenty of sacrifices along the way. In your case, you left China at an early age to move to the UK. How hard was that?

It was so hard. You don't have a chance to live a normal childhood because of the path you've chosen. The most difficult part was when I arrived in the UK. The whole country was a bit of an unknown. In school, I often had to ask for leave on Friday to travel to races and I was doing homework on the flight back. You go to school on Monday and you have to catch up on the classes you've missed. It was exhausting, but this is what I love. Now I feel better focusing more on driving. It's worthwhile, though, and I will keep pushing to become an F1 driver one day.

Naturally there is an expectation in China that you will make it to F1. Is it tough to have that pressure from home?

I never thought about it when I was growing up. When I was a kid, I just loved driving and kept going race by race. And to be honest, since I moved to the UK, I haven't really thought about whether or not I would become the first driver from China to race in F1. I just want to make my own dream come true. At the moment, I don't have the pressure. I think there was a little bit when I first joined the Ferrari Driver Academy, but after all these years I don't feel it anymore. I just keep working as hard as I can.

Testing with the Uni Virtuosi Racing team has put Guanyu Zhou in good stead for his F2 debut.

03

CROWD CONTROL

The FIA is utilising the latest sensor technology and a new set of guidelines to ensure spectator safety at rally events

TEXT
/
MARC CUTLER

Rallying fans are some of the most passionate in the world. They love the thrill of watching highly-skilled drivers tackle the toughest terrain and being as close to the action as possible.

However, some fans take this passion too far, often with disastrous consequences. Incidents of spectators wandering into dangerous areas to get closer to the cars or even taking selfies on the side of the road have been growing.

Last year, more than four million spectators attended rally events, which take place on stages that can stretch across more than 25 kilometres. This can make it difficult for rally organisers to monitor an entire stage, which are often on relatively narrow dirt and gravel roads that cut through diverse terrain, further hampering efforts to control the movements of spectators.

This is why the FIA is looking to utilise the latest technology and issue new guidelines to improve spectator protection and overall safety in rallying.

"We've really worked hard over a long period of time to improve the safety of the cockpit environment of the drivers," says Stuart Robertson, the FIA's Head of Circuit and Rally Safety. "But we see more spectators being injured or losing their lives on rally stages now than drivers."

Statistics compiled by the FIA's World Accident Database bear this out. "Those statistics tell us that over the last five years nearly 50 per cent of all motor sport fatalities came from rally-related disciplines," says Robertson. "And more of those are spectators than drivers." ▸

Some rally fans persist in trying to get too close to the action, prompting a safety drive led by the FIA.

Left and above: Keeping fans at a safe distance allows rally drivers and co-drivers to focus on the job at hand.

Above: Effective communication between marshals paired with new technology can help keep track of spectators on stages.

TECH TRANSFER

The FIA is in no doubt that the large majority of spectators want to stay in safe areas to watch the event. But there are always a few rogue fans who are pushing the boundaries.

"They're the ones who are lying down at the side of the stage trying to get the action shot for YouTube, or are literally trying to cheer on their favourite drivers close to the edge of the stage with their flags or banners," says Robertson. "It is madness and very much a current issue."

So the FIA is exploring a high-tech solution. It has joined forces with global technology group Siemens to improve the detection of spectators in dangerous locations. This will make it easier for rally organisers and drivers to take preventative and immediate action to avoid accidents.

Through this partnership, which was unveiled at the 2019 Geneva International Motor Show, the FIA will leverage Siemens' expertise in real-world autonomous and connected vehicle applications, transferring that technology to motor sport (and potentially back again to the connected highways of the future).

This project is supported by the FIA Innovation Fund as well as the DFKI – the German Research Centre for Artificial Intelligence.

"We want to use onboard cameras to work on image recognition to see if there is differentiation between when the safety car goes through the stage and the first rally car," says Robertson. "Often we'll declare the stage is safe and then some spectators move back into dangerous areas. So continually detecting this change via onboard cameras on the first car is important, as is following this with close monitoring of the following cars to make sure nothing has changed in the spectator environment."

The FIA is also looking at ways to embed GPS location tracking into the rally apps that spectators use on their phones to help track their movements. If a spectator is looking at rally results, the FIA would receive their GPS location anonymously and be able to build up a heat map of the rally stage to know where the crowd is moving. In addition to this, the FIA is looking to use drones and other sensors to locate spectators.

This is where Siemens will use its autonomous vehicle pedestrian detection technology.

"If a pedestrian walks off the pavement, an autonomous car is programmed to spot that and react to it," says Robertson. "We don't need our rally cars to jump on the brakes automatically but we need to know if there is a problem with a spectator so when the next car is coming through the stage two minutes later we can do something about it. We can alert a marshal to go to that location and we can send messages to that spectator's GPS area. Or we can, almost as a last resort, create a slow zone or even stop the stage until we solve the problem."

Siemens is planning to utilise its latest technology to help with this. Artificial Intelligence will enable various data to be fused from vehicle sensors to add a predictive safety layer around the cars and drivers. Intelligent infrastructure technology will create a safety-enabling network at rally events, connecting drivers, spotters, race organisers and spectators.

Although much of this technology is coming from the road to the track, this project also has an important track to road element with outcomes directly helping efforts to improve pedestrian safety in cities.

As FIA President Jean Todt put it: "The FIA leads the agenda to connect motor sport and urban mobility in order to inspire change and create a transformative impact on people's lives. This agreement between Siemens and the FIA on a project that involves R&D with the highest level of motor sport and urban transportation technologies will enable us to make racing safer and significantly influence the development of transportation in smart cities."

GOOD GUIDELINES

This technology will be employed at the top level of the sport such as in the World Rally Championship, but the FIA also wants to improve spectator safety at national and grass roots level, where it might not be an affordable solution.

This is why it has produced a new set of Rally Safety Guidelines, a 100-page manual for rally event organisers to ensure the highest levels of safety at their events.

Straying into the path of danger /

Rally fans lying next to stages trying to film the action is a problem, says the FIA's Head of Circuit and Rally Safety Stuart Robertson.

"The guidelines gather the best practice that we currently apply at World Rally Championship level in a format that can also be used by rally organisers around the world at regional and national level," says Robertson. "A lot of our serious and fatal accidents happen at national level so it is important to filter down top-level safety."

At world championship level, safety delegate Michèle Mouton will drive through the stage to make sure it is ready before the rally cars come through. "That role is vital in that it's the experienced pair of eyes looking at where the spectators are, where the marshals are. If there are any obstacles on the stage and so on."

This is an essential element to the safety of an event. The FIA is encouraging all of its National Sporting Authorities around the world to have their own safety delegates at each event they sanction. This will be supported by a training programme for safety delegates.

"We're working on a pilot training seminar this year, then from 2020 onwards there will be regional training for these Safety Delegates from each country around the world," says Robertson. "We're pushing that very strongly."

Other key points in the guidelines cover the importance of using safety cars; having a strong safety plan; using helicopters and drones; and incident handling.

'Often we'll declare the stage is safe and then some spectators move back into dangerous areas. Continually detecting this change is important'

Following on from these guidelines the FIA Closed Road Commission will look to update the international sporting code for the organisation of rally events so that some of the key points become mandatory for event organisers.

"Anything that we have in the guidelines that we feel should be elevated to a regulation will be considered in the near future," adds Robertson.

The ASNs have welcomed the new guidelines and rules. However, their main concern is that some of the initiatives may add costs which they aren't able to cover. But as Robertson points out, that is not necessarily the case.

"For example, to ask the marshals to make a loud blast on their whistle 30 minutes before the first car is due to warn spectators to clear the stage doesn't cost anything, just a few rules and organisation. The same with the effective communication with the marshals and safety cars, to say everything is okay or to stop a safety car if needed to solve a particular problem on a corner."

The FIA will work closely with ASNs and event organisers to ensure that costs are not a barrier to safety.

With new rally safety guidelines and a number of high-tech solutions the FIA is aiming to have safety, and stray spectators, firmly under control.

Driven by technology 03

The future was once again on display at this year's Consumer Electronics Show in Las Vegas as automotive manufacturers showcased tomorrow's mobility technology. AUTO looks at seven of the headline innovations to come out of CES 2019

TEXT / JUSTIN HYNES

No 01 Mercedes goes modular

In 2018 a number of car makers presented concepts for multi-purpose vehicles and at this year's CES in Las Vegas it was Mercedes' turn. Like its rivals, the German giant presented a platform-based mobility system called Vision Urbanetic that it says "enables the needs-based, sustainable and efficient transport of people and goods" while also "meeting the needs of cities, companies from a wide range of industries, as well as travellers and commuters in innovative ways."

What does that mean? Essentially that mobility services are fulfilled on demand, with interchangeable body modules being fitted to a universal, autonomous, electrically-driven platform depending on the immediate need.

The concept integrates an IT infrastructure that analyses supply and demand in real time. The result is an autonomous fleet whose routes are planned flexibly and efficiently on the basis of current transport needs.

Thanks to full networking, evaluation of local information and intelligent control, the system can not only analyse current requirements but also learn from them. It is thus able to anticipate and respond to future needs. This process can be optimised, shortening waiting times in local passenger traffic. For example, the entire system can recognise a larger group of people in a specific area via data recording in the Vehicle Control Center. It can then send vehicles there to serve the increased demand quickly and efficiently.

Mercedes' Vision Urbanetic is the latest platform-based mobility system aiming to transport people and goods.

No 02 Nissan making the invisible visible

One of the most interesting technologies on show at CES was Nissan's Invisible-to-Visible, or I2V. The system aims to support drivers by merging information from sensors outside and inside the vehicle with data from the Cloud. This enables the system to not only track the vehicle's immediate surroundings but also anticipate what lies ahead – even showing what's behind a building or around the corner. To make driving more enjoyable, guidance is given in an interactive, human-like way, such as through avatars that appear inside the car.

"By helping you see the invisible, I2V enhances your confidence and makes driving more enjoyable," said Tetsuro Ueda, an expert leader at the Nissan Research Center. "The interactive features create an experience that's tailored to your interests and driving style so that anyone can enjoy using it in their own way."

Nissan also chose CES to launch the long-range version of its Leaf EV. The 2019 Leaf E+ tweaks the world's best-selling electric car formula with a larger battery pack that bumps its range to about 226 miles, a significant boost over the current model.

Nissan's Leaf E+ boasts improved range, while its I2V system (above) promises an enhanced driving experience.

Audi's Aicon concept features an electronic vehicle assistant and displays in place of the usual interior furnishings.

№ 03 Audi's new reality

While the bulk of thinking on autonomous vehicles revolves around the technology required to make a driverless future possible, a sizeable amount of parallel effort is being expended on just what people will do in a vehicle when the task of piloting it is taken away from them. Audi brought its vision of a driverless vehicle interior to this year's CES in its Aicon concept.

With all of the standard car furniture such as steering wheel, pedals and clusters of instruments gone, Audi has opted for wide, uninterrupted surfaces. These aren't devoid of function, however. The car's empathetic electronic vehicle assistant recognises a passenger by his or her phone and activates all of their personal settings. The door rail encircling passengers features variably positionable control interfaces that help activate navigation, communications channels, and video and entertainment systems. Depending on seating position, passengers can use the large front display as a display surface or a virtual head-up image shown above it in the windshield.

The German company also unveiled a VR system that closely mirrors a car's movements in the VR experience, so that wearers can enjoy the system without feeling unwell.

The READ system developed by Kia Motors and MIT can assess a driver's mood and alter the car's interior display accordingly.

№ 05 Kia gets emotional

Korea's Kia Motors showed off its interactive 'Space of Emotive Driving' at CES, a concept focused on user experience in driverless vehicles. Central to the concept is technology the company has dubbed the Realtime Emotion Adaptive Driving (R.E.A.D.) system, developed in collaboration with the Massachusetts Institute of Technology (MIT) Media Lab's Affective Computing group.

Kia says the system can optimise and personalise a vehicle cabin space by analysing a driver's emotional state in real time through artificial intelligence-based biosignal recognition technology. The technology monitors a driver's emotional state and tailors the interior environment according to its assessment – potentially altering conditions relating to the human senses within the cabin, creating a more joyful mobility experience.

№ 04 Hyundai's holographic heads-up

Hyundai, in collaboration with Swiss deep-tech startup company WayRay AG, unveiled what it says is the world's first holographic-augmented reality navigation system at CES.

According to Hyundai, the chief advantage of a holographic AR navigation system built into the vehicle is that the stereoscopic image is displayed on the actual road and appropriately adjusted in accordance with the specific viewing angle of the driver, thereby delivering accurate driving guidance. Additionally, while conventional head-up display (HUD) units project a reflected image indirectly through an LCD screen mounted on the dashboard, the holographic AR display projects an image through the windshield.

The display shows not only navigational features — such as lane guidance, destination points and current speed — in augmented reality, but also incorporates safety features such as lane departure and forward collision warnings.

"This demo car is the first step of the proof of concept (PoC), but is an important step towards technology-driven innovation," said Yunseong Hwang, Director of Hyundai's Open Innovation Business Group. "Future mobility windshields will be more than just a piece of glass. AR holographic-powered glass will serve as a platform to provide new services and open up new in-vehicle experiences."

The holographic AR navigation system developed by Hyundai and WayRay AG feeds information to the driver directly via the windshield.

Australian firm AEV is targeting a wide range of services with its electric modular vehicles.

№ 06 AEV Robotics' pod power

Modular vehicles were also on show at CES from Australian company AEV Robotics.

Working in partnership with the University of Melbourne among others, and a team including former General Motors staff, the company has been working on its MVS vehicles for three years and unveiled the project at CES.

Like Mercedes and Toyota, the Australian company has based its approach on a modular system, with different 'pods' attaching to the universal base system, ensuring easier and less expensive manufacturing. The base is controlled via a programmable digital interface in the pod. Bases are available with 15- and 30-kWh batteries and are designed to work with inductive chargers.

AEV is targeting a wide range of possible applications including delivery, taxi services, ride-sharing services, industrial logistics, roadside store fronts and even medical services. Ride-sharing and taxi services would also be able to use the new vehicle. The company is opening up the programmable interface for developers later this year to "support service providers to open new markets, commercialise leading-edge technology and drive social change in cities."

The Guardian system being championed by Toyota takes over from the driver when it senses danger.

№ 07 Toyota's Guardian angel

Toyota's autonomous driving research is currently a two-stranded approach, focusing on a system it calls Chauffeur that does as its title suggests and Guardian, a driver-assist system derived from the aerospace industry. It was the latter the Japanese marque chose to unveil in Las Vegas.

"We humans have an inherent need for autonomy, which is much stronger than our desire for autonomous cars," said Toyota Research Institute CEO Dr Gill Pratt in a statement outlining how Guardian will "amplify rather than replace human ability".

Taking inspiration from fighter pilot systems, Pratt said Toyota has developed what is known as "blended envelope control". In most situations the driver is in control, but when he or she goes beyond a defined safety envelope the car takes over and steers it back to safety. "It's a seamless blend of human and machine working together as team-mates," Pratt said. "Our Guardian alerts the driver visually and audibly of imminent danger and avoids it by manoeuvring out of the lane briefly, then returning to the original lane to avoid the obstruction."

AT THE PINNACLE
/
Formula 1 2019

04

RACING TO A GRAND TOTAL

As Formula One prepares to mark its 1000th grand prix, AUTO asks some of the sport's major players to choose their remarkable races, looks at the impact of 2019's regulation changes and celebrates the life of one of F1's true unsung heroes

From Alfa Romeo to Lotus, Tyrrell to McLaren, and Williams, McLaren and Ferrari to Mercedes, F1's 1000 grands prix encompass seven decades of racing.

Making history

As Formula One prepares to celebrate its 1000th grand prix at this year's race in China, some of F1's major figures explain what the sport means to them and stars choose the races that have meant the most to them

Ferrari's 2000 F1 driver's title, its first in 21 years, still resonates with Jean Todt.

JEAN TODT

FIA PRESIDENT

JAPANESE GRAND PRIX, 2000

In China, the FIA Formula One World Championship reaches an amazing landmark, its 1000th grand prix. To get there has involved hundreds of drivers, thousands of men and women working in the teams, all of the marshals and officials who give so freely of their time, as well as all the big names from the motor industry, because this sport has always been and will continue to be the pinnacle of motor sport. As President of the FIA, I offer all of these people my thanks for the show they have put on for the hundreds of millions of fans who follow this fantastic sport.

I am often asked which was my favourite grand prix and my answer is always the same: Japan, 2000. On that day, the 8th of October, at Suzuka, Michael Schumacher took his third world title, and his first with Ferrari, the team I had by then been in charge of for seven years. As Michael and I walked up the steps that led to the podium, I said to him that from this moment on, our racing lives would never be the same. That indeed turned out to be the case and, thankfully, there were many more great races that would be well worth remembering, but Suzuka 2000 is still my first choice.

Looking to the future, I believe Formula One will continue to be one of the best and most enjoyable sporting spectacles. The love of speed and the desire to push to the limit in every way – in human terms and technologically – is part of our DNA, which has always expressed itself through competition, first of all as human beings and then, with the help of vehicles that were beginning to be used as means of transport.

This competition made a significant contribution towards driving technical innovation through a continuous transfer of ideas and technical solutions from the race track to the cars we use every day.

The people who will watch the 2000th grand prix will look back with the same sense of pride and the same hopes for the future of this sport that we feel today.

MICHAEL SCHUMACHER*

SEVEN-TIME FIA FORMULA ONE WORLD CHAMPION

JAPANESE GRAND PRIX, 2000

In Japan, the moment when I crossed the line – crazy! Later I was repeatedly asked what my predominant feelings were at that moment, and on no single occasion was I able to find the right words.

I honestly believe it's something you cannot convey with words. I was so wonderfully happy. I didn't know what to do with this happiness, I suddenly felt trapped in the car, trapped in my Ferrari, as if I was about to burst. I banged so hard on the steering wheel they thought it was broken, and, as a precaution, it had to be taken out of service. It was simply such a release! I had finally done it, after so many years of disappointments.

On the in-lap, when it was all over, I just kept driving. I was overcome with tears, and it was as if I were standing next to myself, looking in on the moment. It was almost as if I were someone else.

The moment I got out of the car in the Parc Fermé, the whole team were waiting. It was fantastic. Those faces! Shining eyes and everyone cheering, I could have thrown my arms around them all and kissed them. I did try to and, thank God, Corinna was there.

Formula 1 is a fascinating world. It's about finding the limit, even if it's different in each lap. That's what I like about it. Because feeling the limit is a deep feeling of joy and satisfaction.

It's at its most beautiful during races or tests in which we drive long distances. In the beginning you correct the set-up in every lap until it fits. Then, at some point, there's a kind of flow, a single rhythm. Then you're one with your car because you don't have to fight the car to move it to the limit. When that moment comes, I only see the ideal line. I visualise it: a black band that winds in front of me. The sensation of being precisely at the limit is incredibly high.

**Extracted from the book 'Michael Schumacher – Driving Force', with thanks to Sabine Kehm*

Michael Schumacher won an incredible 9.1% of the first 1000 F1 grands prix.

TOTO WOLFF

TEAM PRINCIPAL & CEO OF MERCEDES MOTORSPORT

F1 CONSTRUCTORS CHAMPIONS 2014-2018

AUSTRIAN GRAND PRIX, 2014

There are so many Formula One races that resonate, for many different reasons, but one in particular that I have very fond memories of is the 2014 Austrian Grand Prix.

Firstly, it's my home race and 2014 was the first time Formula One had been back in Austria since 2003, thanks to the work and vision of Dietrich Mateschitz. There is always something special about racing in your home country. There are many emotions – anticipation, the weight of expectation, and a really strong desire to do well in front of your own people. Overall, the feeling is very positive and I really enjoy racing in Spielberg.

Secondly, the good feeling comes from the circuit itself. I have a lot of great memories from my time in Austria and particularly at the Österreichring. When I was younger I worked as an instructor at the Walter Lechner Racing School at the circuit in Spielberg and I learned so much about racing and about life while working with Walter; it was like my university.

I led a pretty straightforward life then. I lived in the farmhouse at the circuit. I stayed with the family, and they were fantastic. They fed me – just bread and milk for breakfast – and they made me feel like one of their own in the evenings. I loved it because it seemed I was on the road towards realising my dream of becoming a racing driver.

As for 2014, we didn't have a good qualifying – Nico [Rosberg] was third and Lewis [Hamilton] was all the way back in ninth – but we had a great race. I think Lewis got up to fourth on the opening lap and then they both worked their way to the front from there.

We scored a one-two finish, with Nico ahead of Lewis, but the icing on the cake for me was that Valtteri [Bottas] scored his first podium finish that weekend with Williams, which was my team before I joined Mercedes, and also Felipe [Massa] finished in fourth place. So it felt like I had a special link to the whole podium. Overall, it was just an incredible race.

MAURO FORGHIERI

FORMULA ONE DESIGNER, FERRARI 1962-1987

MONACO GRAND PRIX, 1962/1981

My life in Formula One began at an historic moment in the history of the sport. My first Grand Prix as a Ferrari engineer was Monaco 1962 and it marked the debut of the first rear-engined single-seater to come out of Maranello, the Dino 246.

At the time, I did not know what my future would hold and I dreamed of going to work in America. But Enzo Ferrari changed my life when, on the 31st of October 1961, he put me in charge of all racing and research activities. I was 26-years-old and I never moved from Maranello, living through times that were sometimes difficult, sometimes tragic, but more often simply exciting.

I must confess I always preferred Formula One to sports prototype racing, because of the close, aggressive wheel-to-wheel racing compared with the long distance battles of sports car racing. For example, how could I ever forget when Gilles Villeneuve honoured Ferrari with the first win for a turbo engine in Monaco in 1981? It was a moment of immense happiness, and followed by an equally great win at Jarama in Spain. Those were just two unforgettable wins out of so many.

I still watch F1 today. The move towards hybrid power is correct, but I'd like more real overtaking, and the only way to achieve that is to get rid of DRS (which I detest) reduce aerodynamic downforce and put all the innovation into an area that falls within the wheelbase. That way there would be less turbulence and fewer obstacles during the overtaking phase. Then I'd remove a lot of the rules regarding engines, allowing for more imagination – a case of live and let live 'flower power' more than hybrid power perhaps.

ROSS BRAWN

FORMULA 1 MANAGING DIRECTOR, MOTORSPORT

BRAZILIAN GRAND PRIX, 2009

I consider myself lucky to have spent nearly my entire working life in Formula One, in a variety of roles. In fact, the only one missing is that of a driver!

There are so many grands prix that bring back great memories it's difficult to single out just one. Obviously, on a hypothetical shortlist, there are those that clinched world titles with Michael Schumacher or the race in 2009 that saw Jenson Button and the team that bore my name win the championship, but there are plenty of others too.

When I left the Mercedes team at the end of 2013, I believed this chapter of my life was over, but then I got the opportunity to return and look after the sport I love in a very different capacity and at a very special time in its history.

Today, winning is no longer the 'magnificent obsession' it was for me every day. That has been replaced with the desire to play a part in taking Formula One into the future. This is an opportunity to trace out a new path for a sport that has few rivals, in terms of the spectacle it offers and its global reach. It has an amazing history from which to move forward and this 1000th grand prix is its brightest symbol.

We want to make Formula One ever more spectacular, with more unpredictable racing and endow it with sustainability, both financially and ecologically. We are all working together to achieve this and I am very optimistic, as we are starting from an incredibly solid base.

For example, there's the whole story of the power unit, which is a masterpiece of technology and efficiency. There is also a common will to improve. All of us who love this sport know that the world is changing fast and we want the next generation Formula One to keep pace with these changes, keeping in mind that, at the heart of it all, are the people, be they at the wheel of a car, in the grandstands at the race track or in front of a TV screen or watching on a mobile device.

CHASE CAREY

CHAIRMAN AND CEO FORMULA 1

SINGAPORE GRAND PRIX, 2016

Formula One is the pinnacle of motor sport and will remain so. It is unique because of the marriage of sporting competition with engineering and technology. Success in our sport requires the sophistication to analyse enormous amounts of data in seconds, the technical skill to rebuild a damaged car in hours, and the teamwork to change four tyres in two seconds.

Success in racing should always be about the driver, but no driver wins without a great team around him. The complexity of motor sport makes it uniquely appealing to many of our fans and that is another strength to highlight.

Since I joined Formula 1, I have been asked many times how our future will be affected by changes in technology and in society. The world is changing but we believe motor sport, and drivers, have a great future. The key to bringing about that future lies in building upon what has made motor sport great, to cherish our past, while not being afraid to change or to take advantage of new opportunities.

At Formula 1 we believe the marriage of great competition and incredible technology, our rich history, world class spectacle, and the engagement of fans worldwide in new and exciting ways will provide an exciting future.

Of course, for many fans, what truly sets motor sport apart is the shock and awe. The power, speed, and sound are unlike anything else. The first race I attended was the Singapore GP of 2016 and it was astounding. You never forget your first live race – I know I never will!

For F1 chief Chase Carey nothing beats attending a grand prix.

CHRISTIAN HORNER

TEAM PRINCIPAL, RED BULL RACING, F1 CONSTRUCTORS CHAMPIONS 2010-2013

BRITISH GRAND PRIX, 1986

The 1986 British Grand Prix was the first F1 race I ever attended. Then I raced in F3 at the British GP in 1992 when Nigel Mansell was at the height of his fame, which was special for me.

Moving into my current role, winning our first grand prix in China in 2009, the first drivers' championship win with Sebastian Vettel the following year in Abu Dhabi was wonderful.

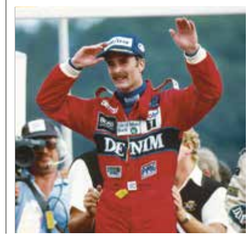
There have been so many special moments but it all goes back to that first race in 1986. I watched it peeking through the fence. It was the full Williams-Piquet-Mansell era. I was an aspiring young 12-year-old go-karter and they were these giants, the gladiators and heroes of the sport at the time. Just the energy and power of those big turbo cars was quite phenomenal.

I was a massive Nigel Mansell fan; I had posters of him on my wall at home. I used to record all the races and watch them at the weekends. In those days there was also a highlights programme on British television quite late in the evening, which I was never allowed to stay up for, but my brother had a little black and white TV in his room so I would sneak in and watch all the bits that hadn't been shown during the race.

But going to races was a very different experience to watching at home. The sound of those cars was incredible. I remember attending the race in I think 1990 there was that Ferrari V12 and it was such a different note to the V8s and V10s of other cars the time. I remember watching from Woodcote corner and the power was awesome.

I still get that buzz today when you see a grand prix at full pelt – it is genuinely something to behold.

Horner's idol Nigel Mansell celebrating victory at the 1986 British GP.



SEBASTIAN VETTEL

FERRARI DRIVER, FOUR-TIME FIA FORMULA ONE WORLD CHAMPION

GERMAN GRAND PRIX, 1994/'95

There are so many races I could choose. My father watched every Formula One race, so I basically followed him and watched all of them too, even the ones at night – or ar least I tried to when I wasn't falling asleep.

The first race I actually remember watching was Ayrton Senna's first win in Brazil. I think it was 1991 and he was so exhausted because he'd lost part of the gearbox or was missing gears and he couldn't even lift the trophy. But I was just three years old, so it's really just images – like a sense memory.

After that, the ones that really mean something to me from when I was a kid were the races from Michael Schumacher's Benetton days – when he was racing at Hockenheim, in front of a full stadium section, with German flags everywhere and a real sense of occasion. Those were amazing to me. After that I started racing myself and I guess I watched a lot of races – though not so much in recent years, because I'm in them!

Michael Schumacher at Hockenheim in 1995, on his way to the first of four German GP wins.

ALAIN PROST

FOUR-TIME FIA FORMULA ONE WORLD CHAMPION

ARGENTINIAN GRAND PRIX, 1980

It's impossible to choose a favourite race or a most significant, so I'll go back to my first race, in Argentina in 1980. When I started, we had unbelievable drivers: Clay Reggazoni, Emerson Fittipaldi, Carlos Reutemann, Alan Jones, Gilles Villeneuve, Jody Scheckter. You can't believe what these guys were like, with their charisma, their personality. And the cars! The cars were unbelievable. We had small teams, an aluminium chassis, and unfortunately, a lot of accidents.

Today it is maybe a bit different. [The drivers] start much younger, the cars are really different, and the risk is a lot less. When I met with Alan Jones or Carlos Reutemann at my first race we almost had a big hug, and you could see in their eyes that they were saying 'we are still here; we escaped.' We had a fantastic time, but we escaped. It's importan to remeber that.

That first grand prix was a very strange race. It was very hot and the tarmac was going completely away. The race director was Juan Manuel Fangio. We were in the drivers' briefing, and we didn't know if we could race. I remember Fangio said: "OK guys, there is only one solution: you have to go slow!" Everybody laughed. It was that relaxed.

But it was all those guys really. You never forget it when you meet people like that, especially in that period when in almost every race we had an accident. It really was an unbelievable time.

Looking to the future, it's hard to know. We are in a period where we have a lot of technology, a lot of data. That technology is fantastic, and for the major engine manufacturers, it's very good, as there is more and more a link between society and competition.

Having that, if we talk about the future direction of the sport, then in my opinion, we should go towards a Formula One where there is more ingenuity, where we have more surprises, more strategic possibilities, and we need to make the sport more human – drivers, engineers – we need to accent the human side, and maybe focus a little bit less on technology.

of course we need to have that extreme engineering but I think we need to have more of a balance. Then I think Formula One will be a little bit more understandable for people outside of the sport.

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04

Closing the gap

As the new Formula One season gets underway, the FIA's Head of Single Seater Technical Matters, *Nikolas Tombazis*, looks at the likely effect of this year's major rule changes and explains why they're so important for the future of grand prix racing

TEXT / JUSTIN HYNES

The FIA introduced a number of key rule changes for F1 this season, especially in the area of aerodynamics. Can you explain what the major differences are and what they were designed to achieve?

The major rule changes were aimed at facilitating closer racing. The most important ones involved the front wing and the brake ducts. The changes around these aimed to reduce the ability of teams to control [air] wake from the front wheels, which was being pushed outboard of the car and creating a lot of turbulence behind it. That had a detrimental effect on the aerodynamic stability of a following car, making it very difficult for a rival to get close and make an overtaking move.
The rules were designed to bring that outwash a little further in, making it easier for cars to race more closely.
We had noticed that year on year it was a worsening trend, and the 2019 rules have been framed to recover some of that. From the indications we've had from some teams there has been a step in the right direction.

The goal of closer racing was also targeted through changes to the rear wing, which is wider and deeper. In many ways that was a safe bet, as we knew it would increase the effect of the Drag Reduction System and therefore a car will be able to close on the one in front more easily.

Have you received any data detailing the result of the changes?

We were not expecting a huge delta in Australia, which is a difficult track at which to overtake in any case. Some simulations were showing a +10% increase of overtaking, assuming a similar evolution of a race, of course. In other races the same simulations expect a more sizeable increase, possibly to the tune of +50%.
To be clear, that is from simulations of cars following each other in races from last year, using this set of rules. That's the feedback we've had so far, but it will really only become clear as we progress through the season. We weren't expecting miracles in round one at Australia, but generally we are expecting a step in the right direction as far as aerodynamics are concerned.

There was some suggestion that as a result of these regulation changes that lap times would increase. Have the rules been successful in avoiding that or was it even a concern?

We were not really concerned about whether the car would become slower or faster.
That was not the objective. The goal was to facilitate closer racing, which makes the racing better. I really do not believe that the lap times we envisaged are significant. If we were 20 seconds slower that's another story, but one or two seconds at the level we are at is inconsequential if it results in closer racing.
Through their development of the cars, teams have clawed back time and will continue to do so across the season. I don't think outright performance is part of this debate; I think it's part of the distraction.

So the rules won't impact on the excitement of this season?

I would say that how exciting a race is depends on a number of parameters and not just aerodynamics. It depends on tyre management during the race, and we have revised tyres this year. It depends, too, on performance differentials. For example, if you happen to have a car that is one second a lap faster than the following car, then no matter how much the rules have been designed to promote close racing. The fast car will pull away and the race will not be that exciting.
It's both a function of ability to follow each other closely and of the delta performance.
And again we don't know yet where that is.
We have seen some design trends in Barcelona and I'm sure teams will try out each other's solutions in their wind tunnels and in CFD,

'If we hadn't gone through this process and we were sitting here writing the 2021 rules we would be in a much weaker position'

so I'm hoping that if there is initially a performance delta between the cars that due to certain parts of the car being a bit simpler convergence among teams will be relatively quick.

Did you get any pre-season data on wake turbulence and how it has changed?

Anecdotally, some drivers mentioned that following another car was easier. It's obviously nice to hear that feedback, but I think it's easy to get confused if you're following a much slower car or a car on a very different test programme. I don't think you can really judge.
And to be honest, teams are far too busy in pre-season testing to spend time doing any serious work on this topic.
All teams say the increased DRS effect is a strong positive. But as I said, that was fairly easy to achieve. Some teams say the front wake is going in the right direction but that it's not a huge step, while others are saying it does represent a bigger change. It's not fully clear yet.

Having seen how teams have interpreted this year's aerodynamic changes are you satisfied overall with what's been achieved?

Looking at the cars in testing and seeing certain solutions there are undoubtedly a few things we might have done slightly differently in the rules, but that's always the case. Overall, I'm pleased with the direction of the aerodynamic characteristics. I certainly don't think we have arrived at the final destination point and we can never sit back and say, 'OK, it's all fine'.
However, I think that if we hadn't gone through this process and we were sitting here writing the 2021 rules we would be in a much weaker position. For what we are trying to achieve, 2019 has been a very useful exercise and has lessened the wake effect.
Whether this season proves to be an exciting championship depends on how closely matched the teams are. And like everyone else, that's something I'm very anxious to see.

FIA Head of Single Seater Technical Matters Nikolas Tombazis hopes this year's rule changes will facilitate closer racing.

A simpler front wing, limited to five horizontal elements, has been brought in to reduce the wake effect on a following car..

When are you expecting to have a version of those 2021 rules finalised?

The FIA's International Sporting Code determines that certain things need to be finalised by the end of June, and that's what we're working towards.

Looking at the other 2019 rules, there have been a couple of safety modifications, haven't there?

The rear wings have moved up a bit for visibility in the mirrors. This was done because we found that part of the issue of drivers not being able to see properly was to do with where the rear wings lie in relation to the sidepods and where the mirrors were positioned. It offered only a very thin field of view and, depending on where the head is and where the mirrors are, they would just not see properly. We moved the rear wing up by 50mm to correct that and we have also been a bit more specific about mirror positioning. We added two rear lights on either rear wing end plate. That is in addition to the existing central rear light. That's obviously for increased visibility in poor weather conditions.

Drivers will also have an extra fuel allowance this year. What was that designed to achieve?

There is a 5kg increase in fuel to 110kg in order to enable drivers to do less fuel saving and push a bit more during races. It will not have an effect at every race, but there were some races that were too close to the limit and the change should make life a bit easier. I would say it is not a panacea, though, as there are other reasons why drivers save fuel, such as a team choosing to be fuelled light at the start of the race. The rules cannot cover that choice but where possible it will allow drivers to push harder in the closing stages of a race.
With regard to that wish to have drivers pushing in the closing stages of a race, there has obviously been a significant change in recent weeks with an alteration to the sporting regulations that offers championship points for the fastest race lap. That has been done to bring more excitement and encourage drivers to push in the final stages of a race when their cars are at their lightest.

Charlie Whiting dedicated his working life to F1 and was respected throughout the paddock for his considerable input to the sport.

04

A man for all seasons

On the cusp of the 2019 season, the F1 world was rocked by the sudden passing of one its most vital figures – FIA Director of Formula One *Charlie Whiting*. AUTO celebrates the life and work of one grand prix racing's major personalities

TEXT
/
ANDREW BENSON

Formula One and the FIA lost a great man on the eve of the new season when Charlie Whiting passed away on the Thursday morning of the Australian Grand Prix. Whiting, who was 66, had devoted his life to motor sport, and for the past 30 years had been central to the FIA's running of F1, first as technical delegate, later as safety delegate and latterly as the Federation's Director of Formula One.

Whiting played a key role in all the developments that have made F1 a vastly safer sport than it once was, but while he will certainly be remembered for the legacy he has left for motor racing and all its participants, it was Whiting's qualities as a human being that enamoured him to so many people.

His relaxed, warm character ensured that Whiting was able to fulfil a difficult task with apparent ease – he managed to combine overseeing an incredibly complex sport, full of ultra-competitive personalities, marshalling and ruling on their disputes, while remaining on good relations with everyone.

Mercedes director of motor sport Toto Wolff spoke for all when he summed up Whiting's qualities as the sport reeled from his loss over the weekend in Melbourne after he suffered a pulmonary embolism hours before the season-opening event of 2019 officially got underway.

"Charlie was an unbelievable person," Wolff said. "If you are in that position over so many years and you still don't make a lot of enemies, that shows your character. ▸

"He was always well balanced. You could seek him for guidance. He would always, when it was difficult within the regulations to really get down to the bottom and interpret certain things, he would give you a common-sense answer that you could work with and he was a reference point who will be dearly missed.

"There is a huge hole at the moment that needs to be filled. But for us [it is] the person, Charlie, who strolled in for a coffee and was just a decent man, and I'm really sorry for his family in these terrible times."

Whiting fulfilled so many roles within F1 that in some ways it seems remarkable he was able to do them all.

He inspected circuits. He was centrally involved in drafting the sport's regulations. He answered teams' queries about technical aspects of their cars that might be at risk of veering outside what was allowed. He was a go-between for all sporting and technical matters. He was part of the Formula One Strategy Group that shapes the future direction of grand prix racing. He led drivers' briefings. He started the races. And, in recent years, he had started holding regular media briefings to explain the intricacies of the many complicated decisions that are made over a grand prix weekend.

That he was able to adroitly manage so many interlinked roles speaks volumes for his commitment to hard work and his love of the sport. Yet what was remarkable was that he was always unflappable, no matter the issue – a locus of calm in a world where the word 'crisis' is never far from the lips of those given to the melodramatic. He never seemed rattled by any situation, however tense, and he always had time for people who worked within the sport, whoever they were.

SAFETY CONTRIBUTION

On his watch, the FIA made huge strides in how Formula One and motor sport more widely is staged. Heading into the 1994 season, F1 was perceived as very safe. There had not been a driver fatality for 12 years. But then two came within two days at the San Marino Grand Prix, with the loss of Roland Ratzenberger in qualifying and Ayrton Senna in the race, and there had been a dreadful crash immediately preceding them when Rubens Barrichello's Jordan took off at Imola's Variante Bassa in Friday practice.

By the time Karl Wendlinger crashed on the Thursday morning in Monaco, the impact leaving in him a coma for 19 days, moves were already afoot to address the situation. A package of emergency measures was prepared for immediate introduction – a stepped floor being introduced to reduce downforce and engine power was cut.

For 1995, a minimum height for cockpit sides was mandated for the first time. For '96, they were raised again and impact protection beside the driver was introduced. Since then, the safety crusade has never stopped.

Whiting worked alongside then-FIA president Max Mosley and FIA medical delegate Sid Watkins and, following Mosley's departure and Watkins' death, with current president Jean Todt and the FIA's expanding safety and technical team.

Wheel tethers were introduced to reduce dangers in a crash. Cars were made stronger still, with increasingly stringent impact tests for the chassis. The Head and Neck Protection Device (HANS) made a huge stride in protecting against neck injuries. A new form of track barrier was introduced, circuits were reshaped, helmet standards refined. And so on, until the advent of the lauded Halo cockpit protection device last year.

This work did not go unnoticed by racing drivers. World champion Lewis Hamilton said: "He really was a pillar, such an iconic figure in the sporting world, and he contributed so much for us. May he rest in peace."

Four-time champion Sebastian Vettel added: "I've known him for a long time and he's been our man, the drivers' man. Obviously there are regulations, then there is us, and he was the middleman. He was someone you could ask anything of, anytime. He was open to everyone at any time. His door was always open. He was a racer. He was just a very nice guy."

Whiting ended up at the FIA after 10 years working for teams. His career in F1 started in 1977, at the Hesketh team, and after its demise he moved to Brabham for '78. At Brabham, his job title was chief mechanic, but his role was broader and more important than that. He was part of a triumvirate that ran the team, in the days when F1 teams were much smaller than they are now, with team boss Bernie Ecclestone and celebrated designer Gordon Murray.

Together, they made Brabham one of the slickest-operating, most innovative and best teams on the grid, taking two World Drivers' Championship titles with Nelson Piquet in 1981 and '83, the latter the first in F1 history for a turbo-engined car.

Whiting stayed at Brabham until 1988, rising to a new job title of chief engineer, and loved the expanded role – Red Bull team principal Christian Horner says there was "always a smile on his face" when conversation turned to the Brabham days.

But the team was losing its way, and Ecclestone, now running the commercial side of F1, folded the team at the end of the season. Whiting moved to the FIA and so began an era in which nothing in F1 moved or happened without Whiting knowing about it.

Brabham had been notorious for living on the edge of the rules. Whiting's knowledge of what teams could do to play in the grey areas to gain an advantage proved invaluable in his new role.

"He knew all the tricks in the book," Horner added. "That made him the ideal guy to become poacher turned gamekeeper when he took on the role with the FIA.

"He handled that role, a tremendously difficult role, with great balance and diplomacy in some incredibly difficult situations. He was one of those guys who went under the radar but what he contributed was enormous, from a safety point of view, from what the sport is today.

"I think there is a huge debt of gratitude owed to Charlie for what Formula One is today, the safety, the lives that his actions actually saved. You know, the way these cars are now and the safety record that they now have."

'There is a huge debt of gratitude owed to Charlie for what F1 is today, the lives that his actions saved'

FIA President Jean Todt, F1 CEO Chase Carey and F1's drivers paid tribute to Whiting at the Australian Grand Prix.

The last word should perhaps go to FIA President Jean Todt, who a couple of years ago decided that Whiting's importance to F1 should be better reflected by his job title. For years, Whiting was simply race director – which somewhat underplayed his influence. Todt made him FIA Director of Formula One, a better description of the fact that Whiting was the pivot around which the entire sport revolved.

"It is with immense sadness that I learned of Charlie's passing," said the FIA President. "Charlie was a great race director, a central and inimitable figure in Formula One, who embodied the ethics and spirit of this fantastic sport.

"Formula One has lost a faithful friend and a charismatic ambassador in Charlie," he added. "All my thoughts, those of the FIA and the entire motor sport community, go out to his family, friends and all Formula One lovers."

Whiting's passing has left a void in a sport that, perhaps unknowingly, came to lean upon his vast knowledge, calm assuredness and gentle authority as a vital safety valve in a extraordinarily volatile environment. Finding so complete a support system for the future will be no easy task.

Whiting with the Brabham crew and driver Andrea de Cesaris in 1987.

Whiting worked at Brabham for a decade, becoming chief engineer, and played an integral role at the team alongside Bernie Ecclestone.

Sebastian Vettel described Whiting as the "drivers' man" and someone he could approach for advice at any time.

In the days of Michael Schumacher's F1 reign, Whiting continued his push for ever-greater safety.

Braham driver Willy T Ribbs with Whiting and Herbie Blash, Estoril, 1985.

A great loss to racing

/

The sudden passing of Charlie Whiting on the eve of the Australian Grand Prix weekend is still hard to come to terms with, for myself and everyone within the FIA family, and for those involved in motor sport at all levels around the world.

Charlie's impact was enormous. Not only was he a regulations reference of unimpeachable integrity for F1 teams, he was also a definer and refiner of those rules, helping to shape our sport for the better.

That was especially true in the area of safety, where he was instrumental in introducing a great many life-saving improvements, to the cars we race and also to the circuits upon which those cars compete.

That was the professional Charlie Whiting, a man with a lifelong love of racing who translated that passion into a dedicated pursuit of excellence, innovation and fairness in all his dealings.

But there was also the personal Charlie – universally liked, generous with his time – no matter who was asking of it – and possessed of a sharp wit and keen intellect.

Above all he was a man devoted to family and our thoughts are very much with his loved ones at this time.

The breadth of Charlie's influence and the scope of his many responsibilities make him almost impossible to replace. I think we are only beginning now appreciate just how important he was to motor sport, and how dearly we all will miss him.

I know I will.

The power of change

TEXT / EDOARDO NASTRI

05

In his two decades at the helm of Hyundai-Kia, *Chung Mong-koo* has overseen a massive increase in quality, innovation and sales. But even as he prepares to hand over control to the next generation, there's still one change on the horizon – mobility's move to alternative energies

The i30N has helped to provide a more sporty image for Hyundai, whose products are now noted for their build quality.

The technical revolution that has taken place over the past few years – and which is still in full swing – has led automakers to face up to new challenges by investing heavily in innovation. In just a few years we have a seen a radical change in outlook from several brands at the cutting edge in terms of alternative energy, electrification and safety, which have a clear vision for the future and that today play a key role in the industry.

Since the early 2000s, Chung Mong-koo has been president of the Korean Hyundai-Kia group. In the space of 19 years he has transformed the company into a global player, overcoming economic crises, during which his modus operandi has been to invest in the product and in quality. Before he came along, Korean cars were unreliable and cheap. Today, his radical transformation means the company is challenging established European brands. One famous element is the five-year warranty on Hyundai cars and the seven-year guarantee on Kia models.

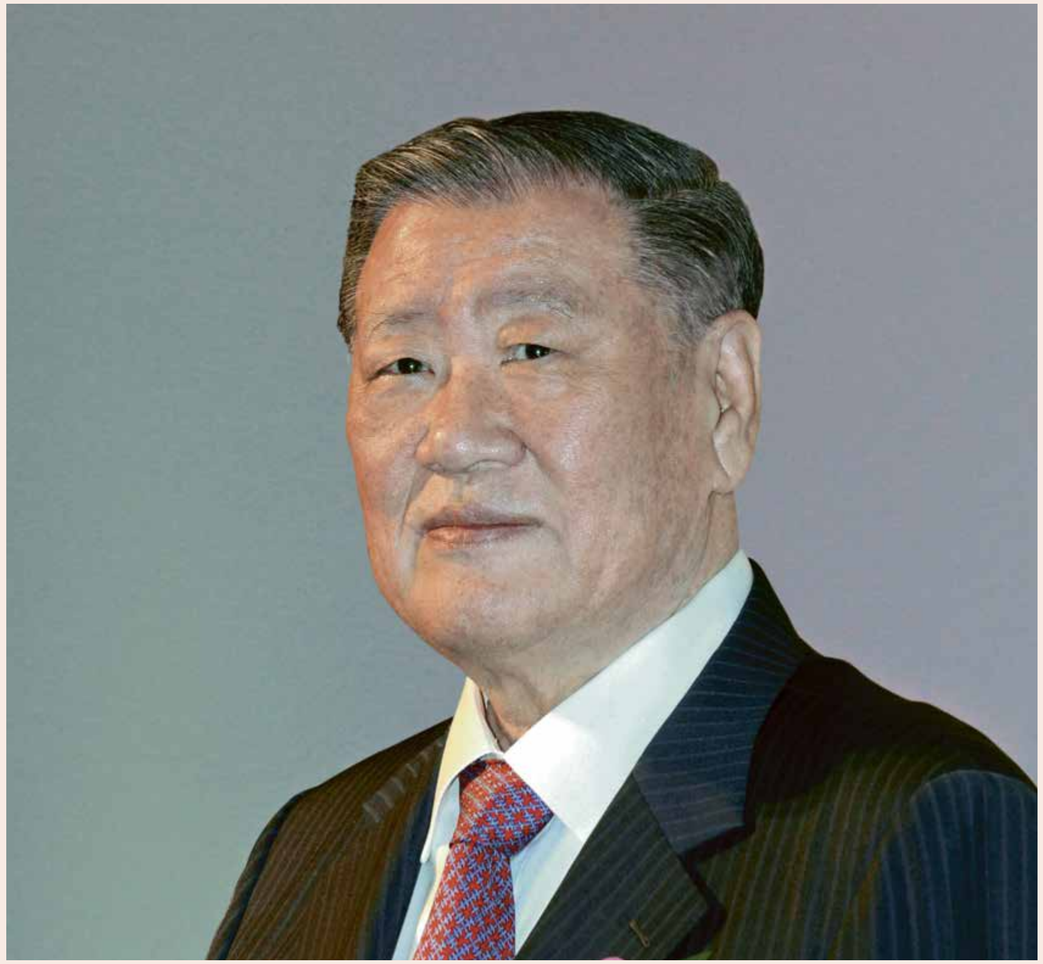
The customer has always been central to Chung Mong-koo's philosophy. "First and foremost, we want to please those who buy our cars with build quality as the number one priority," he explains. "There's always time to win the fight with other companies."

Chung is the son of company founder Ju-Yung Chung, a self-made man who dreamed of seeing the north and south of Korea reunited. When he decided to retire at the age of 84, Ju-Yung was head of one of the biggest and most important companies in South Korea, producing everything from cars and microchips to ships and oils rigs.

Today, his son Mong-koo is 80 years old, almost the same age his father was when he retired. Having graduated in industrial engineering in 1967 from the University of Hanyang, Chung Mong-koo became a trainee in a division of the family firm, taking on various roles. Ten years later he was appointed Chief Executive Officer of Hyundai Precision & Industry, a company producing components. He stayed there until 1981 when he took on the role of Hyundai Pipe CEO before switching to what was then known as Incheon Iron & Steel in 1986. A year later, he was running Hyundai Motor Service and in 2000 took on the Hyundai Motor Group presidency. He was awarded two honorary PhDs, the first in 2001 from the University of Mongolia, the second in 2003 from Korea University.

Prioritising build quality has brought great results for Hyundai. The Korean group's cars have for many years now been highly rated by European constructors for their quality. Sending top management to keep an eye on the competition at motor shows is common practice in the motor industry and several years ago Martin Winterkorn, at the time president of the Volkswagen group, famously sat in a Hyundai i30 the Frankfurt Show and marvelled at the technology and build quality.

"Hyundai has progressed enormously in recent years for a very simple reason: we have always put the accent on quality," explains Mong-koo. "The success of the group is down to several factors, including heavy investment on a global level into research and development. We have several R&D centres in various key areas around the world and have production sites everywhere, including in Europe. Meanwhile the company has not ignored its commercial network and emerging and key markets. For a while now, we have been active in Brazil, Russia, India and China, and in other new markets."



Hyundai-Kia president Chung Mong-koo has transformed its fortunes over two decades at the top.

PASSION AND MOTIVATION

The results are striking, given that today the Hyundai Motor group is the fifth largest car maker in the world with some 4,586,775 units sold in 2018, up 1.8 per cent from the previous year.

The growth is down to constant investment in developing new technologies and a passion for the task in hand.

"Above everything there's a passion for cars shared by everyone who works at Hyundai, which is another important element of our success," says Mong-koo. "Our staff do not feel they are just doing a job. They have developed a strong sense of belonging and feel part of a large family. In terms of human resources, for a while now we have worked on a success-based path and we have no intention of limiting our workforce's sense of initiative. In fact, the aim has always been to motivate the entire company with effective internal communications programmes, aimed at constant development."

It's something that also motivates customers to choose their products. It was Chung Mong-koo who came up with the "Tripla5" idea, a new service that offers a five-year warranty, five years of roadside assistance and five years of free checks, with Hyundai the only company to do so in Europe.

'Hyundai has progressed enormously in recent years for a simple reason: we have always put the accent on quality'

That passion extends to producing sporty cars, too. The i30N launched the Korean brand into the 'hot hatch' world market and Hyundai is also involved in rallying. A Hyundai world rally team was first created in 2000, making its debut on Rally Sweden with Kenneth Eriksson and Alister McRae at the wheel of the Accent WRC. The project did not go that well and at the end of the 2003 season the team announced it was temporarily retiring, talking of a return in 2006, which did not happen. ‣

Like all Hyundai models the Santa Fe SUV comes with a five-year warranty – something the brand is noted for.

Back in 2011, there were already 30 ix35FCCEV SUVs in the hands of the European authorities to test their effectiveness and functionality on the road. Today, its descendant, the Nexo, is a hydrogen fuel cell-based electric SUV capable of covering over 660 kilometres following a five-minute fill-up on hydrogen.

Chung Mong-koo has great hopes for the models launched last year, but he has no intention of stopping there. "We will continue to develop electric and electrified motors, investing in traditional hybrid vehicles, plug-in, battery and hydrogen. At the moment, we are the global leader in fuel cell technology."

By 2025, Hyundai plans to have launched 44 electrified models; before 2030 investment in fuel cell vehicles will pass the €6 billion mark and will also be used to increase the production of systems using fuel cells. In Chungju, the constructor has opened a second factory for such production. "The factory will produce up to 40,000 fuel cell systems by 2022, compared to the current 3,000," says Mong-koo. "We intend to ensure a production capacity of 500,000 hydrogen units per year by 2030, bearing in mind that the annual global demand will increase to around two million vehicles with this form of propulsion technology."

BRANCHING OUT

Once it is fully functional, the technology could be sold to other producers for various applications: cars, buses, ships and even drones. "The group is taking a brave step forward to speed up the creation of a hydrogen company. We are widening our role outside the car industry to develop a key element in the transition of the global society towards sustainability, contributing to making hydrogen an economically viable energy source."

Electrification is not the only challenge in a future that also involves autonomous driving and artificial intelligence. By 2021, the Hyundai-Kia group plans to launch a pilot programme for autonomous taxis in South Korea. Currently, in Gyeonggi province, the experimental K-city site is used to test Level 3 autonomous vehicles controlled via a 5G network. The programme is the work of Korea Telecom, the biggest mobile network provider in the country, in collaboration with the authority responsible for transport safety, the minister of the area and Hyundai.

Chung Mong-koo's transformative role at Hyundai might be entering its latter stages and the conglomerate's president on the brink of handing over the reins of power at Hyundai, but not before he makes one final change – to the power that drives us. ◂

Then in 2011 Chung Mong-koo announced, "we have had requests to take part in Formula 1 and in rallying. We are evaluating these options and will take a decision soon. Whatever happens, I believe we will be involved in motor sport within the next two to three years."

True to his word, in 2014 Hyundai Motorsport entered the WRC with the i20, with Thierry Neuville scoring its first win on that year's Rallye Deutschland as well as podium finishes in Mexico and Poland. This year, Hyundai is again fighting to claim the Drivers' and Manufacturers' titles, with second place for Neuville on the season-opening Rallye Monte-Carlo and third in Sweden. Time will tell if the president's hopes come true.

Investment in technological development is vital for any company to be competitive in the future. In an age of electrification, the Korean group is definitely not holding back. Apart from models that use hybrid and hybrid plug-in powertrains, studies are taking place in South Korea into hydrogen-fuelled electric power.

Indeed, Chung Mong-koo intends to make his country "the home of zero-emission engines". Over the next 20 years, the government in Seoul plans to have 6.2 million hydrogen-powered cars in circulation and it is working on putting in place the necessary infrastructure, which means that by 2040 it should have more than 1,200 new hydrogen refuelling points in place. When it comes to talk of powering electric motors with the first element on the Periodic Table, Hyundai is on the front row.

'The group is taking a brave step to speed up the creation of a hydrogen company. We are widening our role outside the car industry'

Hyundai Motorsport has competed successfully in the WRC since 2014, with Thierry Neuville leading the charge. The Belgian was third on this year's Rally Sweden.

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Setting a new agenda for world mobility

TEXT / JUSTIN HYNES

This year's annual meeting of the World Economic Forum in Davos focused attention on the seismic changes occurring in world transport and saw the FIA receive expanded support from some of the world's largest corporations and NGOs for the Global Road Safety Partnership it has launched in collaboration with the WEF

Each January the annual meeting of the World Economic Forum draws together in the region of 2500 of the world's foremost political, business and societal development leaders to help shape global, regional and industry agendas.

The future of mobility, and the provision of safe and accessible transport as a driver of economic and social well-being, occupies a key space in the WEF's vision. It is, however, a time of significant upheaval in the mobility sector, as new technology redefines what mobility means, as the automotive sector transition to alternative energies while confronting worsening public perception. It is also a time of escalating carnage on the world roads, where, despite the positive outcomes of the United Nations Decade of Action for Road Safety, the death toll continues to rise. All of these issues figured heavily on the agenda at this year's World Economic Forum.

The challenges and opportunities presented by emerging technologies couple with the task of bringing about sustainable mobility were addressed in two sessions at the Forum.

The 'How Autonomous Vehicles Earn Trust' session focused on the implementation of driverless cars on the world's road and what steps might be taken to ensure autonomous vehicles are accepted by the public as a safe and dependable mode of transport.

The main outcomes centred on the reality that new technology such as that featured in driverless cars takes a surprisingly long time to introduce and to integrate. The meeting also accepted that autonomous vehicles were initially likely to be rapidly accepted by industry than consumers, and also that integration may be driven by public bodies and large-scale private enterprise.

The meeting also pointed to the necessity for common standards, as well as ensuring that autonomous vehicles meet with common perceptions of the automobile in order to humanise the experience.

In the session entitled 'Electric vehicle future: The power of fleets', stakeholders from the automotive, infrastructure, energy and public sectors discussed strategies for accelerating zero emission vehicle adoption.

Rapid adoption of electric vehicles is hampered by a Catch-22 scenario in which infrastructure bodies await sufficient consumer adoption to invest in charging facilities, while consumers await infrastructure changes to feel secure in purchasing a battery-powered vehicle.

Thus, commercial EV fleets may prove to be the answer for fast upscaling of infrastructure. This was demonstrated by the case study on deployment of electric buses in Santiago, Chile.

Davos in Switzerland hosts the annual World Economic Forum where road safety was firmly on the agenda for 2019.

COMMITTED TO CHANGE

Tasked with helping to define the future shape of mobility is the WEF's Automotive Governors group, made up of major motor manufacturers, suppliers and global transport providers.

The Governors meeting acknowledged that the automotive industry is facing a dramatic transformation and industry leaders noted the importance of the coming wave of autonomous mobility and recognised the need for enhanced public-private cooperation in order to advance self-driving applications for people and goods.

The industry leaders debated the perceived industry trust gap in the wake of 'Dieselgate' and broad support was shown for improving trust by focusing on far greater transparency, especially in safety and climate action.

A key feature of the 2019 meeting was the presentation to the Governors of the Global Road Safety Partnership by FIA President Jean Todt.

Launched by the FIA and the WEF, the GRSP has engaged a wide variety of major corporations and NGOs in developing collaborative efforts to address key road safety issues. The alliance has seen organisations such as Bosch, UPS, Renault-Nissan-Mitsubishi Alliance, Volvo Group, and Total, as well as the World Bank, the UNECE, and the International Federation of Red Cross and Red Crescent Societies work together to develop a pilot project, Road Safety Partnership India (RSPI), which aims to reduce an annual death toll that ranks among the highest in the world.

"Some 1.35 million road deaths and 50 million injuries each year represent an unacceptable toll on development," said President Todt in his address. "This makes me question if the current governance structure of road safety is adequate for a transformational change and whether we could go beyond the incremental improvements of the past in order to turn the tide.

"I believe it is possible if we all work together, if the private sector gets on board to a much greater extent, if future road safety interventions can leverage the efficiency of the private sector, and the stability of the public sector."

'This public-private partnership creates a powerful opportunity to unite global support for road safety and related issues'

President Todt went on to explain how the RSPI is acting on those ambitions and why India was chosen as a pilot project for the GRSP.

"India still accounts for more than 10 per cent of the world's road traffic deaths. Reported data from India puts the figure at 11.16 per cent, some 150,000 fatalities, but if we read the World Health Organisation's estimated data of total deaths the figure leaps to 22.15 per cent. That is a staggering 299,000 people losing their lives on India's roads.

"The joint project we have initiated has ambitious goals, but with the active participation of key stakeholders from the private and public sectors it can set the example for a new, modern public-private partnership acting together to make road mobility safe."

Following the discussions, the Automotive Governors supported deeper engagement in road safety efforts in India, in part through support for the joint GRSP project.

Commenting on its support, UPS Chairman and CEO David Abney, who attended the FIA/WEF reception on Road Safety (GRSIP), said: "This public-private partnership creates a powerful opportunity to unite global support for road safety. We know our leadership is important, but that it will take a broad, public-private commitment from a wide array of organisations to affect real change – that is exactly what the Global Road Safety initiative is poised to accomplish."

Christoph Wolff, Head of Future of Mobility System, WEF, FIA President Jean Todt and Punjab's Minister of Finance and Planning Manpreet Singh Badal at the WEF's road safety discussion.

President Todt presented the GRSP to automtove leaders. Left: At the FIA booth, WEF attendees could try a VR simulator designed to track the effects of distracted driving.

05

Clearing the smokescreen

TEXT
/
KATE TURNER

What were supposed to be cleaner vehicles have had a devastating effect on urban air quality and public health. And despite stringent new regulations, levels of toxicity are still dangerously high. In a bid to raise awareness of the impact of vehicle pollution, the FIA Foundation and its partners have been measuring the real scale of emissions in our cities

The TRUE Initiative has tested vehicle emissions in London and Paris to gain an accurate picture of air quality.

Readings from an array of vehicles in city centres are being logged in an effort to tackle the emissions problem.

'There is a vast health burden caused by vehicles on our streets, but we can't trust manufacturers to give us good information'

Walking to school in South London, nine-year-old Daniel worries about the air he and his family breathe. "London is having a bad time right now with air pollution," he says. Along the busy Old Kent Road, stationary traffic belches out toxic fumes – but he knows that what he can see is only part of the story: "Diesel cars are making this happen."

Diesel vehicles dominate many European cities as the result of a push by governments in the 1990s to promote the fuel as a low-carbon option. Carbon dioxide and its impact on climate change was the primary concern to which diesel was presented as the panacea; the fuel promising lower, safer emissions and greater efficiency.

Increasingly stringent rules, through Euro regulations, aimed to reduce levels of vehicle emissions rapidly as investments in new engine technology paid dividends. No new vehicle was supposed to be dirtier than the model that came before, and the generational improvements were bold and significant.

The real result of the diesel rush, however, was an invisible pollutant spreading across urban spaces at a terrifying rate. As manufacturers and regulators claimed vehicles were getting cleaner and cleaner, the air in cities was getting dirtier.

The mystery of the 'super clean' diesel vehicle piqued the curiosity of many and was only solved when the Dieselgate scandal revealed that a development which was too good to be true was just that.

TRUTH UNCOVERED

In the US, work by the International Council on Clean Transportation (ICCT) and the Environmental Protection Agency revealed that German automaker Volkswagen had been using software to control emissions to pass laboratory tests. Under normal driving conditions these controls were disabled, allowing the cars to spew unregulated emissions into the atmosphere. Subsequent investigations revealed the use of such 'defeat devices' had become systematic and pervasive among a number of manufactures across different regions.

The cost of the deliberate deception is vast. Some 37,000 deaths, mainly in Europe, are directly attributable to the NOx emissions caused by this cheat alone, according to a recent report.

The full health impacts of these toxic diesel fumes are still being uncovered – from respiratory difficulties to learning disabilities, even before birth – with children the most vulnerable and worst affected.

Currently, just 12 per cent of all cities have air that complies with World Health Organization standards and overall an estimated 3.7 million people, mainly in urban areas, die each year as a result of outdoor air pollution, to which vehicle emissions are a major contributor.

Frustrating cities actively seeking to improve their air quality and address the health burden are the limits of their knowledge.

"You can't make informed, effective policy decisions when you know you don't have accurate data," says Sheila Watson, Deputy Director of the FIA Foundation. "There is a vast health burden caused by vehicles on our streets, but we now know that we can't trust manufacturers to give us good information, so someone else has to step up and provide it."

To fill that gap, The Real Urban Emissions Initiative (TRUE) was formed to measure real-world emissions on city streets, with its system dubbed by UK newspaper *The Guardian* as an 'uncheatable' test. TRUE is a partnership of the FIA Foundation, the International Council on Clean Transportation, the Global New Car Assessment Programme, Transport and Environment, and C40 Cities.

The initiative uses remote sensing technology to capture vehicle emissions in urban environments, building up a data set to accurately assess vehicle families. The test results have been used to create an innovative and interactive new database ranking vehicles based on their nitrogen oxide (NOx) emissions.

The data set has two distinct purposes: to provide open information for city administrations to identify their specific emissions challenges, and to provide the public with the real vehicle emission levels when looking to purchase cars.

"We are trying to make sure there is a steady drum beat of information about real-world emissions from vehicles," adds Watson, "so that it continues to be present in the minds of the public, policy makers and city administrators."

The initiative was launched in the presence of Anne Hidalgo, Mayor of Paris, and Sadiq Khan, Mayor of London, in whose cities pilot TRUE real-world vehicle testing projects would be taking place in order to identify their particular air quality challenges.

Drew Kodjak, Executive Director of the ICCT, identifies this city engagement as central to addressing the issue. "We need authorities to commit to continued testing of real-world emissions, to recognise that policies need to be put in place and to better enforce those policies."

The first findings of the TRUE project were based on the real-world emissions of more than 350,000 cars across the continent's cities and was launched in June 2018. This data showed that most of the newest diesel cars in European cities are still polluting the streets with NOx emissions up to 18 times the levels set by Euro vehicle standards. Four manufacturers had average emissions of more than 12 times above the approval limit and all Euro 6 diesel models tested exceeded NOx emissions.

Six months later, the first results of the TRUE pilots were released for London. The study took 100,000 samples at nine locations in Greater London from passenger cars, light commercial vehicles, taxis, buses, trucks and motorcycles as they passed by. The Paris pilot results are expected this spring/summer and the TRUE unitive hopes to announce a host of new cities outside Europe where testing will occur throughout the year.

Arming cities with the data to analyse their specific emissions challenges will finally give them the ability to develop informed and tailored solutions. But for children like Daniel, much of the damage has already been done – he and so many of his peers will lead lives carrying the physical burden of childhood exposure to a wholly preventable health crisis. ◂

The Mayors of London and Paris, Sadiq Khan and Anne Hidalgo, have both backed pilot TRUE studies in their respective capitals.

Case study – London

/

The streets of London have been badly affected by the impact of diesel emissions, dubbed the city's 'health emergency'.

A recent investigation found that there are more than 800 schools and colleges in the city where pupils are exposed to levels of NOx that breach the European Union's legal limits. It is currently estimated that air pollution contributes to the death of 9,500 people each year in the UK capital.

The abstract impact of poor air in the city is hard to assess. But every day these dangerously dirty vehicles pollute the streets, the most vulnerable are at risk.

One of those was Ella Kissi-Debrah, who walked to school every day along one of London's most polluted roads. Following the nine-year-old asthma sufferer's death from respiratory failure in 2012, her mother discovered that air pollution peak days correlated with every respiratory crisis Ella endured. Now the inquiry into her death is being reopened in a bid to attribute her cause of death to air pollution. For cities across the globe, this small legal ruling could become one of the greatest turning points – recognising that dirty air, created knowingly by vehicle manufacturers, kills.

For the city of London, it is clear that understanding and addressing the air pollution crisis as swiftly as possible is not just important but vital.

TRUE worked with London Mayor Sadiq Khan to assess 100,000 vehicles on its streets at nine different locations to build a picture of the city's specific challenges.

The analysis showed that London's iconic black cabs are disproportionate polluters in the city, currently responsible for 20 per cent of harmful NOx emissions, and by 2020 would be the biggest source of transport pollution in central London. The findings also examined passenger vehicles and established that Euro 5 models and older are responsible for approximately 60 per cent of greater London's NOx emissions from passenger cars and that Euro 5 and Euro 6 diesel cars are, on average, producing six times more NOx than equivalent petrol cars.

Mr Khan said: "Data from TRUE and ICCT reveals the stark health impact of polluting diesel taxis on our streets. London's air is so toxic it damages children's lung growth, causes thousands of premature deaths, and increases the risk of asthma and dementia."

Khan used the data as the basis of a new policy towards the most polluting cabs, adding: "We know that dirty vehicles are responsible for half of our NOx air pollution – and it also underlines why we have been delivering hard-hitting, urgently needed policies to tackle vehicle emissions."

There were success stories in the data also: average NOx emissions from buses in London have declined significantly over the past five years. NOx emissions (grams per kilogram of fuel burned) from the buses sampled were 65 per cent lower than those in similar studies conducted in 2012/13.

Together, these findings highlight where policies have succeeded and where they require further work. Subsequently a range of new policies, informed by the findings of TRUE's testing, were announced by the Mayor, specifically to tackle black cab emissions and support drivers switching to new zero-emission capable taxis.

This swift response demonstrates how active city leadership can be on emissions data when protecting public health and addressing transport needs are a priority.

Championing a safer, cleaner future (05)

Since retiring from Formula 1, *Nico Rosberg* has channelled the focus and commitment that took him to world championship glory in 2016 towards the challenge of building a smarter, cleaner and safer future. And the FIA's groundbreaking #3500LIVES road safety awareness campaign is part of his vision for a better tomorrow

TEXT
/
JUSTIN HYNES

You were one of the first ambassadors to get involved with the #3500LIVES project. What prompted that and why do you believe a campaign such as this, which seeks to bring simple road safety messages to a global audience, is important?

I find it very hard to understand that so many people get killed on our roads. The roads are my territory. I was a Formula One World Champion and I feel it's my responsibility to help ensure that we do all we can do to improve safety in our daily day lives. The campaign has been very successful since it was launched and I've received lots of positive feedback on the messages delivered by the ambassadors. I'd like to congratulate the FIA and JCDecaux. It's an innovative approach and it's paying dividends.

The message you promote is to not drink and drive. Much has changed with regard to the social acceptability of mixing alcohol and driving but is it still an issue?

I think the psychological side of this issue is really interesting. In the UK, scientists found out that peer pressure leads people to make the mistake of having one drink and then driving – they convincing themselves it's OK, so that they don't appear weak or uncool. So there's already a problem there and it's a trap so many people fall into. We can´t make enough noise about the issue. It isn't cool to drink and drive but there are still a lot people who mix alcohol and driving. We have to keep repeating the message that this is wrong.

How much do you think the involvement of celebrities as role models can help spread the message of road safety, especially a message that is global in nature? Do you believe in the power of role models?

Yes, more than ever. There is so much content out there now and so many conflicting messages. People always listen to other people and to the messages they send – for good or ill. It's why the front cover of every magazine features the face of a human being. We are interested in other people. Role models are really important in the delivery of positive messages. We have to be aware of that power and leverage it to make changes for the better.

Have you had personal experience of the other safety issues outlined by the campaign?

Yes, sure. Use of seat belts is also a message that we can't reinforce enough. Sadly it's the case that in some countries using seat belts is still seen as uncool. I'm really passionate about safety, so it's a message I'm happy to keep delivering whenever I can.
Distracted driving is another serious issue and as far as I can see it's an increasingly significant problem of our new digital world. There's a huge amount we can do to increase awareness. It's one of the messages we deliver in the #3500LIVES campaign but given the amount of technology at our disposal now maybe it's worthy of a single global campaign of it's own – maybe a 'Don't touch this' campaign.

What do you hope the #3500LIVES campaign can achieve in the coming years?

I really hope we can influence as many people as possible with these simple messages. None of them are complex solutions to safety issues and if people adopt these straightforward behaviours while mobile then it will move things in a positive way.

Following your world championship win in 2016 you've stayed closely connected to motor sport and you've taken a big interest in Formula E. Why is that?

I really believe in future technologies and especially green technologies. I am convinced they will influence our lives in a positive way. All of the major car manufactures are involved in Formula E and it's clear from their commitment to the chasmpionship that they want to bring their new technologies also on our roads. So we all will benefit and that's great. It was the same philosophy we saw with the hybrid cars at Mercedes during my F1 years.

Since retiring from F1 also you've become heavily involved in technology entrepreneurship. One of the companies you've invested in is Uber rival Lyft. What prompted that and what's your view of future mobility?

Change is unstoppable. We're at a point now similar to when horse-drawn mobility was confronted by the first car. In Germany in those days, the Kaiser, Wilhelm II, said that cars would not last and that everyone would go back to horses. We know what happened. You cannot stop change. After my F1 career I found I have a huge passion for helping to make what is happening now a positive change.
It's why I co-founded the GREENTECH FESTIVAL, which will take place in Berlin on the last weekend of May – the same time the E-Prix is in the city.
We want to showcase new technologies and host a leadership conference. We have to celebrate technological innovation and see it as a huge opportunity and not as a threat. It's very possible that through the development of autonomous cars we can reach a point where we have zero fatalities on the roads. There is of course a long way to go, but this a dream we have to pursue, because without having a dream we stop living.

Can motor sport lead the way in terms of being an innovator and incubator of new sustainable technology?

Yes, it has to. An intelligent, sustainable mobility system is one of the most important challenges for our society and this area is fascinating for me. OK, I grew up the son of an F1 champion, so it's no big surprise that racing and innovation appeal to me, but I genuinely believe we all have to work towards building a mobility system that benefits everyone – one that's smart, clean and safe. There is so much to gain so let's all work together to improve our lives.

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

The long-established connection between motor sport innovation and road car sales and development is stronger now than ever, with manufacturers such as Hyundai, Toyota and DS Automobiles leveraging knowledge gained on track and in rallying to push the boundaries of road car technology

TEXT / BEN BARRY

Performance enhancement

Car manufacturers have long contested the FIA World Rally Championship to emphasize the performance, durability and desirability of showroom models closely related to competition cars. Most commonly, they've aimed to generate a halo over an entire brand. While that's true of current WRC rivals Hyundai and Toyota, there's an extra twist: both use the championship – and other FIA series – to promote fledgling high-performance sub-brands.

In Hyundai's case, its i20 hatchback rallies under the Hyundai N banner. Toyota's Yaris WRC, meanwhile, is entered under Toyota Gazoo Racing. Hyundai N also contests the FIA World Touring Car Cup, while Toyota Gazoo Racing enters the FIA World Endurance Championship. Until recently, neither high-performance sub-brand was well known.

Hyundai's WRC return in 2014 after a decade-long absence loosely coincided with the launch of its high-performance N division, though the direction of future road cars was still to be properly defined. Since then, Hyundai N road cars have built on foundations laid down by the WRC campaign. First came the i30N hot hatchback in early 2018, a Golf GTI rival with more power and equipment sold at a lower price-point. ▸

Toyota's new GR Supra GT4 concept was developed using experience gained in motor sport by Gazoo Racing.

Two additional N models are now available: the Veloster N (which is not available in Europe) and the new i30 Fastback N, a sleeker derivative of the original hatchback.

Gyoo-Heon Choi was instrumental in Hyundai's return to the World Rally Championship, co-ordinating between Hyundai Motorsport GmbH in Europe and senior management in South Korea. Today, he oversees high-performance road car planning.

"Five years ago, we looked at the Hyundai brand – it was known for its reasonable price, but also for being very average," he explains. "We wanted something more dynamic to enhance Hyundai's image, so we started N. Now we conquest new customers – they are younger, richer people who'd never visited Hyundai dealerships."

Hyundai marketeers say N visually represents the dynamic challenge of a chicane and stands for 'born in Namyang, honed at Nürburgring'. The company's operational structure mirrors this split between Asia and Europe. A headquarters in Namyang, South Korea, employs around 100 engineers. A European development centre is located in Rüsselsheim, Germany, an hour or so from Hyundai Motorsport GmbH in Alzenau. Worldwide, Hyundai N employs around 150 people.

"We wanted something more dynamic to enhance Hyundai's image, so we started N."

GYOO-HEON CHOI

With no back catalogue of true performance-focused road cars, Hyundai made a series of high-profile appointments from well-established European premium performance brands. These include director of high-performance vehicle development Klaus Koester, who joined from Mercedes-AMG in 2015.

"It's rare to help build something from nothing and Hyundai is an exciting company," enthuses Koester. "We have our in-house supplier Mobis, we manufacture our own steel, the i30N's electronic limited-slip differential is in-house, we developed the brakes... There's a lot of potential. Even now, if you look at the i30N road car, no competitor puts this much development into the base car. It's not just a badge and power."

Motor sport has inspired Hyundai N's processes and its ethos, partly thanks to the WRC and more recently the WTCR in which the i30N races.

"Motor sport is at the top of Hyundai N's hierarchy," says Choi, referencing a pyramid structure with motor sport at its pinnacle and road cars positioned below. "Our engineers learn a lot from motor sport – it's not so much the technology for a specific part, it's more the spirit of competition. It's good motivation for mass-production engineers, because they are usually conservative. Motor sport teaches them to try to the absolute limit and overcome problems."

"Taking the engine or ball-joints from the rally car isn't possible, because of homologation requirements, cost and refinement issues, so you have to be realistic," adds Koester. "But you learn a lot about *how* to do things and take inspiration – like the shift lights on the i30N road car, that idea came from the rally car. There is close collaboration between Hyundai Motorsport GmbH and colleagues at Rüsselsheim and Namyang, and there are more items we are working on that benefit from this."

DUAL BENEFITS

The back story of Toyota Gazoo Racing is more esoteric than Hyundai N's. 'Gazoo' derives from the Japanese 'gazo', meaning picture or image. Two decades ago, Toyota president Akio Toyoda introduced a then-revolutionary online website for retailing used cars, illustrated with pictures of the vehicles. It was called gazoo.com. Over time, 'gazoo' is said to have evolved to represent a garage full of cars to Toyota management, and when Toyoda raced a Lexus LFA at the Nürburgring 24 Hours in 2009, he entered under the Gazoo Racing banner.

Today, Gazoo Racing has hundreds of employees globally, the number fluctuating as workers collaborate on a project-by-project basis. Japan is home to three key Gazoo Racing divisions: GR Management is responsible for planning; GR Development (split into Project Operations and Powertrain Development) focuses on product and technical development; the Advanced Technical Skills Institute is responsible for the development of production and racing vehicles, plus driver development. In addition, Gazoo Racing partners with Toyota Motorsport GmbH – based in Germany and responsible for the WEC programme and development of the WRC engine – and the Gazoo Racing WRT (World Rally Team), outsourced to team boss Tommi Mäkinen's base in Finland.

Though Gazoo Racing road cars have a longer history in Japan, these models are only just being rolled out for Europe in a three-tier hierarchy: limited-edition GRMN (Gazoo Racing Meisters of Nürburgring) models are the most uncompromising, as witnessed with the recent Yaris GRMN that directly references the WRC car. GR models sit one rung down; they are more widely available, but remain highly focused performance models. GR Sport derivatives are marketed as sportier than a mainstream model but less uncompromising than GR versions. Uprated, motor sport-inspired aftermarket GR parts are also available.

Alain Dujardyn, general manager of Toyota Gazoo Racing marketing in Europe, recognises motor sport's significance in developing the GR brand. "The WRC has been vital in linking a cutting-edge racing car with a road-going vehicle as GR products have been introduced to European showrooms," he explains. "Competing at the highest level brings authenticity to the Gazoo brand, as well as fan excitement and engagement."

For Dujardyn, technical learning from motor sport is similarly beneficial. "Motor sport has been central to Toyota's drive to make ever-better cars for many years. What we've learnt technically through racing all over the world has helped road car development and technology, from engine management to suspension design, and from hybrid energy capture to safety. It also helps Toyota colleagues hone technical skills, their ability to work under pressure and their understanding of teamwork. It goes to the heart of our belief in *Genchi Genbutsu* – learning first-hand how to bring GR-class sports cars and custom parts to market."

Dujardyn is quick to stress, however, that the advantages of competition stretch well beyond relatively niche Gazoo Racing products, driving forwards the Toyota brand generally.

"Engineers working on Gazoo projects almost always have a background in the wider company and often return to areas of the business outside GR, bringing what they learnt with them – for instance, hybrid technicians on the WEC project are road car engineers on assignment. They contribute detailed knowledge of hybrid technology [to the race team] and learn how to operate and make decisions in a high-pressure, time-limited environment. This experience, as well as first-hand knowledge of hybrid performance in extreme conditions, is then applied directly to road car developments."

Benefits to Toyota's sales and in attracting younger, more performance-focused drivers are also apparent. "We can't quantify 'win on Sunday, sell on Monday' with data, although we do see spikes, such as with Yaris sales after we won at Rally Finland," says Dujardyn. "Generally these are younger, more performance-focused drivers looking for the ultimate version of the kind of car they love, as well as drivers seeking exclusivity."

FUTURE INSPIRATION

The next step for the Gazoo Racing road car programme is the launch of the Supra GR sports car, a high-performance coupe with a long history but one that has never before worn the GR badge.

Hyundai is in less familiar territory. Koester cautions that it's important to progress step-by-step with the N brand. Planned next steps include the introduction of a dual-clutch transmission and earlier integration of high-performance 'N' derivatives when a new model is being planned. ▸

Hyundai has launched its successful high-performance N brand on the back of its WRC exploits with the i20.

For Toyota, technical learning from motor sport is key, with road cars engineers gaining experience in WEC. They then return to work on projects like the Corolla GR (top).

"Competing at the highest level brings authenticity to the Gazoo brand, as well as fan excitement and engagement."

ALAIN DUJARDYN

'You cannot do it all at once, but the one stopping is the first loser, so we are always thinking "what's next"'

KLAUS KOESTER

"It was not possible to do this very early integration with the time we had [on i30N]," explains Koester. "You cannot do it all at once, but the one stopping is the first loser, so we are always thinking 'what's next'."

Hyundai is also rolling out the N Line trim level (bringing some of the appeal of full N models to more mainstream models) and assessing N Option, which would offer motor sport-inspired parts – a concept car features a carbonfibre bonnet, stickier tyres and bucket seats.

While committing to this methodical approach, already the Korean company has confirmed it's working on a standalone halo N model – a car that isn't derived from a mass-production model as the i30N hatchback is, but a bespoke nameplate, perhaps in the mould of the Toyota Supra.

Exactly what form this exciting model will take remains unclear but a concept teased at the i30 Fastback N presentation did appear to show a sports coupe silhouette. That's logical given the rear-wheel-drive architectures Hyundai has already developed.

No matter how both brands progress in the future, Hyundai N and Toyota Gazoo Racing road cars will take their lead from the pinnacle of motor sport, and no doubt be inspired by their fierce rivalry in the WRC. ◂

The i30 Fastback N is Hyundai's latest hot hatchback to be developed under the N banner.

Getting a boost from Formula E /

Citroën promoted its premium DS sub-brand to a mainstream audience when Sébastien Loeb drove the Citroën DS 3 WRC, introduced from the 2011 season. In 2015, DS Automobiles became a standalone brand, positioned as Groupe PSA's luxury division, alongside mainstream Peugeot and Citroën. With electrification at the core of the brand, DS has found the perfect synergy with Formula E. It partnered with Virgin Racing from the 2015-16 season to 2017-18, and teamed up with Techeetah for 2018-19. Thomas Chevaucher, technical director of the DS Performance division, reveals lessons learned in Formula E filter into the development of high-performance electric and hybrid models. "We are five years in advance of road cars," he says. "We might not share the technology directly, but it's the understanding that's important. We are working a lot with our research department for future DS road cars." At the Paris motor show, DS presented two new electrified road cars alongside its DS E-Tense FE19 race car – the DS 7 Crossback E-Tense 4x4, featuring a plug-in hybrid electric drivetrain, and the all-electric DS 3 Crossback E-Tense. The latter is a small premium SUV with a 100kW electric motor, 50kWh lithium-ion battery and a range of up to 200 miles. There was also a pure electric concept, the DS X E-Tense, with a drivetrain developed by the DS Performance motor sport division.
There's more to come too, with CEO Yves Bonnefont confirming all new DS models will be exclusively produced in electrified versions from 2025.

DS Automobiles' focus on EVs has made it the perfect partner for Formula E teams – it is partnering Techeetah in 2018-19.

The newly-launched DS 7 Crossbank E-Tense features a plug-in hybrid electric drivetrain.

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The only man to win FIA world titles in two disciplines and a recent inductee to the Federation's Hall of Fame, *Petter Solberg* explains why he's always been determined to forge his own path and why his next step will be electrified

06

TEXT / DAVID EVANS

It's October 1996 and there's a very blonde Norwegian standing outside the Spydeberg Savings Bank wondering if he should have given his shoes another polish. Too late now. The bank's president is waiting for this 21-year-old odd-job man to tell him why he should lend him £100,000 to go rallying.

Even Petter Solberg was a little bit surprised that a short while later he walked out of the building having secured the money – all of it.

"I got it by telling him I was going to be the best. But it was risky. I was a painter at the time, and a carpenter. I didn't have any money."

It's a mark of just how convincing Petter Solberg can be. "Everybody was telling me I couldn't do it at that time," he says. "I had done rallycross and then I had a go in a rally and did well – but everybody said 'rally is too different. You won't be able to.' What did I say? Two words: watch me."

Solberg spent the next two years driving a Toyota Celica GT-Four and winning on both sides of the Norwegian-Swedish border. When he wasn't driving, he was busy bothering folk. "I wrote to Subaru, to Ford, to everybody," he says. "I kept sending my CV."

Second place on the Lebanon Rally was enough to catch the eye of Ford team principal Malcolm Wilson. Cumbria replied to Solberg's solicitations and a test was offered. Solberg was in. That was the end of 1998.

The following year – only his third in the sport – and he was a factory Ford driver, and team-mate to Colin McRae.

"I have so much to thank Malcolm [Wilson] and Elaine [Wilson's wife] for," says Solberg. "Looking back, and I don't think I said this enough, I would never have got anywhere without them. I am so respectful and so thankful for what they did for me."

On the face of it, the Wilsons made the simple and apparently straightforward move of taking on a young Nordic charger who was proving to be quick and committed. ▸

At 44, Petter Solberg is the only driver to have enjoyed FIA world title success in both rallying and rallycross.

What they really did was to open the door to a whirlwind from the north whose approach was anything but stereotypically stoic and reserved.

"I stayed in their house and never stopped asking questions," he says. "I was learning English, so I had questions about that, the car, the team. Everything."

The enquiries didn't stop when he started testing.

"I was allowed to sit in the car with Colin," he says. "That was incredible. He was so good and patient with me. He helped me so much."

But on occasions McRae's patience wore thin. "We would be in a restaurant and Colin would say: 'Don't speak! You're not allowed to ask any more questions!' I would be quiet for five minutes, or maybe two. Then the questions started again."

INTO THE SPOTLIGHT

The plan for 1999 was to ease Petter and his new co-driver Phil Mills in with a series of outings in a Ford Escort WRC. But when Thomas Rådström was injured in a fall at the Safari Rally, Petter stepped up to a Focus WRC. He finished the rally in fifth place, demonstrating exceptional maturity.

From then on, Solberg's future with Ford looked assured – especially when he got even closer to a maiden podium with fourth place in New Zealand the following season.

Incredibly, Solberg's life was in turmoil at that time. His agreement with Ford had yet to be cemented and Subaru was chasing him hard. He stalled Prodrive Subaru chief David Richards, but in the end agreed to join the Anglo-Japanese effort in the latter stages of the 2000 season.

In a different shade of blue, Petter got his head down and focused on the driving. That first podium was delivered on the 2001 Acropolis Rally, with a cherished first win following a year later on Mills' home event, Rally GB.

"For those two years – in 2002 and 2003 – I had a special team-mate in Tommi [Mäkinen]," says Solberg. "At that time in my career, I was alone; there were no Norwegian drivers in the championship, I had no manager, nobody really behind me. When Tommi came, we did everything together."

Mäkinen was reaching the end of his career and happily devoted much of his effort towards helping Solberg reach his potential. Twelve months on from that first WRC rally win Petter delivered Norway's biggest motor sporting moment, and placed the Solberg name on top of the world in the winter of 2003.

And he'd won title number one in some style, showing Sébastien Loeb a clean pair of heels to take back-to-back Rally GB wins. "There's nothing like that moment when you are the best in the world," says Solberg. "It was so special, but it was close."

He'd beaten Loeb by a single point.

Unbeknown to Petter, he'd also become the only person to ever beat the masterful Frenchman across a full season. Loeb went on to win the next nine world championships, with Solberg close but never quite close enough.

"The 2004 season – that hurt," says Solberg. "I should have won the title that year. I was faster in '04 than the year before. The car was so good. I told the team I could win 10 rallies in 2004. I won five and I think I led the other five. But we won a lot of stages."

Solberg's Subaru was fastest on 95 of the 323 tests in 2004, 26 ahead of Marcus Grönholm, the next best. But issues with the Impreza WRC's cooling package – and its ability to go through water – cost him dearly. And they were a sign of things to come.

"With some changes to the radiator, we should have stuck with that 2004 car [in '05]," said Solberg. "In 2005, I won Sweden and that was a proper win. The new car came for the next event in Mexico and I won that one too. That wasn't a proper win... I took the silver [medal] for 2005, but I don't think we deserved it."

Things went downhill for the next three seasons as the Prodrive-Subaru alliance struggled to scale former heights. The culmination of that downturn was president Ichiro Kudoh's flight from Subaru's Shibuya headquarters to Solberg's apartment in Monaco. His news was just about as bad as it gets – the manufacturer was withdrawing from the sport.

"You ask about the most difficult time in my career," says Solberg. "Forget the missed wins or the crashes or the disappointments from mechanical trouble – I think that conversation I had with the president was the most difficult. I had such a good relationship with Japan; they were like family. There was a lot of emotion, a lot of crying at that time."

Before the dust settled, Petter and his wife Pernilla picked up their phones and didn't put them down for a month. In that month they built themselves a WRC team.

It's only now that Solberg reveals some of the funding for his Citroën Xsara WRC came from Tokyo.

"They [Subaru] wanted me to carry on," he says, "they wanted to help. It was hard work, but we employed the best people and we made it work."

And on Thursday February 12, 2009, Solberg started the first stage of Rally Norway. His silver and black Xsara was coloured by the backers who'd kept his career alive, but just under the rear wing were written four poignant words: 'This is my life.'

Solberg developed a close bond with Subaru team-mate Tommi Mäkinen during 2002/03, who acted as a guiding light.

Solberg's exploits in a Toyota Celica GT-Four in 1998 caught the eye of M-Sport boss Malcolm Wilson.

Top: Solberg made his mark with Ford on the 1999 Safari Rally before Subaru came calling, leading to a switch to the Prodrive team for 2000 (above)...

...That move started to bear fruit, leading to a breakthrough WRC victory on co-driver Phil Mills home event – the 2002 Rally GB.

A return to Ford for 2012 brought good results – and a near-miss on that year's Acropolis Rally.

When Subaru quit the WRC, the indomitable Solberg started his own team, scoring a series of top-five finishes in 2009 aboard a Citroën Xsara.

'There's nothing like that moment when you are the best in the world. It was so special, but it was close'

Solberg emerged from his nightmare with fastest time on his first-ever stage in his own WRC team. Oslo went wild.

Beating the factory WRC teams was always going to be tough for Solberg. In three years, he progressed from Xsara to C4 to DS 3 World Rally Cars, but was always a step behind the works cars.

"That was the way it was," he says, "you had to accept it and give it the best shot. We were third in the championship [in 2010], something I'm really proud of for me and my team."

Solberg's dedication and hard work was rewarded with a return to M-Sport and Ford in 2012.

"I had the offer to go to Volkswagen that year," he says, "but that meant driving a [Škoda Fabia] S2000 car for the season as Volkswagen was getting everything ready to come with the Polo in 2013. I didn't want to drive S2000 and I did want to go back to Malcolm [Wilson]. We had some good results, we came close..."

Never closer than the Acropolis. He and Loeb were fighting tooth and nail for the win when Petter hit a bank in Aghii Theodori. "I pushed too hard," he says, "I wanted it too much."

Ford's decision to depart the WRC at the end of 2012 left Solberg high and dry for the second time in four years. There must have been regret at not joining Volkswagen?

"How can I regret anything?" he asks, "I have a fantastic career – a career where I won in everything I did. I tested an ORECA LMP1 car in 2009. They wanted me to do the season with them. I thought about it, but I'm a rally driver."

In the mood for revelation, Solberg rewinds further. "[Guy] Fréquelin made me an offer to join Citroën in 2005, but I couldn't leave Subaru. Like I said... family."

Rally driver or not, he was forced to make a decision for 2013 and that decision was rallycross.

"I knew there was an FIA World Championship coming to rallycross," he says. "We spent one year getting everything ready and then we won the first two World RX titles in 2014 and '15 with my car and my team."

In doing so, the Norwegian made history by becoming the first – and only – driver to win FIA World Championships in different categories. ▸

‘I’d won the WRX drivers’ championship, but not the teams’ title, I wanted that one’

For 2017, he signed to run a pair of VW Polo R Supercars in the PSRX Volkswagen Sweden team. The aim was simple.

“I’d won the WRX drivers’ championship, but not the teams’ title, I wanted that one,” he says. “With Johan [Kristoffersson] we did it. We have such a good team – in those two years we won four titles.”

But it came at a cost, a personal cost to the 44-year-old.

“I knew something was wrong for a while,” he says. “I had no energy. In the middle of last year, it became really bad and I could hardly hold a cup of coffee. In the end, we found I had a problem with one of my lungs.”

Sarcoidosis, a disease in which abnormal collections of inflammatory cells form lumps known as granulomas in the lungs and other organs, was diagnosed and eventually treated.

“By the end of last year, I was getting stronger and stronger and now it’s back to normal,” he says. “Through all of it I have to thank Pernilla. She did everything. She was fantastic. But now I’m ready again.”

Ready for what, though? This year’s looking fallow, but typically, Solberg’s a man with a plan.

“We wait for the news on WRX going electric,” he says. “We can be back next season, we have all the infrastructure and team ready to go.”

In the meantime, there’s Solberg the second to consider. Solberg Jr – Oliver – recently signed to drive for Subaru Motorsports USA and become the second member of the family to don the famous blue and yellow overalls.

“That will be emotional when we see Oliver drive a Subaru for the first time,” he says. “But he’s done it himself. Like I did, I want him to find his own way.”

Petter certainly found his own way – and it’s a long way from the Spydeberg Savings Bank. ◂

Solberg's move to the world rallycross with his own team proved immediately successful, with two drivers' titles in 2014/15 (above and right).

His unique achievements have seen Solberg recently inducted into the FIA's Hall of Fame.

The Mille Miglia proved an instant hit when first run in 1927 with participants and spectators alike.

06

In May, connoisseurs of classic racing will gather in Brescia, Italy for the 37th re-enactment of one of the legendary events of long distance racing – the Mille Miglia. Now billed as the 'most beautiful race in the world' it began as a gruelling test of man and machine run at extreme speeds and at high risk, as AUTO finds out...

BEAUTY OF THE BEAST

TEXT
/
PINO ALLIEVI

There are events that seem to belong to a long gone, enchanted world, with few if any links to the present – the Mille Miglia is undoubtedly one.

First run in 1927 and brought to an eventual halt in 1957 due to the dangers it presented, it was an extraordinary, crazy 1600-kilometre blast through the narrow, twisty, tangled Appenine roads of Italy where, to this day, speeds are limited because of the terrifying drops and blind corners. This was a race reckoned to be the most demanding and thrilling of all time by legendary drivers such as Juan Manuel Fangio, Stirling Moss, Alberto Ascari, Mike Hawthorn, Piero Taruffi and Wolfgang Von Trips.

Enzo Ferrari was fascinated, not to say bewitched, by the Mille Miglia. Mercedes built a legend around it, while Alfa Romeo used this race to build credibility and fame by investing colossal sums of money, even entering 12 factory cars.

"I never won it and that left a void in my career," said Fangio of the event. "No other race got to me like the Mille Miglia. To practice for it, Alfa Romeo gave me a car similar to the one I'd race in and always on my own I would really go at it, doing the route two or three times. I loved driving in that free-flowing way through the beautiful Italian scenery. On the rare occasions when I stopped to drink at a bar, or to eat something in a *trattoria*, the crowds would gather round. It was like a party."

Jacques Ickx, famed journalist and father of Jacky, summed up the Mille Miglia with a striking epithet: "It's a whole lifetime condensed into 12 hours or even less."

The extreme nature of the course tested every element of a driver's skill set. Instinct, intuition, improvisation and a huge dose of disregard for danger were prerequisites, but it also required supreme technical ability in order to look after tyres and safeguard the car's components to the finish. Competitors also needed to be supremely fit and able to withstand the physical beating of driving a thousand miles flat out on rough roads, and the exceptional mental challenge of maintaining focus and precision as spectators crowded the edge of the road.

To describe the Mille Miglia as pure madness is perhaps apt for a race that not only brought out the extreme in competitors but also induced hysteria among the populace. For a day and a night the Mille Miglia brought an entire country to a standstill, with millions of spectators staying up to await the arrival of the daredevils, as well as applauding the efforts of complete unknowns.

For Italy, the Mille Miglia stimulated the country's transition from a largely agrarian, rural society to a nation that raced towards the new technological frontier on the global horizon. ▸

'No other race has had such a major and important impact on the development of the motor car as the Mille Miglia'

And the impact resonates to this day. The people who built the first Ferrari, the 815 that made its Mille Miglia debut in 1940 under the name Auto Avio Construzioni (there was an agreement with Alfa that prevented the constructor from using his name), all came from the factories in Emilia e Romagno, where they built and repaired tractors.

When the Mille Miglia first took place, there were only 119,000 cars on the roads of Italy, not many compared to the rest of Europe. But the race created a rush of interest that led to a huge upturn in the number of four-wheeled vehicles.

The spark for this great race arrived almost by chance, through a spirit of revenge, a desire to shock and one clear-headed idea. Two wealthy members of the aristocracy from Brescia, Count Aymo Maggi, 23 years old at the time, and Franco Mazzotti who was 22, along with their friend Renzo Castagneto (34) and a journalist from the *Gazzetta dello Sport* newspaper, Giovanni Canestrini (32), came together to light the fire under a discussion about a special race which would help Brescia regain a reputation it had lost, having hosted the first Italian Grand Prix for single-seaters in 1921 before the race switched to Monza.

This was in the early 1920s, at the cusp of the emerging fascist era in Italy, which was centred in Rome. After much discussion, the 'four musketeers' as they would be known agreed on the idea of a road race from Brescia to Rome and back. The total distance was 1628 kilometres, or around 1000 miles, hence Mille Miglia, a nod to the fact that in Ancient Rome distances were measured in miles.

It didn't take long for the race to be established, such was the enthusiasm of its creators. Finance was straightforward, with both Maggi and Mazzotti putting their lavish resources behind it, and the decision to go ahead was made on December 26 1926 in the house of Canestrini, in Milan. The race organisers began work the following day and, on March 26 1927, two months before Charles Lindberg flew across the Atlantic from New York to Paris, the first race was held. It was dominated by three factory OMs, built in Brescia.

The crew of Minoia-Morandi won at an average speed of 77.2km/h. It was immediately a huge success, which led to Alfa Romeo, Lancia, Fiat, Bugatti and OM all entering factory teams the following year. Only part of the route was run on asphalt, with much of it held on poorly surfaced and even failed roads. But given the growing popularity of the race, the fascist government, looking for praise and popular approval began to fix, although not necessarily tarmac, almost the entire route.

At the same time, the motor industry needed to tackle the problem of car reliability, something of an unknown quantity at the time. But increased confidence in the stability of machinery was essential for the Mille Miglia. Work began on strengthening the chassis, innovating with the suspension, improving electrics – with several drivers adding extra lights – as well as trying new materials to ensure the engines would last.

Then came work on lubricants. In the early editions of the Mille Miglia, the factory Alfas changed oil twice in order to cover the 1600kms, but within a few years, it was just a case of topping up at the midpoint thanks to better quality lubricants developed specifically for the race.

All the while, the shape and weight of the cars was changing, becoming more streamlined, lighter. "No other race has had such a major and important impact on the development of the motor car as the Mille Miglia," said Enzo Ferrari.

GRIT AND GLAMOUR

If one considers that Tazio Nuvolari and Gian Battista Guidotti won in 1930 with the Alfa Romeo 1750 breaking the 100km/h average for the first time, one gets an idea of the progress made given that the roads were still dusty and in a bad way. And the rewards on offer? Lots, much more than international races on circuits. As co-driver to Nuvolari, Guidotti took enough prize money to be able to build a beautiful villa in Bellagio, by the shores of Lake Como, which even then was a playground for wealthy socialites.

When it comes to Nuvolari's 1930 win, there's always the accompanying tall tale of his overtaking move on Varzi in the other Alfa Romeo, which has it that Tazio switched his lights off so that the competition didn't know he was coming. Guidotti was honest enough to explain it wasn't true, given that Varzi was passed in the morning when there was no more need for lights. However, the 1930 race was the first of many battles between the two Italian aces, one impetuous and spectacular, the other clinical, analytical and precise in his driving style. Nuvolari won again in 1933, but in '34, when he was hoping for a hat-trick, Varzi beat him by more than eight minutes.

Nuvolari's greatest and most heart-rending race took place in 1948, when he was 56 and had a lung condition. He rejected the advice of doctors and the implorations of his wife and accepted Ferrari's offer to drive the Mille Miglia, teamed up with the mechanic Scapinelli in a 166 S.

After a cautious start, Tazio was flying and arrived in Rome with a 12-minute lead over Alfa Romeo's Consalvo Sanesi, 13 ahead of Ferrari team-mate Franco Cortese and 14 in front of Maserati's Ascari. It was a miracle. But the car was damaged after a collision, was missing a mudguard and the suspension was damaged. Nevertheless, Nuvolari did not relent and, on the difficult Futa pass, with rain reducing visibility to almost nothing, he pulled away and was first to arrive in Bologna with 29 minutes in hand over Biondetti. Brescia seemed within reach, but in Reggio Emilia, the damaged suspension finally gave way and retirement was inevitable.

Nuvolari got out of the car and said nothing, his dirt-covered face streaked with tears. No one was brave enough to approach him. Monosyllabic, all he asked for was a bed in which to rest. Ferrari tried to console him by telling the 56-year-old, "You'll have better days." "No, I won't" was the icy response.

The first non-Italian win in Brescia dates back to 1931, when Mercedes showed up with a dash of Italian nevertheless in the shape of its driver, the German Rudolf Caracciola, whose ancestors migrated from Sicily. At the time, he had a contract with Alfa Romeo, which was not easy to get out of, but a compromise was reached and Caracciola went on to win with a superb drive in the 7068cc, supercharged, six-cylinder Mercedes SSKL. It put out 270 horsepower and weighed a noteworthy 1600kg. Nuvolari's 1930 record was beaten by around eight minutes.

A German marque again took the spoils at a shortened version of the event in 1940, though this time it was BMW.

Following a fallow year after a tragic accident during the 1938 edition, in which 10 people were killed, the event resumed as the Gran Premio di Brescia and was held over a triangular course with Brescia, Mantua and Cremona at its apices. The race entailed nine laps over a 104-mile circuit.

And though Alfa Romeo's quarter of 2.5-litre roadsters were reckoned the likely winners, it was the lightweight, quick BMW 328s that dominated, with Huschke von Hanstein victorious as the German squad finished first, third, fifth and sixth.

Fifteen years later, Mercedes was back at the Mille Miglia with another exceptional car, the F1-derived SLR, which boasted an eight-cylinder 3.0-litre engine putting out 280bhp, with a weight of 800 kilos. Four cars were entered and as part of their preparation, each driver was instructed to cover the route "at least" 10 times. Fangio wanted to race on his own, while Stirling Moss chose to have a co-driver in the shape of former sidecar racer and motor sport journalist Denis Jenkinson. ▸

Stirling Moss and Denis Jenkinson pioneered the use of pace notes in their 1955 win for Mercedes. Right: Among the race's other famous winners was Alberto Ascari, in a Lanica D24 in 1954.

Top: BMW dominated with the lightweight 328 to win the shortened 1940 edition. Above: the final Mille Miglia, won in 1957 by Ferrari's Piero Taruffi, was also marred by tragedy.

For the first time ever, this pair prepared a set of pace notes with a rudimentary roll of paper on Jenks' lap. It proved extremely useful and Moss was uncatchable.

The Briton covered the 1600 kilometres in 10 hours and seven minutes at an incredible average speed of 157.650km/h. In second place, Fangio was 32 minutes down. No one could touch Moss and years later, Jenkinson said, with no trace of irony, "We had God on our side that day." Moss, meanwhile, said he had never driven so hard, so well and in such inspired fashion.

There was, however, a funny incident linked to the 1955 race. Two youngsters, aged 15 and 16, snuck behind the wheel of a Fiat Topolino with a fake number on it. Neither of them had a driving license, but they drove the car until it ran out of fuel. The *Carabinieri* came across them and assumed the stoppage was as a result of a mechanical breakdown. The two lads were not arrested and could not believe it when, the next day, they found themselves sitting at the top table during the prizegiving ceremony, alongside Moss and Jenkinson.

A race like this, that resonated on the world stage even though this was before the age of global communication, inevitably transformed itself into a glamorous event, attracting notables from the world of politics, finance, show-business and culture. The time check in the elegant Piazza della Vittoria in Brescia, the pits area in Rima and the centre of Bologna all became as stylish as the Via Veneto with Italian and international celebrities and high fliers very much in evidence.

The Ferrari 'hit squad' of Eugenio Castellotti and Alfonso De Portago was a magnet for famous actresses, and the other major marques were also besieged by showbiz folk and famous people. It was inevitable then that the race became something of a cult, attracting famous industrialists such as the four Marzotto brothers from Venice, who invested incredible amounts as they all took up racing. Gannino, the most talented of the quartet, even won in an official Ferrari – the first time in 1950, teamed with Marco Crosara in a 166 Le Mans Berlinetta with the same specification as the 195S, the second in 1953 with the same team-mate, driving a Berlinetta Vignale. Marzotto never wore a race suit, preferring to win while wearing a double-breasted jacket, as if he was about to join his high society friends at a party.

THE FINAL ACT

Many tried their luck in the Mille Miglia, including film director Roberto Rossellini, a dear friend of Enzo Ferrari, who took part in 1953 in a Vignale-bodied 250 Spider. But he had to retire following a terrifying accident. Ingrid Bergman, who was waiting at the finish, was deeply upset and Rossellini, clearly shocked, never attempted the race again. At this time, in the 1950s, the Mille Miglia was spiralling out of control, with between 500-600 ever-more sophisticated and faster cars taking part. There had already been a tragedy, in 1938 in Bologna, when a Lancia Aprilia had crashed, killing 10 people, including seven children.

The final act, in 1957, was even more grisly: the Ferrari crewed by Alfonso De Portago and Edmond Nelson was going through Guidizzolo, near the finish in Brescia, when it flew straight into the middle of the crowd. It is believed the crash was caused by the failure of a tyre damaged in a previous incident. Twelve spectators and both drivers were killed. The race was won by Piero Taruffi in a 290 MM identical to the one driven by De Portago. Second was Wolfgang Von Trips in another Ferrari, who had slowed to avoid a dangerous battle with his team-mates, when there really was no more room for tragedy. There was no triumph, only tears. Ferrari gave Taruffi a subdued hug and the Roman driver informed him that this race would be his last.

The day also marked the end of the epic, heroic and over-the-top event that was the Mille Miglia, even if in recent years it has been run again as a 'tour' for historic cars. ◂

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FAMILY

Measuring green machines

07

With emissions in the spotlight and consumer confidence in the auto industry at an all-time low, the recently launched Green NCAP programme aims to restore trust and, through its ratings system, drive environmental innovation among manufacturers – and the FIA family is at the heart of its mission

TEXT / GAIA PELLICCIOLI

Independent studies by the FIA-backed Green NCAP body are encouraging car manufacturers to be more open on emissions data and fuel efficiency.

Since 2015 and the beginning of the emissions scandal, vehicle pollution and its impact on air quality, public health and the environment have rarely been out of the news, with a succession of municipal and regional authorities as well as national governments taking action to limit the proliferation of polluting vehicles in markets across Europe.

It's not just car emissions that have come under scrutiny, however, and on a broader level the emissions irregularities at the centre of the scandal have served to focus attention on emissions testing as a whole and on the trustworthiness of the information provided to consumers.

Last month the demand for clarity and independent, credible data was crystallised in the launch of the Green NCAP programme. The FIA decided to support the development of the new environmental performance programme of Euro NCAP, which has more than 20 years of experience in providing consumers with safety rating information.

The new body, initially launched in Europe, is made up of a consortium of independent stakeholders from the automotive sector. As well as European governments, consumer groups and universities, it includes four FIA Member clubs: the Automobile Club d'Italia (ACI), the Allgemeiner Deutscher Automobil-Club e V (ADAC), the Österreichische Automobil-, Motorrad-und Touringclub (ÖAMTC) and the Touring Club Schweiz (TCS). In conjunction with partner test centres and test labs across the continent, Green NCAP aims to employ the same methodology as its safety forebear – supporting ▸

'Consumer testing can encourage car manufacturers to beat their competitors by innovating in the field of energy efficiency and emission reduction'

and promoting existing legislation by rewarding exemplary vehicles and their manufacturers.

Currently, all cars sold in Europe must pass type-approval tests to demonstrate that their emissions of carbon monoxide, oxides of nitrogen, unburnt hydrocarbons and particulate matter do not exceed certain critical values. However, regulation offers no reward to manufacturers who go beyond the minimum standards.

Green NCAP uses a broad range of methods to complement approval tests and by simplifying complex results through the offering of targeted consumer information, rewards manufacturers whose vehicles go beyond the minimum requirements to offer excellent, robust, real-world performance.

REWARDING INNOVATION

"For years, there has been a mismatch between the way cars perform in regulatory tests and how they perform on the road," says Pierre Castaing, President of Euro NCAP. "Consumers often don't get the fuel economy officially claimed for their vehicles and end up paying for the difference in fuel. Now, legislation is tightening up, but consumer testing can complement it and go a step further: it can really encourage car manufacturers to beat their competitors by innovating in the field of energy efficiency and emission reduction. We're confident that they will respond to the challenge, to the benefit of car buyers and the environment.

"By going beyond the legal requirements, differences between vehicles can be highlighted and more realistic information about the fuel consumption in daily use can be given to consumers," he adds. "This should be relevant for every car buyer but also for fleet operators and authorities that are interested in monitoring the environmental impact of cars. A truly independent assessment of their cars is also beneficial to the manufacturers as it rewards innovation and provides an incentive for improvement."

The Green NCAP pilot programme was launched by Euro NCAP in 2017 and supported by the Federation Internationale de l'Automobile through the FIA Sustainable Mobility Programme, which receives funding from the FIA Foundation. Speaking at the launch of the first ratings at the start of March, FIA Secretary General for Automobile Mobility and Tourism Andrew McKellar said: "The FIA and its network of 145 Mobility Clubs are convinced that the role of consumers is key in the transition towards more sustainable mobility solutions. Wherever possible we should help decision makers to design inclusive and fair policies in order to provide consumers with clear and reliable information about the environmental performance of new cars.

In Green NCAP's first round of tests, the Volvo XC40 T5 only received a one-star rating.

'Green NCAP is designed to be an independent source of information for consumers, something they can rely on'

The FIA's Andrew McKellar says independent bodies like Green NCAP provide important real-world information for consumers.

Euro NCAP President Pierre Castaing believes Green NCAP's success could help restore consumer trust in the car industry.

"In light of what has happened in recent years, the industry has a lot of ground to make up, but it is important that independent organisations provide real-world information to consumers so that they know that when they are purchasing a new car they can have confidence in the data they are being given," he added.

"Green NCAP is designed to be an independent source of information for consumers, something they can rely on and base their judgment on when they are looking for a new vehicle. But it is also intended to provide competitive pressure on the industry to make sure it is reaching the best standards possible in terms of environmental performance.

"In that perspective, Green NCAP methodology will require further improvement, but we are confident that the programme will grow rapidly in the coming years."

Today, most new car models are offered with a range of power units: petrol, diesel, hybrid and, sometimes, full electric. Petrol and diesel variants may be offered with a choice of power/torque outputs, most often achieved by different mapping. Green NCAP aims to provide information about as many of these variants as possible, but it is almost impossible for an independently-funded organisation to test all of them.

The most popular vehicles across the range of powertrain types will be tested to try to maximise the information available to consumers. In time, as more cars are added, the database will expand to provide a comprehensive resource. To begin with, Green NCAP will look only at passenger cars. The impact of delivery vans is recognised but is beyond the scope of the initiative, at least to start with.

In Green NCAP's first round of tests, 12 cars were rated. The Hyundai IONIQ and BMW i3, both electric vehicles, achieved a maximum five-star rating, while the VW up! GTI got four stars. BMW's X1 2.0d and the Mercedes-Benz A200 were awarded three stars. The Ford Fiesta 1.0 EcoBoost was given two stars in its latest guise, with a one-star rating given to the Audi A7 50 TDI, the Volvo XC40 T5 and Subaru's Outback 2.5.

Three vehicles – the VW Golf 1.6TDI, FIAT Panda 1.0 and the previous-level Ford Fiesta 1.0 EcoBoost – received zero star ratings. All three cars are approved to Euro 6b emissions standards, still valid for models introduced before September 2017. However, from September 2019, all cars will have to meet the tougher standards of Euro 6d-temp and updated versions of these cars will be rated in the next round of tests.

Above: The Green NCAP study featured an on-road driving test, using portable emissions measuring equipment, to accurately assess real-world emissions. Left: The FIAT Panda being assessed.

The FIAT Panda 1.0 received a zero Green NCAP rating but an updated version is expected soon.

While it may seem unrealistic to test electric vehicles alongside fossil fuel-powered cars, NCAP's president is convinced that both concepts can achieve five stars if they meet certain performance criteria, regardless of fuel type.

"We are not looking to favour one concept over the other and will leave the technical solutions and their feasibility to manufacturers," says Castaing. "Vehicles equipped with an internal combustion engine can also achieve five stars. For example, the latest move to 48V onboard electrical systems will enable a more efficient recuperation of energy from the powertrain and increase the overall energy efficiency. The main propulsion unit is still the ICE, but smart design of the electrical system will help these cars make another leap in becoming cleaner and more energy efficient."

WIN-WIN SITUATION

A further closing of the gap may occur when Green NCAP begins to look beyond raw emission data and includes driving range in its assessment. Ultimately the body plans to look at the whole life cycle of the vehicle to give a holistic overview of its environmental impact.

The long-term aim of Green NCAP is to develop a collaboration with manufacturers similar to the safety partnership that resulted from the launch of Euro NCAP more than two decades ago and which now includes associated schemes worldwide.

"It's a win-win situation whereby Green NCAP would benefit from the latest technological know-how and available data in the industry, and vehicle manufacturers could demonstrate their efficiency to customers with the potential, some day, to apply it in other regions as well," says Castaing.

If the programme is successful, it should not only restore consumer trust in the industry but also provoke a 'green arms race' among manufacturers. Ultimately, the real winner of that battle will be future generations and the environment in which they live.

1,000 FORMULA ONE RACES IN NUMBERS*

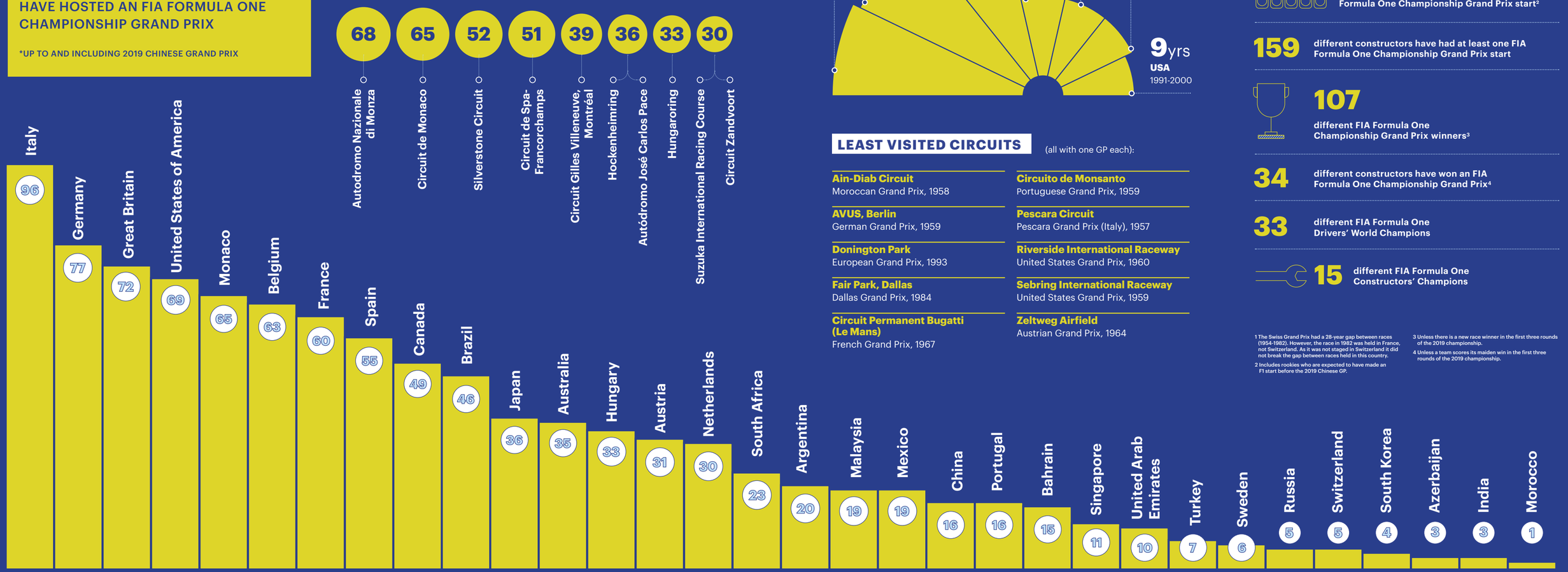
08

Did you know that Italy has hosted the most F1 races (96)? Or that the total distance covered by F1 over 1,000 Grands Prix (km) could drive the circumference of the Earth eight times? Check out these and other stats from 1,000 F1 races

72 DIFFERENT CIRCUITS IN 32 COUNTRIES HAVE HOSTED AN FIA FORMULA ONE CHAMPIONSHIP GRAND PRIX

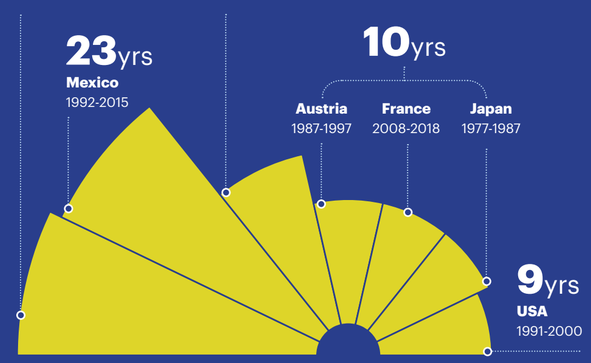
*UP TO AND INCLUDING 2019 CHINESE GRAND PRIX

MOST VISITED CIRCUITS



1000 RACES

LONGEST GAP BETWEEN RACES BY COUNTRY[1]:



LEAST VISITED CIRCUITS

(all with one GP each):

Ain-Diab Circuit
Moroccan Grand Prix, 1958

AVUS, Berlin
German Grand Prix, 1959

Donington Park
European Grand Prix, 1993

Fair Park, Dallas
Dallas Grand Prix, 1984

Circuit Permanent Bugatti (Le Mans)
French Grand Prix, 1967

Circuito de Monsanto
Portuguese Grand Prix, 1959

Pescara Circuit
Pescara Grand Prix (Italy), 1957

Riverside International Raceway
United States Grand Prix, 1960

Sebring International Raceway
United States Grand Prix, 1959

Zeltweg Airfield
Austrian Grand Prix, 1964

322,476.07 km have been raced

65,196 laps have been completed

40,498.47 points have been awarded

772 different drivers have had at least one FIA Formula One Championship Grand Prix start[2]

159 different constructors have had at least one FIA Formula One Championship Grand Prix start

107 different FIA Formula One Championship Grand Prix winners[3]

34 different constructors have won an FIA Formula One Championship Grand Prix[4]

33 different FIA Formula One Drivers' World Champions

15 different FIA Formula One Constructors' Champions

1 The Swiss Grand Prix had a 28-year gap between races (1954-1982). However, the race in 1982 was held in France, not Switzerland. As it was not staged in Switzerland it did not break the gap between races held in this country.

2 Includes rookies who are expected to have made an F1 start before the 2019 Chinese GP.

3 Unless there is a new race winner in the first three rounds of the 2019 championship.

4 Unless a team scores its maiden win in the first three rounds of the 2019 championship.

In a career spanning five decades, *Charly Lamm* was responsible for some of BMW's greatest touring car and sportscar successes at the head of Team Schnitzer. It's no surprise, therefore, that his sudden passing has left a hole in the sport he loved

A lifetime of racing 09

The motor racing world mourned the loss of one of its most passionate competitors in January, with the sudden passing at the age of 63 of former BMW stalwart, Charly Lamm.

Lamm's death came just two months after his retirement from his long-standing post as team principal at BMW Team Schnitzer, and following a hugely successful career in a variety of touring car and sportscar categories with BMW that spanned five decades.

Lamm was the architect of success at the Schnitzer team started by his half brothers, Josef and Herbert Schnitzer, turning the squad into the most successful touring car team in history. With Lamm in charge, the team won the European Touring Car Championship with BMW three times in the 1980s, before achieving success in the German DTM series and in Italy at the close of the decade and at the start of the 1990s.

Schnitzer later moved into sportscar competition in partnership with BMW and won the 1999 Le Mans 24 Hours with the V12 LMR prototype.

There was more touring car success with a string of victories in the World Touring Car Championship, and in DTM Lamm helped the team take championship glory when BMW returned to the series in 2012.

Lamm's final act as team principal was to claim victory in the prestigious FIA GT World Cup in Macau last November. It was the 14th win for the team on the Guia street circuit, the first of which it had claimed back in 1980.

"I cannot consider myself a sportsman – the drivers are the athletes – but I try to give them the tools to go fast. This was what lifted my passion for the sport and what I could do for a very long time," said the modest Lamm afterwards.

Commenting on Lamm's passing, BMW Motorsport Director Jens Marquardt said: "It is incredibly difficult to accept that Charly is no longer with us. He had a significant impact on racing at BMW for decades, celebrated major successes with his team and wowed fans around the world with his unique passion for racing. Losing him so suddenly is a shock and a tragedy."

Lamm's long service was celebrated by BMW at both the 24 Hours of Daytona and the ABB FIA Formula E Championship race in Santiago, both held in late January.

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