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The peak of Ferrari's best Formula 1 era

FERRARI HAS PRODUCED SOME OF THE GREATEST

Formula 1 cars in its seven decades. Only the 500 model of the 1950s and the F2002 can compete with our cover subject, the F2004, when it comes to domination. And the final Michael Schumacher title-winner has one other accolade: despite the faster, meaner F1 cars introduced last year, the F2004 still holds several lap records.

Ignoring the negligible track changes in Bahrain and Monaco, the V10-engined machine holds seven records on current F1 circuits, plus another five (Imola, Nurburgring, Indianapolis, Magny-Cours and the final version of pre-2010 Silverstone). The current regulations mean that quicker cars are surely on their way, but for now the F2004 still has the title of Ferrari's fastest F1 car.

As key figures Rubens Barrichello, Ross Brawn, Aldo Costa and Rob Smedley reveal from page 16, the F2004 was the culmination of a remarkable period for the Ferrari squad, which was surely one of the best of all time. It was so good that even the team couldn't believe how fast it was when testing began...

One example of the F2004 will be at Autosport International, which kicks off the 2018 season. Among the many highlights in Birmingham this week will be the launch of this year's World Rally Championship (p30) and a display celebrating 60 years of British Touring Cars (p34). As ever, there will also be a strong engineering contingent, so this is a good time to publish our regular Engineering supplement, which will appear every other month in 2018. See you at the NEC!



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COVER IMAGE

Steve Etherington/
LAT Images

COVER STORY

16 Ferrari's fastest F1 car

PIT+PADDOCK

- 4** Alonso begins his Daytona challenge
- 6** Giovinazzi heads Formula E testers
- 9** Pruett calls time on illustrious career
- 11** Nurburgring eyes Formula 1 return
- 12** Fifth Column: Nigel Roebuck
- 15** In the paddock: Tom Errington

AUTOSPORT INTERNATIONAL PREVIEW

- 26** Show introduction
- 28** Preview contents and show info
- 30** Why the WRC will be mega in 2018
- 34** British Touring Car Championship hits 60
- 36** University of Bolton in motorsport
- 38** All the exhibitors at the show
- 40** How to find the key attractions

FEATURE

42 Farewell Felipe Massa

RACE CENTRE

48 Dakar Rally interim report

CLUB AUTOSPORT

- 61** British Formula 3 retains title for 2018
- 62** Foster and Martin commit to FF1600
- 65** Thruxton to celebrate 50 years
- 66** How Porsche picked its UK junior

FINISHING STRAIGHT

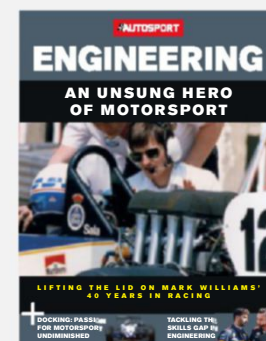
- 70** What's on this week
- 72** From the archive: 1970 British GP
- 74** Introducing: Jari Huttunen

AUTOSPORT SUBSCRIPTION OFFER

64 January savings offer

FREE INSIDE

ENGINEERING SUPPLEMENT



Mark Williams and Alan Docking open up in this issue, which also takes a look at the work of Al Kamel and the Year of Engineering.



Alonso slides into the Ligier, while Nasr (inset) set the quickest time

DAYTONA 24 HOURS

Don't expect Indy-style

THERE'S ONE VERY SIGNIFICANT difference between Fernando Alonso's latest jaunt off the Formula 1 piste in this month's Daytona 24 Hours and his famous assault on last year's Indianapolis 500. Beyond, of course, the Daytona 'roval' featuring right turns as well as left.

Neither Alonso, nor anyone following the pre-Daytona 24 Hours test — dubbed 'The Roar Before the Rolex 24' — that took place last weekend, expects the Ligier-Gibson JSP217 he's driving to be as competitive as his Andretti Autosport-run IndyCar. After all, the Andretti team was the quickest around Indy last May.

But regardless of whether the United Autosports Ligier he shares with McLaren protege Lando Norris and Asian Le Mans Series LMP3 champion Phil Hanson can emerge as a serious threat for victory on pace, or must rely on trying to 'stealth' its way to the front, Alonso's contribution will be one of the big stories of the race.

The bare facts of his outing in the Roar are as follows. During the three days of running, split into seven sessions and including a nebulous, but entertaining, 'qualifying' to decide pitbox and garage order for the 24 Hours, he completed a grand total of 64 laps of the 3.56-mile track. Alonso admitted he was a little surprised by how little track time he logged, which reflects more the schedule of the test than how the

team used the available time. He did run in the 15-minute 'qualifying' session on Saturday afternoon, posting the 12th fastest time. But this was 1.709s off the pacesetter Cadillac DPi of old F1 sparring partner Felipe Nasr.

Outright pace is only part of the picture, albeit a bigger part of the endurance-racing equation than it once was. And Alonso's single-lap pace is a given. "With drivers like Fernando and Lando, in terms of pure speed we know where they are," says Gautier Bouteiller, race engineer of the #23 Ligier. "But single-lap performance doesn't really matter to me. What I want is consistency over the stint, no mistakes, respecting the procedures, working on the fuel economy."

Consistency is dependent on traffic management, and that's the great unknown for Alonso heading into the Daytona 24 Hours. After logging 13 laps during the sole night session on Saturday night, Alonso reported no problems given the significant illumination at Daytona, which has none of the dark spots of, say, Le Mans. So that box is ticked. Traffic is still a work in progress.

"Traffic is clearly new to him and it's really important in the US," says Bouteiller. "Most of the time, if you are able to stay on the lead lap and fight at the final restart, that's where you can make the difference being strong through the traffic. We had planned a longer run for each



Nasr leads the field in Cadillac

THE FOUR CADILLAC DPis SET A SEARING pace in the Daytona test, with former Sauber Formula 1 driver Felipe Nasr recording the fastest time over the three days of running.

Nasr, who shares the #31 Action Express Cadillac with Mike Conway, Eric Curran and Stuart Middleton, set the time in what was dubbed a 'qualifying' session, albeit setting the order of pitboxes and garages rather than the grid for the race on January 27-28.

Tristan Vautier (Spirit of Daytona), Filipe Albuquerque (Action Express) and Renger van der Zande (Wayne Taylor Racing) completed the Cadillac top-four lockout. The gap from Nasr to the leading non-Cadillac, the new Penske Acura ARX-05 of Dane Cameron, was 1.182 seconds.

The Cadillac was switched from a 6.2-litre V8 to a 5.5-litre version of the engine, with the Balance of Performance initially adding 10kg to the weight of the car, but increasing the size of the air restrictor to 1.8mm.

With teams using rival machinery keen to see the Cadillac pegged back, Nasr insisted that the rest have been holding back.

"I wouldn't say an advantage," Nasr told Autosport. "We are doing what we can do now, the maximum, and I don't think other teams are doing it. They can show more than what they have – 100%. I drive behind them on track, and I see what they can do."

The gap to the leading Nissan DPi, the Extreme Speed Motorsports car of Pipo Derani, was 1.439s. The fastest LMP2 car was the Jota ORECA of Alex Brundle, 1.468s down.

With the Balance of Performance for the LMP2 cars locked, any changes between now and the race would be applied to DPi cars on a manufacturer-by-manufacturer basis.

EDD STRAW

TOP TIMES			
POS	DRIVER	CAR	TIME
1	Nasr	Cadillac	1m35.806s
2	Vautier	Cadillac	1m36.037s
3	Albuquerque	Cadillac	1m36.135s
4	van der Zande	Cadillac	1m36.481s
5	Cameron	Acura	1m36.988s
6	R Taylor	Acura	1m37.231s
7	Derani	Nissan	1m37.245s
8	Tincknell	Mazda	1m37.263s
9	Brundle	ORECA	1m37.274s
10	Braun	ORECA	1m37.303s
GTLM			
1	Hand	Ford	1m43.610s
2	Gavin	Corvette	1m43.640s
3	Briscoe	Ford	1m43.714s
4	Bamber	Porsche	1m43.888s
5	Garcia	Corvette	1m43.998s
6	PierGuidi	Ferrari	1m44.037s

Daytona from Alonso

of them [on Sunday morning], but Fernando's run was cut by three red flags, so that's bad luck.

"But when going for a longer run the focus was to identify the places where it's possible to overtake the GTDs and GTLM cars, try different places – 'here I can overtake and it's easy; here I can do it but it's a bit risky so do it less in the early part of the race'. They learned quite a lot while setting a good lap without traffic."

Alonso certainly acquitted himself well

and, while he did use the word 'afraid' of his initial approach to lapping the slower cars, any trepidation was swiftly eliminated. And this was not really fear – what he really means is respect for the challenge.

Performance-wise, that Alonso will be strong is a given. Even among high-calibre endurance specialists, he will be able to hold his own and the main question is how he responds to the cut-and-thrust in traffic when it really matters.

But what will play a far bigger part in his Daytona result is the competitiveness of the car. And that's where things become more difficult, as the man himself admitted after the test.

The Ligier JSP217 was introduced last year and it's not well suited to Daytona, which

comprises two long blasts along the 31-degree banking, one infield section and a brisk chicane on the backstretch.

There's nothing United can do about the fundamental characteristics of the car, but there was some hope. Ligier has played its 'joker', allowing it to introduce an upgrade package. Most significant is the revised front end, which offers more downforce, and the car overall is supposedly more aero efficient. As well as

getting its three Daytona virgins up to speed, United also had to work on that and try to understand the Continental tyres used in IMSA.

United ended the test in relatively good spirits having taken a few, understandable, wrong turns over the three

days while working to get on top of the car.

The team, and Alonso, will put in all the work required to get the most out of the car come the race itself, but there's still one imponderable. This is sportscar racing, of course, so Balance of Performance comes into play. The speed of the pacesetter Cadillac DPis may prove too strong for IMSA not to pull them back, which could also change things.

EDD STRAW

"The Ligier JSP217 is not well suited to Daytona"

OPINION

WHEN HIGHER TECH MEANS LOWER COSTS

Unintended consequences are usually negative, the result of somebody not thinking something through properly. Formula E's move to a new car was always intended to send a positive message. The idea was that starting with a 45-minute race that contained the much-maligned car swaps would give the series a big, fat example of how technological progress had been made when it could switch to single-car races.

That time is almost upon the electric racing category – the new car that comes in for 2018-19 will go the full distance, have more power and be quicker than ever. So, the unintended consequence... it's got to be cost, right? Bingo.

But here's the thing. Costs are going to be lower than before. And teams will actually own the cars for the first time instead of leasing them.

It has been determined that the total cost of a ready-to-race FE car will not exceed €817,300, with powertrains capped at €250,000. The new-for-2018-19 halo device will cost €12,700, while the spec McLaren battery and Spark-built chassis are priced at €200,000 and €299,600 respectively.

While the cost of a powertrain rises by €100,000 on its own, there's a total saving overall because teams will need to use half the number of powertrains as before – the same goes for the batteries and chassis. A total car for 2017-18 was marked up as €480,000, and though this makes the new one €337,300 more expensive on its own, teams will save almost €300,000 overall by buying two of them instead of four.

Individually costs have increased, but the fact that teams will save money overall is a very nice, albeit accidental, win. Especially as FE faces a lot of scrutiny for its cost control in the midst of mass manufacturer participation.

SCOTT MITCHELL

Giovinazzi will test for DS Virgin in Marrakech



FORMULAE

Giovinazzi heads FE testing influx

FERRARI FORMULA 1 PROTEGE Antonio Giovinazzi will take part in next week's Formula E rookie test in Marrakech as the star name among an excellent 20-driver field.

The Italian made his F1 race debut in 2017 as replacement for the injured Pascal Wehrlein at Sauber, and was a contender for a full-time seat this season before Sauber opted for his fellow Ferrari junior Charles Leclerc and team regular Marcus Ericsson instead.

Giovinazzi, who has settled for a third-driver role in F1, will now make an appearance in the January 14 post-race FE rookie test in Morocco, and will pilot DS Virgin's DSV-o3 car. It comes against the backdrop of Ferrari president Sergio Marchionne evaluating a foray into the all-electric racing category with his Fiat Chrysler Automobiles company's Maserati brand, and is aided by Ferrari and DS Virgin sharing a major sponsor in tech company Kaspersky.

Giovinazzi will be joined at DS Virgin by BMW racer Joel Eriksson. The Swedish driver battled McLaren F1 prodigy Lando Norris for the Formula 3 European Championship crown last year, winning seven races on his way to second in the points, and will step up to the DTM in 2018. He has already undertaken simulator work at DS Performance's headquarters in France, where marque director Xavier Mestelan Pinon said he "impressed with his work rate and how quickly he got up to speed".

Aside from Giovinazzi's surprise test shot, Jaguar's announcement that it would field Paul di Resta – alongside

Pietro Fittipaldi as had been rumoured – is also a left-field choice. Di Resta has been pushing for a Williams F1 seat for 2018. The Jaguar team is assisted by Williams Advanced Engineering.

Other drivers confirmed in the past week are Mercedes DTM driver Gary Paffett, who has stated he would "absolutely" consider following the manufacturer to Formula E when it quits the German series at the end of 2018, at Venturi, while Formula 2 ace Alex Albon will slot in alongside Japanese F3 champion Mitsunori Takaboshi at Renault e.dams. NIO has announced Mazda IMSA SportsCar and Ford WEC driver Harry Tincknell and, another surprise choice, former Rebellion LMP1 privateer driver Alexandre Imperatori.

Jani out, Lopez in at DS Virgin

As well as the 20 test drivers, two race drivers will be getting used to new surroundings in Marrakech. Tom Blomqvist will make his FE race debut in place of Kamui Kobayashi at Andretti Autosport, but the main change is Neel Jani exiting Dragon Racing after just one terrible weekend. Jani blamed it on "changes that were unforeseen", which Autosport understands links back to a pre-season problem. After signing Jani, Dragon explored a possible arrangement to embed Porsche engineers amid an encouraging testing programme, but the team decided against any tie-up. In comes Jose Maria Lopez, who was ousted by DS Virgin Racing in the summer, for the rest of the season.

SCOTT MITCHELL

BRITISH TOURING CAR CHAMPIONSHIP

WSR retains title-winning line-up for BTCC

A FLURRY OF DRIVER CONFIRMATIONS in the past few days has ramped up anticipation ahead of the forthcoming British Touring Car Championship season.

Top team WSR will keep an unchanged driver line-up in its BMW 125i M Sports, consisting of former champions Colin Turkington and Andrew Jordan together with Rob Collard.

Turkington (below) won four races last term and claimed the runner-up spot in the championship, and partnered with Collard under the Team BMW arm to help WSR take the BTCC constructors'-manufacturers' and teams' titles.

Independents Trophy runner-up Jack Goff is another driver staying put, in his case remaining with the Eurotech Racing Honda Civic Type R. It will be the first time that the 26-year-old, a two-time race winner, will be staying with the

same team for two consecutive seasons since joining the category in 2013. "The consistency should really help, as will getting the deal done early," said Goff.

The AmD Tuning squad has signed up returnee Ollie Jackson and rookie Sam Smelt to spearhead its attack in 2018 with its Audi S3 saloons. Jackson has targeted success in the Jack Sears Trophy, which will be run this season for entrants who have yet to score an outright podium. The 21-year-old Smelt, meanwhile, is in his second season of racing. He contested part-seasons in the Volkswagen Racing Cup and British Formula 4 Championship last year.

Over at Team Hard, former British GT champion and occasional BTCC racer Michael Caine has tied up a deal to complete the squad's four-car line-up of Volkswagen CCs. The

48-year-old will compete alongside Jake Hill, Bobby Thompson and Mike Bushell. Caine's last BTCC outings came with the same team in 2016, when he raced a Toyota Avensis.

Meanwhile, bosses of the BTC Norlin team, which ran two Chevrolet Cruzes in last year's campaign for Chris Smiley and Dave Newsham, have confirmed a switch to Team Dynamics-built Honda Civic Type Rs. Smiley will return, while Newsham has retired from the BTCC.

BTC Norlin co-owner Richard Irwin said: "The Honda Civic Type R has consistently been at the front of the BTCC grid with drivers such as Gordon Shedden and Matt Neal. Norlin will strive to challenge for the independent title in the coming seasons and the switch of bodysells was important to achieve this."

MATT JAMES



WORLD RALLY CHAMPIONSHIP

M-Sport adds third Fiesta to attack crown



M-SPORT FORD WORLD RALLY TEAM principal Malcolm Wilson is not giving up on the defence of his manufacturers' world title following the signing of Bryan Bouffier and another strong third driver to be announced at Autosport International this week.

"I'm determined to have three cars on every rally," Wilson told Autosport, "and if we do that then we have the chance to keep scoring points. We've got two very strong drivers in Seb [Ogier] and Elfyn [Evans] and both of them have proved consistent. The third driver is a safety net in terms of manufacturer points.

"When we were talking to Bryan, the two events you'd want him for are Monte and Corsica. Don't forget, he almost won this rally with us in 2014 [left, when he finished second to Ogier] and, like I said to him, if he doesn't know those roads now, he never will! He's got a day of testing and I honestly believe his experience and ability on those stages will really help us.

"Away from those events, we've got another driver lined up for eight or possibly more rallies and he's somebody we would be confident of being in a position to score points for us. Don't get me wrong, it's not going to be like last year, but we're in there and we're fighting and that's what I want. We're absolutely not going to give up on this thing."

Bouffier will get his first taste of a latest-spec Fiesta WRC when he drives the M-Sport Ford test car on January 17.

Bouffier is a former winner of the Monte (in 2011 as a round of the Intercontinental Rally Challenge), as well as Corsica when it qualified for the European Rally Championship. He has competed in the French Alps for the past eight years and in the Mediterranean island event for the past seven.

Autosport understands the other third driver is Finland's Teemu Suninen, who starred on last year's Rally Poland and Rally Finland in a 2017 Ford Fiesta WRC.

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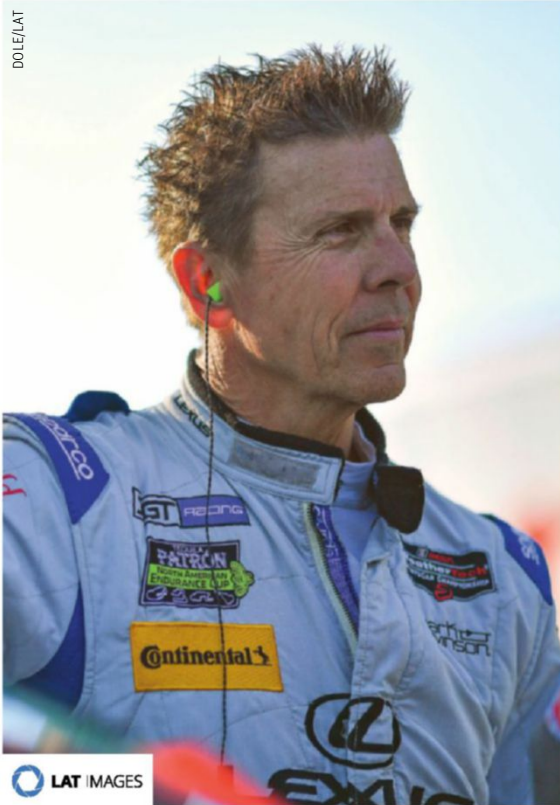


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IMSA SPORTSCAR

Pruett to hang up helmet after five-decade career



SCOTT PRUETT, WHO SHARES THE RECORD FOR Daytona 24 Hours victories with Hurley Haywood at five, will retire after this month's 2018 running of the race, bringing to an end one of the longest and most diverse careers in American racing history.

The 57-year-old Californian started racing in karts at the age of eight and went on to win multiple titles in sportscars. He also enjoyed a successful Indycar career, making his CART World Series debut in a Dick Simon Racing Lola at Long Beach in 1988 and sharing the Indianapolis 500 rookie of the year accolade during his first full season with a TrueSports Lola in '89.

Pruett missed the 1990 season after breaking his back in a heavy crash after a brake failure while testing at West Palm Beach, but returned to win two Indycar races with Patrick Racing (in '95 and '97), taking a best championship finish of sixth ('98), before moving to NASCAR in 2000.

"If you're fortunate enough to have a long and successful career, and lucky enough to come to the end on your own terms, then you are truly blessed," said Pruett. "I did Indycars for 10 years and had my NASCAR stint, but long after I'm gone people will remember me for sportscars, and that's where my heart is as well.

Pruett won the Trans-Am Series three times (in Mercury, Chevrolet and Jaguar) and two IMSA GTO (Ford/Mercury) class titles. But his Daytona wins in 1994, 2007, '08, '11 and '13 stand out on a CV that also features victory at Sebring in '14 and in the GTS class on his sole Le Mans 24 Hours outing for Corvette Racing in '01.

EDD STRAW

INDYCAR

KING HEADS TO STATES TO RACE IN INDYCAR

GP2 RACE WINNER JORDAN King has switched to the IndyCar Series, where he will compete for Ed Carpenter Racing this season.

The 23-year-old Briton, a former Manor Formula 1 free practice driver, will contest all the road and street-course races, with team boss Carpenter taking over for his speciality oval tracks.

Following his disappointing Formula 2 campaign last year, King had to be "reassured" over the move from his former GP2 team-mate, 2016 Indy 500 winner Alexander Rossi.

"I suppose it was more reassurance," said King (below). "There's always a bit of scepticism changing paths. I kind of trust him and believe what he's saying, so I spoke to him quite a bit. From everything down to the car, how did it drive, what does it feel like, all the way through to what's it like living in the US."

King is now targeting a full-time IndyCar career and is likely to perform oval testing with ECR in the meantime.

Another ex-GP2/F2 driver, Rene Binder, will also be on the IndyCar grid after securing a four-race deal with Juncos Racing. The Austrian, fourth in Formula V8 3.5 last year, will make his debut in the series opener at St Petersburg, and will race at Barber Motorsports Park, Toronto and Mid-Ohio.

Juncos already has Indy Lights champion Kyle Kaiser on board for four races. The team is aiming for a full season and Binder is hopeful of extending his programme.

TOM ERRINGTON



WORLD ENDURANCE CHAMPIONSHIP

Brit team TF Sport joins WEC field

BRITISH TEAM TF SPORT IS stepping up from the European Le Mans Series to the World Endurance Championship for the 2018-19 superseason, and will run an Aston Martin Vantage in the GTE-Am class.

British professional Euan Hankey and Turkish gentleman driver Salih Yoluc, who finished second in the ELMS GTE class last season, will be joined in the car by reigning Carrera Cup GB champion Charlie Eastwood.

TF, the team of former BTCC racer Tom Ferrier, made its WEC debut in last year's Le Mans 24 Hours.

"This is by far our biggest ever programme and it underlines the strength of our team at every level," said Ferrier. "It's a really big challenge but we're confident we will be competitive and deliver results."

Hankey added: "We're under no illusions as to how hard the WEC will be as it's the top category in the GT

racing world. Saying that, we've got a great track record, and a mega team, so there's no reason why we can't show what we can do."

Eastwood said: "It's a bit of a change but I'm looking forward to it. I've never done a pitstop, never done a driver change, and I've never raced a car more for more than one hour, so there's going to be a lot of new experiences and it'll be a challenge."

ROBERT LADBROOK & STEPHEN LICKORISH

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FORMULA 1

Nurburgring plots GP return

THE NURBURGRING IS IN DISCUSSIONS with Formula 1 bosses regarding a return to the calendar in 2019.

Ongoing financial challenges and a change of ownership have prevented the circuit from hosting F1 grands prix since 2013. But when Mirco Markfort took over as chief executive officer in March 2016, the venue began formulating a plan to entice F1 back.

Liberty Media is keen to retain European heartland races on the calendar, with the French Grand Prix returning this year for the first time since 2008. The German Grand Prix is also back after a one-year hiatus, with Hockenheim playing host.

Markfort is keen for F1 to return to the Nurburgring, which previously alternated with Hockenheim in holding the German GP. He is believed to have met with F1 chief Chase Carey at the season-ending Abu Dhabi GP to discuss

the possibility and talks have since continued.

"We really would appreciate to have Formula 1 back at the Nurburgring in 2019," Markfort told Autosport. "This will only be possible if we take meaningful economic surrounding conditions into consideration. We are able to confirm that there have been conversations with the owner of Formula 1, Liberty Media."

The Nurburgring first hosted the German GP in 1927. It lost its place on the calendar following Niki Lauda's fiery accident on the infamous Nordschleife in '76, but returned with a new Grand Prix circuit in '84.

It faces stiff competition to secure a place on the calendar. It is believed that Liberty's priority is to secure another race in the United States, with Las Vegas, New York or Miami its preferred options.

LAWRENCE BARRETTO



WTCC Peugeot Sport has developed the 308TCR for the World Touring Car Cup and national/regional TCR competition. A development of the 308 Racing Cup one-make racer, which has also been used in TCR, it features bodywork updates and a bespoke six-speed sequential gearbox. Delivery to customers has been slated for April, with the car costing €109,000. WTCC team Sebastian Loeb Racing and TCR squad DG Sport have used 308 Racing Cup machinery in the past in European Touring Car Cup and TCR respectively.

IN THE HEADLINES

LATIFI TAKES FORCE INDIA RESERVE ROLE

Force India has recruited Formula 2 race winner Nicholas Latifi as its new reserve and test driver for the 2018 Formula 1 season. The Canadian, a former Renault test driver who was fifth in last year's F2 rankings, will take part in "a number of Friday practice sessions". Latifi is expected to remain with DAMS in F2 in 2018. Force India deputy team principal Bob Fernley said late last year that Mercedes junior George Russell was in the frame for the reserve role, but that it wanted to make sure he was available "longer term".

PALOU GETS HITECH F3 SEAT...

Formula V8 3.5 and Japanese Formula 3 race winner Alex Palou will contest the F3 European Championship this season with Hitech GP. The Catalan was reportedly highly impressive in tests for the Silverstone-based team in Spain and Portugal in the build-up to Christmas.

...WHILE ARON RETURNS TO PREMA

Macau Grand Prix podium finisher Ralf Aron will remain in the F3 European Championship for a third season. The Estonian has returned to Prema Powerteam – with which he won a race in his rookie F3 season in 2016 – after a year at Hitech. Motopark, meanwhile, retains Marino Sato for his second season in the series.

FORMULA E GETS TITLE SPONSOR

Formula E has unveiled a multi-year title sponsor, which it claims is the first for an FIA single-seater category. FE has partnered with technology company ABB, which specialises in electrical engineering, robotics and the manufacture of high-performance products and systems. The electric racing series will be officially known as the ABB FIA Formula E Championship.

MATTON TO LEAVE CITROEN FOR FIA

Citroen team principal Yves Matton is expected to depart the French manufacturer and take over as the FIA's rally director at the end of this month, according to sources. Matton, who is expected to join for the second round of the World Rally Championship in Sweden, would take over from the retiring Jarmo Mahonen. It is understood that Peugeot Sport boss Bruno Famin is most likely to replace Matton at Citroen once the Dakar Rally finishes.

F4 STAR PIASTRI MOVES UP TO RENAULT

British Formula 4 Championship runner-up Oscar Piastri will graduate to the Formula Renault Eurocup this season. The 16-year-old Australian remains with the Arden International team, with which he competed in F4 in what was his rookie season of car racing.

NICK SYRETT: 1933-2017

A driving force in the development of Brands Hatch and the circuit-based British Racing & Sports Car Club, Nick Syrett passed away on Boxing Day. He was 84. Syrett joined the BRSCC in 1957 from the RAC, where he had organised customs carnets for British drivers racing overseas. Alongside Brands svengali John Webb, he was instrumental in the introduction of Formula Ford, Formula 5000 and Clubmans. Known as 'The Guv'nor', he was the clerk of the course who famously black-flagged Pedro Rodriguez in the 1970 BOAC 1000. Syrett became president of the Grand Prix Drivers' Association in 1972. Post-motorsport, he ran a restaurant before becoming manager of the Winchester House gentlemen's club in Putney until 2017, and continued to umpire cricket matches.

NIGEL ROEBUCK

Compound interest

Pirelli's additional tyre options for 2018 are intended to increase the number of pitstops. Formula 1's problems run rather deeper than that

[@autosport](#)

FOR 2018 PIRELLI IS EXTENDING ITS RANGE OF DRY compounds from five to seven, and the hope, as Christian Horner said last week, is that this will enable the company to pick the right range of tyres for each grand prix. This, he added, should provide exciting races, with at least two stops, and sometimes maybe three: "I think that going softer into the range can only create better racing and fewer one-stop races, which are the worst scenario."

Well, we'll see. Horner speaks of 'better racing', but while more stops may indeed lead to more order changes, that's not the same thing as cars passing each other on the track. It will be remembered that refuelling was reintroduced for no reason other than to disguise the lack of overtaking, but if that, happily, was done away with, tyre stops remain.

Having grown up in racing at a time when planned pitstops were not the norm, I've always been equivocal about them. They may provide entertainment for the TV audience, and for spectators who have sight of the pitlane, but for those watching elsewhere on the circuit they serve only to confuse.

Back in 2005, you may remember, Max Mosley's FIA suddenly decreed that tyre changes were banned, and if the motive for that decision was unclear, undeniably it had its up side. Michelin and Bridgestone duly built tyres capable

of running 200 miles, but driver discipline also had a role to play – if you hammered your tyres in the early part of a race, you were in trouble in the latter stages. One consequence of this was that – unbelievably – in the late laps there was overtaking at Monaco!

Personally, I thought the 'no tyre changes' idea worked well, but Michelin – apart from the major glitch at Indianapolis, where all its teams had to withdraw, following failures in practice – did a much better job than Bridgestone, whose leading team, Ferrari, was suddenly nowhere after years of domination. That being so, no-one was too surprised when, after a single season, the rule was revoked, and for 2006 tyre changes – together with Ferrari competitiveness – returned.

It was around this time that Bernie Ecclestone murmured to me that tyre wars – traditionally an intrinsic feature of grand prix racing – had to go: "I want to see a 'one manufacturer' rule – and I think if we don't do it, we're going to be in plenty of trouble."

The need for this, Ecclestone argued, was based on cost. Testing, other than pre-season, is effectively banned nowadays, but back then was a non-stop activity, much of it devoted to tyres. "We've got to reduce the necessity for so much testing," said Bernie. "Most of the teams test constantly, and that takes a big chunk out of their

"The current front wing is one of many things I find farcical about F1"



Brundle: "The teams just don't get it"



Another front wing, another 200 grand...



2005 tyre rules
made overtaking
possible at Monaco

 LAT IMAGES

COATES/LAT

budgets. I don't think it's sustainable."

In the Formula 1 of those 'pre-credit crunch' days, the financial brakes were indeed off. Major sponsors abounded, and there were no limits on the number of engines, gearboxes, whatever, a driver could use in a season. Much changed as a consequence of the financial meltdown in 2008, but such as Mercedes and Ferrari have long been back to 'bottomless pit' spending, much of it these days going on things like making three engines last for 21 races. An unfathomable amount, too, is given over to constant 'aero' development, not least to the huge, unsightly, front wings.

For the last 10 years or so, Martin Brundle and I have met for lunch to talk over the events of the season just past, and if most of several hours is given over to drivers and teams – the subject of a story to appear shortly in Autosport – we also fall inevitably to discussing 'the state of the nation' in Formula 1.

"In 2017," Brundle said, "aero was increased, together with tyre sizes, and – except at some circuits, like Monza, where increased drag was a big factor – we ended up 2.45 seconds a lap faster than before: all that money spent – and half as many overtakes! The rulemakers got it wrong, and they continue to get it wrong.

"Look at Force India. Very well run, a great little car, excellent drivers, the best engine – although probably not up to Mercedes 'full works' spec – and in Abu Dhabi they

finished more than 90 seconds behind! This is the top of the second tier of teams, and it tells me everything that's wrong with Formula 1: if you haven't got around 1000 people working on two cars, you're nowhere, so Force India will never close that gap – they don't have the resources to come up with a new 102-piece front wing every other race, or whatever..."

The current front wing, I said, is one of many things I find farcical about contemporary Formula 1. As a technical director said to me recently, "Every time some clown cannons into somebody at the first corner, and loses his front wing, that's more than 200 grand..."

"Yes," said Martin. "Crazy, isn't it? In Baku they had to red-flag the race to pick up all the pieces that had come off the cars! The front wing's ridiculously expensive – and the way it is they can't even put any sponsorship logos on it."

As well as that, I ventured, nor does it do anything for the show.

"Actually," Brundle said, "if you think about it, unfortunately it *does* do something for the show – it makes it worse! It scatters the pack – and they can't follow each other.

"What I find amazing, though, is that when you talk to the teams about it, they just don't get it – I say, 'Guys, *why* are you spending millions on these bloody things?', and they don't agree with you! It's utter stupidity, and, looking ahead, I think the changes for 2021 are totally critical to the future of F1: at the moment the product is *very* seriously flawed..." ❧

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Identity crisis

NASCAR knows it has to create a new generation of stars to replace the old guard, but that alone won't fix its decline in popularity

By Tom Errington, Special Correspondent

[@tomgerrington](#)

DALE EARNHARDT JR HAS BEEN MODERN NASCAR'S most popular driver; he's won the accolade 15 times. Now that he's retired, along with veteran Matt Kenseth, and Danica Patrick's exit is looming, 2018 is a critical period for NASCAR.

And it's not been lost on the paddock. Last year, when NASCAR had a breakout champion in Martin Truex Jr, who dominated in a fashion rarely seen in one of motorsport's closest-fought series, CEO Brian France and president Brent Dewar faced questions in a press conference at the Homestead finale centred on NASCAR's future.

The big cause for concern? TV figures are in steep decline. The 2017 finale was down 20% on ratings from '16, after 4.6 million people tuned in. Even more concerning, it was down 36% from the '15 figures.

"There are things out of our control – how millennials and other fans of ours are consuming not only our sport but all the sports," said France.

NASCAR also argues that TV figures are misleading, but comparison weakens that argument. IndyCar's figures were up 16% on the previous year – a total of 474,000 – while NBC's Formula 1 coverage also grew by the same figure to reach 579,000. It's tiny compared to NASCAR, but stock car racing's slump cannot be good at a time when two star names are departing.

Earnhardt's relatable character brought fans to the series. As if that wasn't a big enough hit alone, Patrick will also retire after planned swansongs at the Daytona 500 and the Indianapolis 500. Disregard the sexist social-media vitriol she attracts: Patrick is marketing gold for NASCAR. Her first Daytona 500 coincided with a 24% ratings increase. But Patrick wanted to stay in NASCAR – it was her 2017 blighted by sponsorship issues that forced an exit.

As 2012 Cup champion Brad Keselowski says: "We can sugarcoat it all we want but you're not going to replace Dale Jr, you're not going to replace Danica Patrick."

Monster is also dithering over extending its title sponsorship and evaluating its backing of Stewart-Haas Racing. It all looks bleak, but there's a chance for NASCAR to reinvent itself, and it already has in the driver market.

Earnhardt will be replaced by Xfinity Series race winner Alex Bowman, team-mate to Xfinity champion William Byron at Hendrick Motorsports. Kenseth's ride has been taken by Erik Jones, and Ryan Blaney graduates to an expanded Team Penske.

Four-time Cup champion Jeff Gordon believes that influx could be important: "I think there's the opportunity that gives them the chance to show their personality and take that into the future. That's exciting and how it got me my chance and some of the others before me.

"People are willing to take a chance on younger drivers. Veterans are moving on and opening the door for the others. I love seeing team owners take the risk. If they didn't risk that on me, I wouldn't have got my first ride."

Gordon's start in NASCAR was a gamechanger back in 1993. His early success was a lightbulb moment for NASCAR, opening the door to further young talent to get their chance in a golden period.

Gordon is calling for a '1990s refresh', and NASCAR is giving young drivers that chance by loosening the reins and letting drivers express themselves. "I think it's [personality] that makes the drivers relatable," Blaney says. "That's what Dale did. I know at times NASCAR's been strict on people speaking their minds, but I feel like the last year or two they've let us

do that a little bit more and it's been beneficial."

Blaney has made the most of it, spreading awareness of NASCAR outside of the series with his own podcast – named 'Glass Case of Emotion' after a quote from the

film *Anchorman*: "I want to be able to get on there and not talk about racing. It's nice to go on there and talk about random things. You can get them [the drivers] just being themselves. I wanted to show people that we can be fun and normal."

NASCAR encouraged Blaney, with the wide-ranging topics attracting young listeners outside of the series' usual fanbase. The series has talked openly about its desire to create new stars from the batch of young drivers.

This can't solve all its issues: track attendance remains as concerning as TV. From the latest figures (2016), there was a 7.4% drop in track revenue, blamed on Gordon's retirement and Earnhardt missing races after suffering a concussion.

NASCAR's prosperity goes hand in hand with the stars, but the series would also make life easier for itself if it didn't persist with a largely illogical 38-race calendar at a time when fans struggle to justify the expense of one.

"Attendance is up at many, many events," claims France. Sparse grandstands would suggest otherwise. It's time NASCAR showed the same focus it has on track to its wider issues. 🏆

"Blaney has spread awareness of NASCAR with his own podcast"

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...EVER

Michael Schumacher claimed his seventh and final world championship in the Ferrari F2004, which set lap times that are still yet to be beaten at many grand prix venues

By Adam Cooper, Special Contributor

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Brawn, Schumacher
and Todt made
Ferrari's 'dream team'

W

as the F2004 the greatest-ever Ferrari Formula 1 car? It's a big claim to make, but there's certainly a good case for it, and not just because it took Michael Schumacher to his seventh and last world championship title.

The numbers are impressive. Between them, Schumacher and his team-mate Rubens Barrichello won 15 grands prix from 18 starts, and for 10 years the car shared the record of most victories in a season with the 1988 McLaren MP4/4 and Ferrari's own F2002. More recently, Mercedes has moved the goalposts, with 19 wins in 2016, and 16 in both '14 and '15. But Schumacher's strike rate of 13 individual successes remains a record, albeit one matched by his friend and countryman Sebastian Vettel in '13.

Above all, the F2004 was one of the quickest F1 race cars we've ever seen. It had a good but not spectacular record in qualifying, with 12 poles in 18 events, but Schumacher's 10 fastest laps in one season has been equalled only by Kimi Raikkonen, in 2005 and '08. Barrichello added four more fastest laps to bring the F2004's overall tally to 14.

Subsequent rule changes designed to cut speeds, and the end of sprints between refuelling stops, meant that many of those lap records stood for years. And despite the dramatically increased speeds we saw in 2017, seven lap-time benchmarks set by the F2004 survive at venues still in use.

"It was a great car," recalls Ross Brawn, then Ferrari's technical director. "It was a dream to set up; it was never a difficult car. It wasn't a diva. So I have very fond memories of that one."

"The car was so dominant, everything happened early that year. We won the constructors' title in Hungary [with five races to go]. In my new role in F1 it would be disastrous if somebody won the championship that early! But that's what we did."

All involved agree that the F2004 was the ultimate manifestation of the 'dream team' put together by Jean Todt in the years after the Frenchman's arrival at an underperforming Ferrari in the summer of 1993. The hiring of Schumacher for the '96 season and subsequent additions of Brawn, and Rory Byrne as chief designer, were the key pieces of the puzzle, but they were just the highest-profile members of what was by the early 2000s an extraordinarily effective organisation.

"I think by then our whole system was really humming," says Brawn. "The whole team, the whole company, we'd gained the confidence in the previous years. It's a hard thing to describe sometimes, but when a team, particularly a technical team, is working well, it has a harmony where you can almost finish each other's sentences in the way you do things."

"Everyone who was working on that car knew what they had to do, what they had to improve, what aspects they needed to focus on. It was just a culmination of everything that we were building at Ferrari that came together that year." »



Ross Brawn and Rory
Byrne had built a new
technical structure



Rubens Barrichello
took four fastest laps as
Schumacher's number two

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'Conservative' 2003 car had been good enough for the title – but only just

"James Allison was the trackside aero man at the time," says head of test engineering Rob Smedley. "To have somebody of his talent doing trackside aero I think probably shows the level and depth of talent within that group. Consider where all those guys have all ended up. It was just a great honour to work there, and we were all really lucky that it culminated so perfectly."

"There was an amazing atmosphere in the team," adds designer Aldo Costa, who compares that era with his recent experiences at Mercedes. "The feeling is the same, the atmosphere is the same. You have the same kind of respect for each other, and you've got that kind of feeling that you are a real team. People are pushing for the development, there are no politics, no hard questions between people, it's very smooth and very calm. Enough pressure to be really motivated, but not nasty pressure to be depressed. It was a very nice time that reminds me of the time that we are living in this moment at Mercedes."

That spirit of cooperation was reflected in the way the team reacted to a challenging 2003 season. That year Schumacher beat McLaren's Raikkonen by 93 points to 91, while in the constructors' table it was Ferrari 158, Williams 144, and McLaren 142 – a little too close for comfort.

"In 2003 and especially in the mid-season we were struggling a bit," recalls chief race engineer Luca Badoer. "We were suffering less with Rubens. He was more connected with the car, and Michael could not exploit it as well."

"I think the best chance I had to win the championship in the Ferrari camp was '03," says Barrichello. "Because that car suited me a little bit better. It was a tricky car to set up, but that was the only car that I could say was almost more to my side than Michael. I had those magic wins in Silverstone and Suzuka, and I was so much on a high going into 2004."

"With Ferrari the great thing was that we had meetings where we said 'What do we want from the car?' And those meetings were translated really well to the next year"

Brawn's conclusion was that the team had been a little too conservative with the F2003-GA, complacent even, and thus no effort would be spared in the development of the 2004 model.

"I wouldn't really want to give away every single secret about the car," says Smedley. "But it was probably the first car really designed around modern-era F1 engineering, where we used new wind-tunnel techniques, or we looked at certain areas of the corner where we wanted to exploit the car."

"We concentrated a lot on the mechanical installation, we concentrated a lot on getting the centre of gravity down, all of the bread-and-butter things, and just really tidying it up."

"Rory was absolutely amazing at that time. He was a big-picture man, and I learned such a lot from him. He was relentless with people, at exploiting every tiny bit of it, and understanding where the important bits were, and where you could perhaps back off a bit. >>



Ferrari unveiled the car at Maranello on January 26 2004



The F2004 impressed immediately in testing at Fiorano and Imola

"Aldo was the foil to Rory's relentless performance quest. If Rory was the big-picture man, Aldo was exactly what he is now at Mercedes, which was super-detailed. He was a huge architect of that car, making sure that we got all of these huge performance benefits, but the car was reliable as well. That was a key to why that car was so good."

"In 2004 I was promoted to head of design and development, and Rory became design director," says Costa. "Nothing really changed between me and him, but I had a wider input on R&D and the development of the car, and on stress analysis, and the whole design activity of the car itself."

"There was a special effort in 2004 to understand more about tyre behaviour, and using the suspension and the set-up to take the best possible performance from the tyres. With strong aerodynamic development, and the mechanical development, it came out a great car."

By now Ferrari had established a special relationship with its tyre supplier – all the other major teams had gone to Michelin, and as a consequence Bridgestone could focus its efforts on Maranello. Ferrari exploited that advantage to the full.

"Sometimes it's difficult to deal with the Japanese mentality," says Costa. "So we made a very special effort in the tyre-management area, in the vehicle-dynamics area, to stay very, very close to Bridgestone. We tried to bring them into a better relationship, to try to develop together, and get them to react more quickly, designing tyres in the direction more of what we wanted for the car handling."

The F2004's potential was evident from the start. Following an encouraging run at Fiorano it was taken to Imola, a more representative venue. It was so much faster than had been predicted that the engineers were left shell-shocked.

"I remember at the first shakedown we were doing lap times that didn't match our simulations," says Baldisserrri. "In those times they were not so sophisticated simulations. But considering the ambient temperature, we were completely off, but in a good way! Everybody was saying we had to check that everything was OK, and that we were on the weight limit."

By the time the package for the opening race in Melbourne was added for a later Imola test, where rival teams were present, the car's pace was clear for all to see.

"It was mega," Smedley recalls. "We had the 2003 car, and then Michael jumped into the F2004. He got out of the car and he had this massive smile, and he said, 'I'm telling you it's real'. And we were saying it can't be, we know what the aero numbers are, we know what the engine is, there's absolutely no way."

"Afterwards we spent about 12 hours with 10 of us poring through every element of the data. We were wondering what the hell we'd done wrong, because there was clearly something wrong – had we put different tyres on it? Was the ballast not in it? We did so many checks."

"We designed this test for the next day where we would be able to outfox ourselves and find out what we'd done wrong, and hopefully confirm that it was only the half-a-second quicker than the 2003 car that we thought it was."

"And we couldn't find it. It was two seconds a lap quicker. But it wasn't just that. The biggest difference was that when we went out and did 15-lap runs, it went from being 1.5s quicker at the start of the stint to 2s quicker at the end of the stint. We were like, 'What are we going to do now? Why don't we have an easy winter and turn up in Australia with this thing?' But we didn't, we pushed on."

"They said we were trying to find a little bit more grip, so you guys can brake later," says Barrichello. "We took to the race track and the tank was full and the time was the best one we could ever set in Imola. It was that magic feeling in the air."

"At Imola on full tanks you're so much slower because of the uphill and downhill bits, braking so hard. We were asking, 'Is the timing actually working, is that correct?' I remember coming back to the pits and those guys laughing their asses off."

"It was the only time we went to Mugello for testing and I was able to go flat-out all through those three Arrabbiata corners. It was just magic."

In Australia Schumacher and Barrichello qualified on the front row and finished one-two. The German followed up this dominant display with wins in the Malaysian, Bahrain, San Marino and Spanish GPs. Only in Monaco was his winning run interrupted, when his race ended in a collision with Juan Pablo Montoya, and Renault's Jarno Trulli triumphed.

The writing was on the wall – for Barrichello as well as for Ferrari's rivals. Any thoughts that he'd harboured about challenging his team-mate were quickly forgotten.

"Rubens was doing a great job in terms of backing up Michael," says Brawn. "I think Rubens had rattled Michael at the end of the previous season, and started to pressure Michael, and he really thought he was going to have a good chance in 2004. But Michael seemed to take a deep breath, think about it, and he came out just in sensational form."

Monaco proved to be just a blip, as Schumacher went on to win the next seven races – at the time a record for consecutive successes in one season, only bettered by Vettel's nine in 2013.

"Michael was super, he was really strong, and he was a fantastic driver," says Costa. "Very good in the car, but as well very good out of the car, very close to the team, very patient – he was the most patient in terms of doing little tests, doing cockpit-fitting activity, doing everything really."

"For us he was a real reference point. Michael was in his top form, and also mentally he was so strong and so determined. It was very difficult for Rubens to keep up with him."

Barrichello had to be content with his late-season victories in Italy and China, both coming after Schumacher had secured >>

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Ferrari qualified and finished one-two at the opening round

TOP FERRARI WINNERS*

	CAR	WINS	POLES
1	F2004	15	12
2	F2002	15	11
3	500	14	13
4	F1-2000	10	10
5	F2001	10	13

Note: The 312T series scored 27 wins, from the 1975 312T to the 1979 312T4.

* World championship race wins





F2004'S GOLDEN SEASON

STARTS 18

WINS 15

PODIUMS 29

POLES 12

FASTEST LAPS 14

POINTS 262

LAPS LED 785 (70%)

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Come Hungary, Schumacher had the world title in the bag



Williams and McLaren had a troubled start to the 2004 season

the title in Belgium in August. He admits that it was tough to take being beaten so often.

"A million drivers outside F1 would probably want to be sat in a competitive car and be second on the grid," he says. "But since you are there and you qualify second to your team-mate it pisses you off the same way. It's just a funny feeling.

"That car was awesome, but it just suited Michael better. I won Monza, and China, which was the first race there. I was pretty good at getting to know things quickly, and I was better than Michael all weekend. But it was the end of the year."

The car's speed aside, Schumacher benefited from the reliability of both engine chief Paolo Martinelli's V10 and the rest of the package, helped by race technical manager Nigel Stepney's meticulous marshalling of the mechanics.

"It was absolutely unbelievable," reckons Costa. "Ferrari was the best in terms of car reliability. There was a lot of development on that side, processes, methodologies, the way we were testing things, it was developed to be superior to the other teams at that moment. Nigel built up a strong team of mechanics, again with very strict processes. This is what he did and the collaboration with me designing the car was very good, and the two things improved hand in hand."

Ferrari was also flattered by its main rivals misfiring – this was the year of the walrus-nosed Williams FW26, while McLaren's original MP4-19 had to be substantially reworked. Both cars improved, but it was too little too late.

"My resounding memory of that season was we used to get back and have a Monday-morning debrief," says Smedley. "And there would be long faces if we hadn't come one-two, because that's what was expected. Jean would have an admonishing look on his face and we'd all hang our heads in shame because we'd come first and third, and this was a great disgrace!"

Brawn made the unusual call to use the car in the first two races of 2005, allowing more time to develop its successor. The one-tyre-per-race rules tripped Bridgestone up that year, but the F2004 did at least add a second place to its record.

"It was a continuous evolution year by year," says Costa.

"And probably the 2004 car had all the best technologies that had been developed in the last few years at Ferrari.

It was the best synthesis of all that activity that started at the end of the 1990s.

"Retrospectively, looking at what we understood in the years after about tyres and geometry, it was really well thought out, combining all the elements that make a car perform well."

"Certainly from all the cars I've worked on, it was the best," says Smedley. "It was flawless. It was a marriage of chassis, aerodynamics and tyres, and it was the synergy of those that made the whole thing work together." ❧

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CHASSIS IN
THE FERRARI
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THE 2018 MOTORSPORT SEASON GETS UNDER way this week with the latest edition of Autosport International at Birmingham's NEC.

The annual curtain-raiser brings together many of the best people from the motorsport sphere – from karting and club-level racing, up to global series.

This year's show includes an exhibition showcasing many famous Ferrari designs, and a special display to celebrate the British Touring Car Championship.

For the first time in the show's 27-year history, a top-tier FIA world championship will launch its upcoming season, with the World Rally Championship unveiling

its 2018 campaign. All the manufacturers will present their latest creations, with many leading drivers, co-drivers and team principals also in attendance.

"I've been going to Autosport International since it began and it really is seen, industry-wide, as the start of the season, so to have an event with this sort of global reach is fantastic for the World Rally Championship," says M-Sport boss Malcolm Wilson.

The four-day event kicks off today (Thursday), the first of two days dedicated to the industry, before it opens to the public on Saturday and Sunday. Here's a taste of what to expect at Autosport International.

PORTLOCK/LAT



CONTENTS

30

WORLD RALLY CHAMPIONSHIP

Ten reasons why this year's title battle will be unmissable



LAT IMAGES

MCKLEIN/LAT

34

BRITISH TOURING CAR CHAMPIONSHIP

Britain's premier tin-top category celebrates its 60th anniversary in 2018



LAT



36

NATIONAL CENTRE FOR MOTORSPORT ENGINEERING

University of Bolton's new dedicated motorsport engineering degrees

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WHO TO LOOK OUT FOR

ENAAHAMED

2017 BRDC British Formula 3 champion joins Chadwick on stage on Saturday and Sunday

OLIVER BENNETT

Former motocross rider and British Rallycross driver will appear at the Live Action Arena

ZAK BROWN

McLaren executive director and Motorsport Network chairman

JAMIE CHADWICK

2015 British GT4 champion will be on stage on Saturday and Sunday

KARUN CHANDHOK

Ex-Formula 1 racer is podcasting live on stage on Saturday and Sunday

DAVID CROFT

Sky Sports F1 commentator is the Live Action Arena ringmaster

GIL DE FERRAN

The 2003 Indy 500 winner will be on stage on Saturday and Sunday

PHILIPP ENG

BMW DTM newcomer appears on stage on Friday

JAMIE GREEN

DTM's 'Stirling Moss' discusses his (latest) title near-miss on Saturday

ANDREW JORDAN

2013 BTCC title winner

BOBBY LABONTE

2000 NASCAR Cup winner brings high-octane spectacle to the Live Action Arena

NIGEL MANSELL

Meet the 1992 Formula 1 world champion on Saturday and Sunday



MATT NEAL

Three-time BTCC champion

GARY PAFFETT

2005 DTM champion will take to the stage on Thursday

GORDON SHEDDEN

Triple BTCC title winner

SHMEE150

Supercar vlogger Shmee150 brings special toys to the Live Action Arena

ASHLEY SUTTON

2017 BTCC champion

COLIN TURKINGTON

Double BTCC champion and 2017 runner-up

DARREN TURNER

The Aston Martin stalwart discusses his 2017 Le Mans GTE win on Saturday and Sunday

SUSIE WOLFF

Dare to be Different founder takes to the stage on Thursday

WRCLAUNCH

2018 season will be officially opened on Thursday by many of the series' leading stars



SHOW INFORMATION

JANUARY 11-14, BIRMINGHAM NEC

Open 9am to 6pm each day (January 11-12 are trade only)

TICKET PRICES (Saturday and Sunday)

Ticket type	Advance price	Door price
Adult	£33	£36
Child (6-15)	£15	£24
Paddock Pass	£44	£47
Child Paddock (6-15)	£25.50	£34.50
VIP Club	£125	£125

All tickets include a free seat in the Live Action Arena and free entry to the Performance Car Show.

For more information visit autosportinternational.com

ROUTE-FINDER

BY CAR

The NEC is easily accessible from junctions 6 and 7 of the M42, which connects to the M6, M40 and M5. The A45 also passes the NEC. Alternatively, type B40 1NT into your satnav.

BY TRAIN

The NEC is a few minutes' walk from Birmingham International Station. Connections from Birmingham New Street run regularly and the station has excellent links to all major UK cities.

BY PLANE

The NEC is a short drive from Birmingham International Airport. The easiest way to reach the venue is by the Air-Rail Link, a free shuttle service running every two minutes between 0330 and 0030. For scheduling call 08445 766000 or visit birminghamairport.co.uk

BY COACH

National Express runs regular services to Birmingham city centre and the airport. For more information visit nationalexpress.com



10 REASONS WORLD RALLYING WILL BE GREAT IN 2018

It's not the first time the World Rally Championship has been to Birmingham. But it *is* the first time it's been launched at Autosport International. As the series prepares for what's looking like its most exciting season yet in 2018, the WRC will be a highlight at the NEC this week. Here are 10 reasons why this year's World Rally Championship will be unmissable

By David Evans, Rallies Editor

[@davidevansrally](https://twitter.com/davidevansrally)

1 2018'S GOING TO BE THE BIG YEAR...

So, you thought 2017 was supposed to be the big year for WRC? New technical regulations allied to returning world rally giants Citroen and Toyota made for a hugely entertaining season, with all four manufacturers and seven different drivers winning one or more rallies.

But last year was a step into the unknown. This time last year, nobody could seriously predict the form (we all tried and said Citroen would fly and Toyota would flop – it didn't quite work out like that...).

We can now. The teams have crunched data from 12 months and 13 events and come to Birmingham with cars primed for performance and ready to be reliable. In the words of Toyota team principal Tommi Mäkinen: "If we don't do this then we are not clever enough to use the experience and data."

Inevitably, and even with technical regulations frozen, a tweak here and a turn there will make the cars a shade quicker this year and we can expect the battles to last longer, with more nailbiting, powerstage-paying conclusions than ever before.



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2 THE MOST OPEN FIGHT FOR YEARS

It's been 14 years since the World Rally champion wasn't somebody with a French passport. Or called Sebastien. The past 1.4 decades have been fairly formulaic for the WRC. Apart from the odd blip (and there really weren't many for Sebs Ogier or Loeb), the championship has been pretty predictable from 2004 all the way up to '17 when, even despite the rule changes – and a team switch – Ogier won with a round to spare.

Not this year. Ogier has usually started each year as favourite to keep the number 1 he first earned in 2013 and has worn ever since. But this time, the Gap driver starts his home round of the series, this month's Monte Carlo Rally, as 'only' joint-favourite for the title. More than ever before, French resistance will be tested by Thierry Neuville, Andreas Mikkelsen, Kris Meeke, Jari-Matti Latvala, Elfyn Evans and Ott Tanak. Including Ogier, there are seven drivers who will command a place in this year's world championship title race and that will make 2018 one of the most competitive seasons in WRC history.

In terms of the makes' race, reigning champion M-Sport (with its Fords) and Citroen could struggle to match the strikeforce and strength in depth that Hyundai and Toyota benefit from in terms of driver line-ups for the year ahead.

Our money? Staying in the wallet – it's too close to call.

**3 CITROEN'S RESURGENCE, LOEB'S RETURN**

Twelve months on from the trumpeted return of the red army, Citroen's aspirations are a little more modest. This time last year there was talk of wins in 2017 and a serious title tilt in '18. But it's unlikely that the Versailles squad will end this season with a ninth makes' crown.

The lack of a regular third driver will hit the team hard, and not even Sebastien Loeb – who steps into Craig Breen's C3 WRC in Mexico, Corsica and Spain – can be expected to work miracles on such a limited programme. Had Citroen slotted a full-time Seb (Loeb or Ogier)

alongside Meeke, with Breen starting all 13 rallies in a third car, it would likely have started the season as favourite.

Ultimately, Citroen fulfilled its promise of winning rallies last season, but 2017 was undoubtedly disappointing. The C3 WRC is probably the car that has undergone the most changes in the past 12 months, and that evolution should offer Meeke the chance to fight on a much more regular basis than last year.

Come to Birmingham this week and listen to Meeke and Breen talk about the season ahead; there's a sort of contentment missing for much of last year. There's light at the end of the tunnel coming out of Paris.

4 EVANS BACK AT THE TOP

Elfyn Evans finished in the top six on eight occasions in 2017. He brought the car home no lower than ninth on 11 rallies, won one and finished on the podium three times.

The Welshman showed incredible consistency through last season. And, apart from his emotional breakthrough win at home in Wales on Rally GB, he was second in Finland. It's for those reasons that M-Sport team principal Malcolm Wilson will talk about Evans as being a worthwhile and realistic bet for this year's drivers' title. The Cumbrian knows Evans better than pretty much anybody and he's seen the rate of improvement since his return to full-time WRC action in 2017.

The other change for Evans this year is, of course, the tyres beneath his Ford Fiesta WRC: he'll be on Michelins like the rest of the frontrunning pack, instead of the DMACKs with which he was formerly shod.

Taking the rugby 'British Lions' approach by including the UK and Ireland as a single sporting force, we will have three drivers – Evans, Meeke and Breen – capable of winning WRC rallies. Not since a brace of McRaes and Richard Burns have we had it so good. >>



5 TOYOTA'S TIME HAS ARRIVED

For Ove Andersson read Tommi Makinen. For Toyota Team Europe read Toyota Gazoo Racing. Twelve months ago, such comparisons between management men and their teams would have been unrealistic. Makinen was unproven; his team the rank outsider with nowhere near enough miles or experience to make a mark.

That's all changed now. With Jari-Matti Latvala joined by last year's Rally Finland winner Esapekka Lappi, not to mention in-bound 2017 championship challenger Ott Tanak (snared from M-Sport), Toyota has strength and some serious speed about it this season. This being his first full season in the sport, Lappi will still struggle on some rounds (he's never competed in Mexico and Argentina), but when he knows where he's going the Finn, who turns 27 next week, will have some blistering speed. The big question centres on Latvala and Tanak working together. If the Estonian gets the upper hand, it's vital Latvala has the mental strength to deal with it better than he did when he was up against Sebastien Ogier at Volkswagen.

J-ML feels he has the tools to take the title this time. It's hard to argue with that; now he just needs to practise what he's preached.



McKLEIN



McKLEIN

7 THE YOUNG GUNS ARE COMING

This is the year of the son. Or sons. Kalle Rovanperä and Oliver Solberg are, of course, the offspring of Harri and Petter. Rovanperä (above) is already up and running – he endured a baptism of fire in Wales last October, but took a dead-cert WRC2 victory next time out in Australia (he was the only starter) and guided a Ford Fiesta RS WRC to a classy win at Memorial Bettega last month. That Italian event was great for Rovanperä and Solberg, with both showing likely M-Sport World Rally Team third driver Teemu Suninen a clean pair of heels at times. Solberg binned his Fiesta in the final, but by then it didn't matter. Like Rovanperä, he had demonstrated huge ability and car control in a twisty and technical stadium stage.

Rovanperä has been signed up by Skoda for selected WRC2 rounds this year, making him the youngest-ever works WRC driver. For 16-year-old Solberg, it's more time rallying in Estonia until October, when he becomes the second consecutive son of a WRC star to take his world championship bow in Wales (provided, like Kalle, he passes his driving test).



McKLEIN

6 HYUNDAI ON THE ATTACK

If you're at Autosport International today (Thursday), make sure you're standing directly in front of the centre stage when the Hyundai team steps up. Watch the dynamic among the drivers and you'll see two sets of two: Thierry Neuville and Andreas Mikkelsen – and Hayden Paddon and Dani Sordo. The haves – and the have-nots. Neuville and Mikkelsen have the full programme, they will lead the team and fight the good fight for the South Koreans. Paddon and Sordo will share a third car, with a fourth i20 Coupe WRC being deployed every now and then.

This policy could go one of two ways: it may deliver some

spectacular results – podium lockouts, multiple victories and a maiden world championship good and early for the Germany-based team; or it could blow up in its face. For whatever reason, Neuville got used to having things pretty much his own way last season, but Mikkelsen's in town to steal his thunder this time around, and there's now more incentive than ever for Sordo and Paddon to show the Belgian the way home.

The Hyundai was super-quick in places last year, but it was fragile at times. Team principal and engineering guru Michel Nandan is confident he's added strength to the speed. It's going to be fascinating to see how his man-management skills fare.

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8 CLASSIC EVENTS

Eight days after Autosport International closes its doors for the final time in 2018, the opening round of the World Rally Championship will be under way as the stars of the Birmingham stage head into the French Alps for the Monte Carlo Rally recce.

Monte Carlo: two words that strike fear and loathing into drivers. Conquering the treacherous blend of ice, snow, sun and rain – often all coming within one mile

of one stage – is part of the reason this is the rally every team wants to win. The other reason is the glamour: rocking up outside the Palace of Monaco on a Sunday afternoon, then spraying Prince Albert with Moët, is the perfect start to the season.

From then on, the WRC offers the ultimate in motorsporting diversity. It's Sweden and the frozen north for round two, before a temperature change regularly measuring 60 degrees as the teams

head across the Atlantic for Mexico's high altitude and scorching, rocky roads.

Two islands and every corner of Europe is visited along with a far-flung final round in New South Wales, Australia.

For this year, Rally GB moves to the first weekend in October and Turkey's back on the menu for the first time since 2010. All-in-all, it's another classic-packed WRC calendar.



9 MEDIA FOR FANS

WRC Promoter's Oliver Ciesla makes his first visit to Autosport International this week, and what better time for the commercial boss of the World Rally Championship to come? But the really good news is the message he has to deliver the audience in Birmingham.

WRC Promoter has been working on its offering to fans for some time now and, with live spectator numbers smashing through the four-million mark last season, the number consuming the sport online and in digital and linear television formats is about to go through the roof. There are going to be some exceptional opportunities for fans to get better access than ever in 2018 – and you'll hear it first in Birmingham.

But even before those advances, last year's inclusion of Red Bull TV's coverage was a major step forward, and here's hoping the WRC's very own Ant and Dec, Matt Wilson and Mike Chen, are back behind the mic again in 2018.

10 IT'S WRC SHOW TIME

The world's coming to Autosport. How exciting is that? This is the first time in the 27-year history of Autosport International that a major global race or rally series has been launched at the show.

Everybody who's anybody in the world of rallying will be right there. As well as all four manufacturer teams, there will be some serious input from the support series, with WRC2/WRC3 and Junior WRC cars on show. And yes, the most-talked-about motor in WRC2, Volkswagen's Polo GTI R5, will be there.

Beyond this being a big deal for Autosport and the whole Motorsport Network, the 2018 WRC launch is a great step for the championship itself. For the first time, the World Rally Championship will have bagged close to 100,000 live fans as well as millions around the world before it even reaches the opening round.

And, as you'd expect, Britain's own WRC round – Rally GB – is playing a key role in the launch itself. The Rally GB stand will boast more cool and contemporary rally cars per square foot than ever before.

It is, of course, courtesy of Britain's WRC round that the series has visited our second city twice before, in 1978 and '93. Both were great events, but neither precursed the sort of excitement coming our way this season. ■



**ASI
WRC FEATURE
HALL 8 STAND 6000**

LAT IMAGES

BRITAIN'S BIGGEST SERIES TURNS 60

A collection of the BTCC's most-famous cars, old and new, will be at the 2018 Autosport show

By **Matt James, Motorsport News Editor**

[@MattJMNews](#)

There is plenty to celebrate at the Autosport International Show, and perhaps one of the most significant 2018 anniversaries will be the 60th birthday of the British Touring Car Championship. Autosport's sister title *Motorsport News* has gathered together many significant cars from the category's past – as well as its present – to pay tribute to the UK's highest-profile championship.

The wraps will come off HMS Racing's new Alfa Romeo Giulietta (below), a dealer-supported attack on the series to be driven by Rob Austin. The three-time race winner and the HMS Racing team have been plotting this campaign for more than 12 months, and the new compact hatchback racer will be revealed in public

for the first time on Thursday and will remain on show all weekend.

Allied to that, the factory-blessed Power Maxed Racing Vauxhall Astra, which was a podium finisher in its maiden season in the BTCC last year, will be there for fans to see. It enjoyed a successful campaign during the British firm's return to frontline competition last season when Senna Proctor took the Jack Sears Trophy, an accolade awarded to the top rookie.

As well as some iconic cars from the BTCC's history (see opposite page), a host of champions including reigning title holder Ash Sutton are due to drop by both the main Autosport International stage and the *'Motorsport News presents 60 years of the British Touring Car Championship'* feature. ■

EBREY/LAT



**“Cars from the past
will pay tribute to
the UK's highest-
profile series”**

ARTIST'S IMPRESSION: EMMA WRIGHT



SBLOXHAM/LAT

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 LAT IMAGES



LOTUS CORTINA

Not only did the Ford Lotus Cortina rewrite what was possible with an average family road saloon, it also ripped up the racetracks – which was the reason it was conceived in the first place.

The Colin Chapman-inspired machine made its debut in late September 1963, replacing the Ford Cortina GTs that were racing at the time. It was a development version but it hounded the all-conquering Ford Galaxies all the way.

That should have sounded the alarm bells. With Jim Clark at the wheel, the saloon swept all before it in Class B in 1964. Clark won all but one of the eight rounds, and the other was won by Sir John Whitmore, who was also piloting one of Boreham's finest. Clark's run included three outright victories as he swept to the drivers' title.

American muscle returned to the fore a year later, but Clark was still able to give the Cortina its final outright win as late as 1966.

ROVER VITESSE

Steve Soper won the British Touring Car Championship in a Hepolite-liveried Rover Vitesse in 1983 – except that he didn't. The terrier-like Briton's achievement was struck from the record.

The Rovers had been superb across the year with 11 victories, but certain people within the paddock were unhappy. Dark clouds hung over Soper's title victory, and six months later the governing body (the RAC MSA) declared that the Tom Walkinshaw Racing-tended car was, in fact, illegal, owing to a bodywork issue and the engine installation. Andy Rouse (Alfa Romeo) was the grateful recipient of the title instead.

As a consequence of the verdict and the way the affair had been handled, Austin Rover withdrew from top-level circuit racing and would not return.

ALFA ROMEO 155

Alfa Romeo immediately spotted the potential of the 155 for tin-top racing, and it became very successful on the continent. But the increasing popularity of the British Touring Car Championship in the early 1990s prompted the Italian marque to take a closer look at the UK.

It scrutinised the rulebook closely too. And, when it finally decided to take the plunge with F1 refugee Gabriele Tarquini and Giampiero Simoni in 1994, it was fielding one of the most controversial cars the series had seen. Alfa claimed that the 155 wasn't a 'homologation special'; but it ruffled feathers with its rear wing and front splitter, and a dispute meant the Alfas didn't show at Oulton Park in the middle of the season. Matters were eventually resolved, and Tarquini returned to take the crown in one of the category's most memorable cars.





NCME aims to be leading centre for motorsport engineering studies

TEACHING SPEED

In 2017 the first group of students started courses at the University of Bolton's new National Centre for Motorsport Engineering

By Alex Kalinauckas, Assistant Editor

[@nauckas](#)

Motorsport and engineering are inseparable. The combination of competition and science – finding new limits for speed – is central to motor racing's DNA.

To help train new generations of engineers, the University of Bolton has established its new National Centre for Motorsport Engineering (NCME), a £13million development project that opened at the start of the 2017-18 academic year. The NCME builds on the university's existing Centre for Advanced Performance Engineering (CAPE), and aims to be "the UK's leading academic centre for motorsport engineering, offering industry-driven and student-led academic programmes creating

outstanding engineers who will shape the future of automotive development in the UK and internationally", according to its mission statement.

Through the NCME, the university offers two three-year courses for students – BSc (Hons) Motorsport Engineering and BEng (Hons) Automotive Performance Engineering – the first batch of which began their studies last autumn. The two courses have been established to satisfy the academic requirements leading to Chartered Engineer (CEng) and Incorporated Engineer (IEng) status. The courses are taught through the usual combination of lectures, seminars and tutorials – alongside group projects and case studies – and these are

underpinned by the NCME's practical offerings, which provide students with hands-on engineering experiences.

As part of this, the university has worked with several motorsport entities in recent years, including Ginetta (the company's LMP3 machine was unveiled on the institution's stand at Autosport International in 2015), Keating Supercars and Century Motorsport, which entered a UoB-backed Ginetta GT4 in the British GT Championship in the past two seasons.

"We work closely with regional and national companies and organisations, including Keating Supercars, collaborating in research, consultancy and product development,

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“ASI is a wonderful opportunity for the NCME to show its capability to all prospective students looking to pursue a career in the motorsport sector in the massive industry we proudly have within the UK,” says Dr Mark Busfield. “Year on year, more young talent use ASI as a springboard to get into the industry and understand the most recent developments in engineering and projects starting for the forthcoming season”



offering a unique opportunity and ensuring our students have the best chance of securing a job on graduation,” explains NCME director Dr Mark Busfield. “Opportunities are diverse and our graduates have gone on to a range of roles both in the motorsports and engineering industries.”

The NCME is equipped to enable students to complete projects that are designed to mirror real-life processes from the motorsport industry, and its facilities – which include windtunnel technology, milling machines, a 3D scanner used for high-tolerance measuring, a rolling road, an engine dynamometer and computational fluid dynamics software – help them take ideas from concept

to production and testing.

One of the centre’s key performance indicators for the current academic year is to “help secure quality work placements and high-quality industry experience” for the university’s engineering students.

“We are currently working with many key industry supporters to ensure this criterion is met, however as NCME was only founded in 2017 no correlation will show until post-graduation in July this year,” says Busfield.

For many engineers seeking careers in motorsport, gaining a degree is a crucial step on that path – a process where ideas are conceived and skills are honed. In the years to come, the courses provided by the NCME could lead to new designs achieving glory on the race track. ■

IMPARTING THE KNOWLEDGE

The University of Bolton’s National Centre for Motorsport Engineering is made up of a 16-person team of academic staff members, motorsport-industry experts and racing professionals. These include:

DR MARK BUSFIELD

The director of the NCME has 35 years of industry experience at all levels. He started as an apprentice mechanic/engineer, and progressed through to hold positions including workshop manager, production manager, project manager, team manager and sporting director. The teams he has worked with in motorsport include Nissan and SEAT in the British Touring Car Championship, Hyundai in World Rally, Chevrolet in World Touring Cars, and he has also worked with Ferrari in the World Endurance Championship and with McLaren in GT racing.

DR JOHN CALDERBANK

Dr John Calderbank is a senior lecturer and currently the course leader for both courses offered by the NCME. He was formerly involved in motorsport-industry research and has been working in the academic sector since 1990. Dr Calderbank has been involved with the Formula Student scheme since 2003, and has led students competing in teams in the Formula Ford 1600 Northern Championship, the Formula Ford Festival, and the Walter Hayes Trophy – where he helped to win Class B in 2001, as well as take podiums at many events. He was also a member of the IMechE Motorsports Committee from 2000-10.

TIM MULLIS

Tim Mullis is currently an NCME lecturer and a consultant with Keating Supercars. He brings more than 20 years’ experience in motorsport, and has worked for teams, constructors and suppliers in an extensive range of roles including data engineer, strategy engineer, race engineer and team manager. Mullis has worked with cars and drivers from karting to Formula 1, and also has experience of the European Le Mans Series, British GT and the VdeV series. He also continues to work as a consultant engineer.

STUART DONOHOE

Stuart Donohoe is currently a lecturer at the NCME. He has worked in sportscar racing for more than 10 years as a data engineer and more recently as a team manager. He has experience in the British and Spanish GT championships, Dutch Supercar Challenge, Britcar Endurance Championship, Creventic 24H series and the Le Mans 24 Hours. Donohoe also has over 10 years of experience in automotive powertrain engineering, most recently working as an engine performance development engineer for a leading British premium car manufacturer.

A-Z OF EXHIBITORS

EXHIBITOR	HALL + STAND				
#TrackAddict	9W	9330	Boost United	9	E42
@Litchfield Motors	6	6575	BPG Motorsport	10	10222
195mph Ltd www.195mph.com	6	6954	Brembo SpA	9	E580
3D Print Bureau Ltd	9	E1130	Bremsen Technik (UK) Ltd	9	E150
3J Driveline Ltd	9	E880	Brett Constable	9W	9054
60 Years of Formula Junior	6	6220	Brian James Trailers Limited	20	2570
750 Motor Club Limited	7	7150	Britcar	20	2641
920Engineering	7	7214	British Historic Kart Club	6	6700
AI Performance Products	10	10230	British Motorsport Marshals Club	8	8232
Abarth	4	4020	British Rally Marshals Club	7	7166
Absolute Alignment	8	8730	British Series Ltd	9W	9030
ACL Bearing Company	9	E540	British Superkart Association	6	6702
Adrian Flux Insurance	6	6830	Brown & Geeson Distribution Limited	6	6460
Advanced Fuel Systems Ltd	9	E481	Brown & Miller Racing Solutions Ltd	9	E970
Aero Tec Laboratories Ltd	8	8405	BRP	6	6555
Aerocom Metals Limited	9	E1171	BRSCC	7	7050
Aford Awards	6	6100	BRSCC Fiesta Junior Championship	8	8451
Aireshelta	6	6200	Bruderer Ltd	9	E560
Akrapovic	20	2650	Bruntingthorpe Proving Ground	9	E180
Allens Crankshafts Ltd	9	E572	BTN Performance	9	E82
Alphateq Ltd	9	E1133	Bute Motorsport	20	2620
Andy Cox Racing Ltd	6	6810	Butler Motorsport	7	7511
ANFIA	7	7662	BWRDC	19	2790
Anglo American Oil Company Ltd	20	2500	Caracalla 1947	6	6102
Anthony Weaver	10	10042	Carbon Clean	8	8742
AP Racing	9	E380	CARL Factory	7	7310
Arkay Sales	6	6920	Carspunk	19	19300
ARP Automotive Racing Products	9	E670	Cartek Motorsport Electronics	8	8244
Arrow Precision	9	E762	Casada	10	10520
ASNU (UK) Ltd	9	E662	CaseLiner s.r.o.	9	E746
Association of British Kart Clubs	6	6801	Castle Combe Racing Club Ltd	7	7430
AST Suspension BV	6	6566	Cataclean	6	6854
Aurora Bearing Company	8	8335	Catex	9	E863
Auto Finesse	19	19141	Celtic Tuning	19	19350
AutoClassics.com	6	6110	Central Motorway Police Group	9W	9132
Autodromo Internacional do Algarve	6	6253	Central Scanning	9	E1131
Autosport Bearings and Components	9	E441	CES Europe Ltd (Pit Equipment)	9	E1071
Autosport Engineering Business Lounge & Press Office	9	E1340	Christina Sillifant #607	10	10554
Autosport Media UK Ltd	9W	9122	CKW Distribution	10	10530
Autosport Media UK Ltd	9	E1350	CL Brakes	9	E492
Autosport Media UK Ltd	9	E1360	Clarendon Specialty Fasteners	9	E272
Autosport Stage	20	2250	Classic Sports Car Club	7	7160
Autotel Race Radio	7	7325	Clickheat	6	6606
AutoXotica	19	19510	Clickheat	8	8201
Avalux Ltd	20	2600	Club 100	6	6711
Aviaid Engine Oil Systems	9	E286	Clubmans Rallycross Championship	9W	9110
BAC	19	19410	CNC Heads	9	E494
Bahrain International Circuit	20	2780	Cobra Coatings	9W	9047
Baked For You	9W	9206	Cobra Cord	10	10531
Baku City Circuit	20	2672	Cobra Seats Ltd	6	6645
Balioukas Charalampos	8	8233	Compbrake Motorsport	8	8250
Bambino Kart Club	6	6710	Competition Clutch	20	2870
BARC	7	7560	Corbeau Seats Ltd	20	2400
Barnes Engineered Components	9	E485	Cosworth	8	8350
Barry Glen	9W	9052	Coventry University	8	8115
BB Engineering Services	6	6922	Coys	6	6150
BBS Motorsport & Engineering GmbH	9	E395	Coys	6	6020
BBVR	6	6770	Cranfield University	9	E1173
Bcomp Ltd	9	E861	CSF Radiators Europe	9	E1060
Beauty Gate Limited	19	19131	CSP Detailing System EDF Motorsports	7	7552
Bespoke Cars	19	19320	Dare To Be Different	20	2942
Bespoke Vehicle Developments	19	19132	Daz's Models/Dan's Motoring Memorabilia	6	6835
Bikers Lock	10	10170	Daz's Models/Dan's Motoring Memorabilia	6	6825
Billy Sandford	9W	9051	DBA	7	7630B
Bilstein	20	2700	DC Electronics	9	E181
Bloodhound SSC	9	E1290	Debbie Millar	10	10383
Bloodhound SSC	9W	9160	Deckle Edge Ltd	7	7335
BMW Car Club	19	19750	Demon Tweaks	6	6540
BMW RDC	7	7540	DEN Motorsport	7	7610
Bobby Gold	9W	9046	Dimsport Srl	9	E870
			Direct Source UK Ltd	6	6600
			DMS Technologies	9	E86
			Docking Engineering	9	E398
			Dodo Juice	6	6901
			Dogs Trust	9W	9207
			Donnerberg	6	6701
			Donnerberg	6	6950
			Draper Tools	6	6720
			Drenth Motorsport Gearboxes	9	E352
			DTA Fast Race Electronics	8	8706
			DTM	7	7450
			Dynojet Research	9	E340
			Earls Performance Products	9	E397
			EBC Brakes	8	8240
			EcuTek	9	E493
			EEC Performance Systems	9	E842
			Eibach UK	9	E1260
			Elite Racing Transmissions	8	8615
			Empire RV	20	2770
			Engine Parts (UK) Ltd	9	E362
			Envy Car Care	19	19200
			erod	7	7320
			Euro Therapy UK Ltd	7	7340
			EVO Corse	9	E1170
			Exglo (UK)	6	6673
			Exo Sports Cars Ltd	19	19140
			F1 Model Helmets	6	6895
			F1 Racing Feature	20	2580
			F1 Spinal Solutions	7	7222
			F1000 Rally Club	9W	9215
			Ferodo Racing	9	E986
			Ferrari	20	2260
			Ferrea Racing Components	9	E570
			FEV Motorsport	8	8305
			Fit2Go Michelin	8	8202
			Flapjackery	9W	9212
			Flint & Flame	6	6959
			Force Racing Wheels Ltd	8	8708
			Force Technology Ltd	9	E760
			Ford Mania	9W	9340
			FordRST	9W	9232
			Formula G & Barrel Sprint	9W	9242
			FOUR Car Audio	19	19252
			FreeM - Free Minds Srl	6	6905
			FUCHS	9	E591
			FUEL FOR FANS	6	6855
			Fun Cup	7	7360
			Funk Motorsport	8	8543
			G&S Valves Ltd	9	E844
			G&T Tools	6	6842
			Gala Performance	8	8205
			Gathercole Race Engines Ltd	9	E282
			Gazeboshop	7	7710
			GDS Engineering	9	E1146
			Ginetta	6	6430
			Gloria Srl	6	6405
			GMR Design UK Ltd	19	19260
			Go-Kart Party House	9W	9255
			Goodridge (UK) Ltd	9	E260
			Gosnays Engineering Company	9	E120
			Grand Prix Racewear	6	6530
			Grant Leather	10	10556
			Great British Sports Cars	19	19110
			Greaves Motorsport	9	E1140
			Greenpower	9	E1255
			Grip Tyre Softener	9	E630
			Gripper Differentials	9	E1065
			GRP4 Fabrications	7	7232
			GT Omega Racing	6	6620
			GTMA	9	E1012
			GTR Drivers Club	9W	9240
			GTROC	9W	9220
			Hadleigh Castings Ltd	9	E931
			Halo Lasers	9	E40
			Hamilton Classic	6	6310
			Harper Adams University	8	8110
			Hauck Heat Treatment	9	E496
			HB Bearings	9	E873
			HCI Systems Limited	9	E241
			Hedtec	7	7665
			Hel Performance	9	E491
			Helix Autosport Ltd	9	E990
			Help for Heroes	9W	9208
			Henleys Love Sweets	9W	9205
			Howland Engineering	9	E942
			HiSpec Motorsport Ltd	8	8600
			Historica Ltd	6	6865
			Hortons Books	6	6400
			Hot Rod 58	10	10220
			HRX Srl	6	6660
			Ifor Williams Trailers	6	6505
			Indespension Ltd	8	8440
			Induction Technology Group Ltd	9	E660
			In-Excess UK Ltd	7	7640
			Integro	9	E799
			Intercomp	9	E964
			International Motor Sports Ltd - Rally	8	8435
			International Powerboat Race Club	19	19450
			Intrax Suspension BV	6	6640
			Irish/British Drift Championship	19	19012
			Isoclima SpA	9	E960
			iTec Tuning Ltd	19	19330
			JE Pistons	9	E890
			Jaguar Racing	6	6440
			JamSport	6	6850
			Jenvey Dynamics Ltd	8	8700
			John Monkman	6	6903
			Jordan Mccann	9W	9050
			Joshua Smith	10	10580
			JPTurbo	7	7750
			JTinnovations Ltd	9	E786
			Juicy Details	19	19050
			Juno Racing Cars	20	2760
			K&N Filters	6	6570
			KA Sensors Ltd	9	E486
			Kaji Corporation	7	7233
			Kent Ferrari	9W	9213
			Kent Performance Cams	8	8400
			Knight Industries	19	19150
			KODE Shop	10	10010
			Koden Motorsport	6	6550
			Kulite Sensors Ltd	9	E449
			KW Automotive UK Ltd	7	7410
			Kwiktrak	7	7550
			L.A.Sleeve	9	E787
			Lake Sea Tyres	19	19005
			Lane Motorsport	9	E391
			LAT Images	20	2470
			Launch Tech UK	7	7220
			Lazer Lamps Ltd	6	6862
			LCS & S	20	2920
			Lea Morris	9W	9055
			Leathergenie	6	6926
			Lee Almond	9W	9043
			Legends Cars	6	6845
			Leicester Castle Business School	8	8112
			Liberty Walk	19	19060
			Life Racing	9	E1080
			Lifeline Fire & Safety Systems/		
			Old Hall Performance	9	E185
			Ligier UK	20	2740
			Lille Racewear	7	7330
			Lista UK Ltd	8	8655

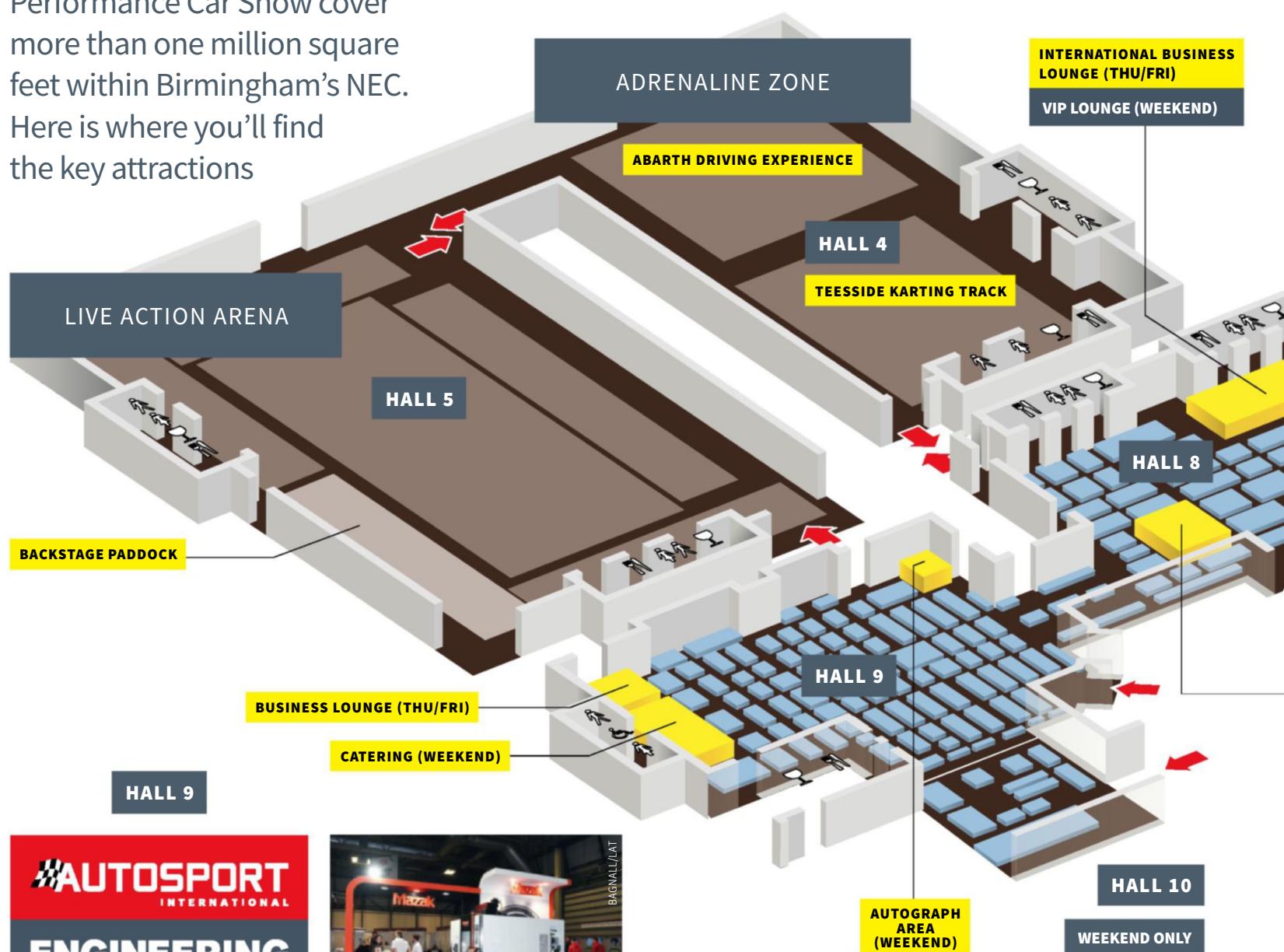
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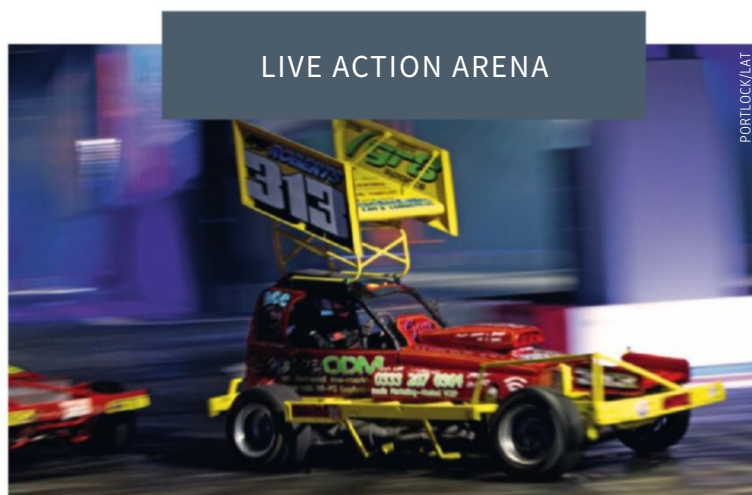
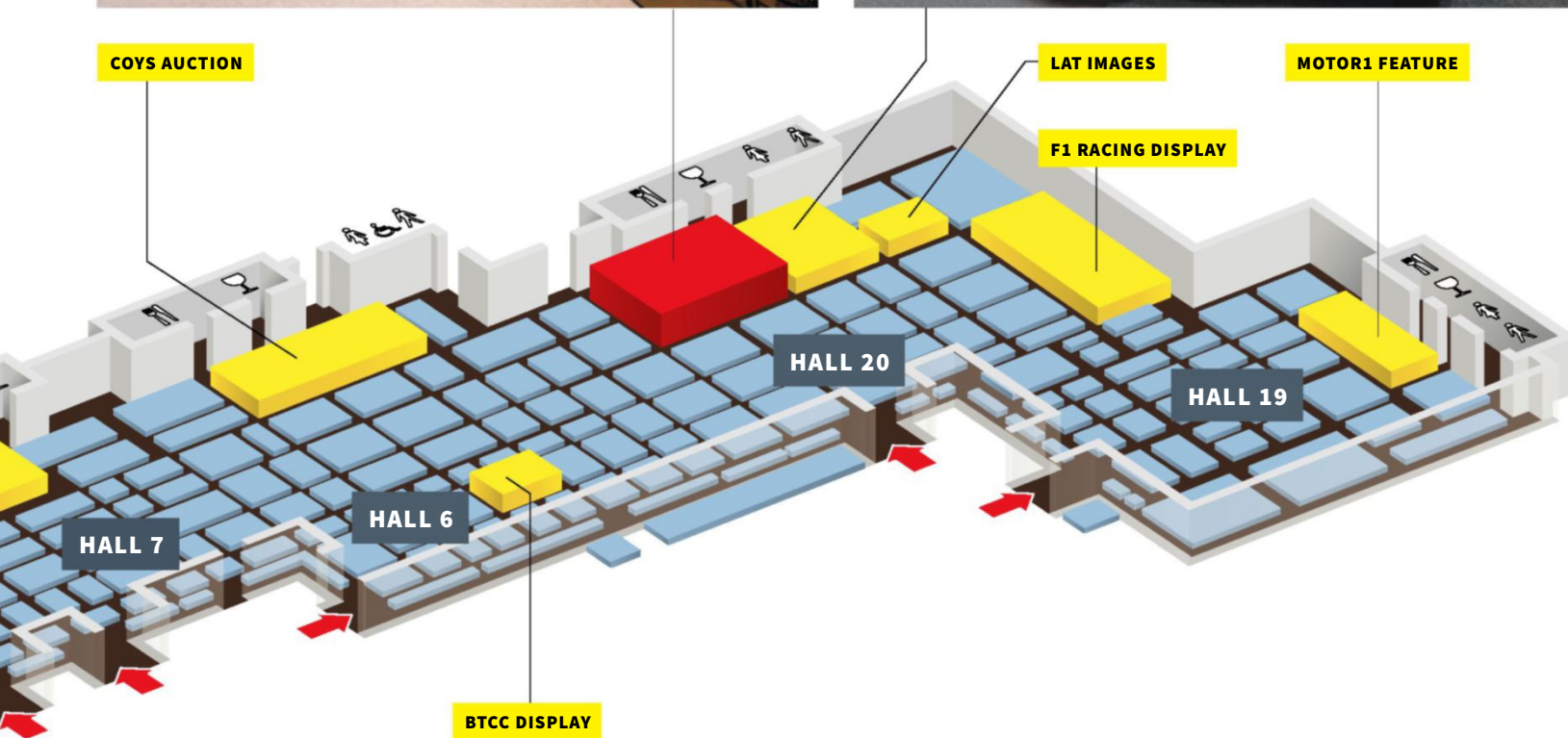
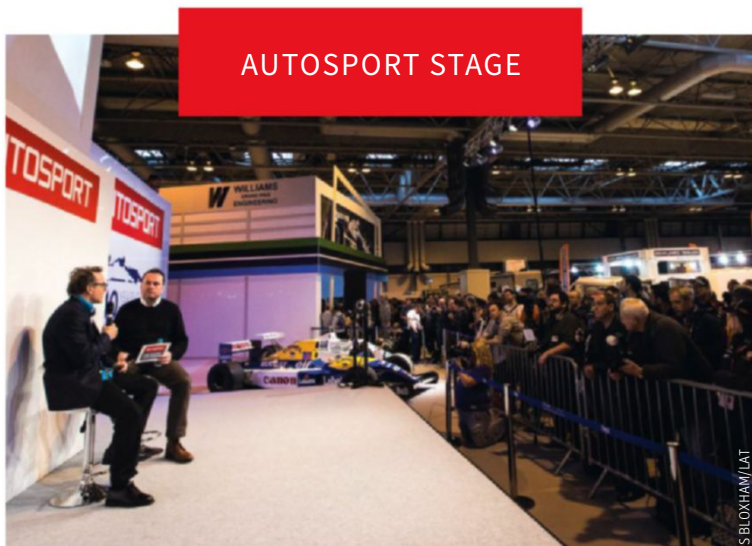
Lotus on Track Racing Drivers Club	19	19430	Optimum G	9	E640	Ringspann (UK) Ltd	9	E470	The Mercedes AMG Petronas F1 Experience	9W	9010
LPtent	7	7411	Oxford Brookes University	8	8150	RM Toys Ltd	10	10250	The Mercedes AMG Petronas F1 Experience	20	2880
Luke Loveland	10	10382	Pakelo Motor Oil	9	E250	Road 2 Race	10	10030	The Next Big Step	9W	9210
MRF Limited	20	2560	Paul Barron	9W	9040	Rob-Co Tools Ltd	10	10260	The Nicoman Ltd	19	19032
Magic Motorsport	19	19251	Paul Gomm	10	10551	Robert Bosch Ltd	9	E475	The Performance Company	19	19160
Maha UK Ltd	9	E472	Paul Gomm	10	10550	Roger Albert Clark Rally	6	6105	The Performance Company	19	19052
Mansell Raceway & the Red 5 Collection	6	6704	Paul Unwin	9W	9020	RRR Engineering	9	E484	The Sporting Memories Foundation	9W	9140
Marches 4x4 Motorsport Management	8	8140	PDP Masters of the Airbrush	20	2940	RSR Retail Ltd	6	6856	Think Automotive Ltd	9	E270
Marcos Owners Club	19	19530	Perfect Bore Manufacturing Limited	9	E1132	Rupes	19	19100	Three Sisters Race Circuit	6	6930
Matrix Motorsport Ltd	7	7432	Performance Engine Components	9	E360	Ruroc	6	6616	Thrill Pic Media Ltd	7	7745
Mazda Road to Indy	6	6716	Performance French Car Magazine	19	19250	Sadev	8	8620	Tillett Racing Seats	6	6565
McGard Deutschland	8	8640	Performance Products Ltd	6	6610	Safety Devices International Ltd	9	E860	Tilton Engineering Inc	9	E548
McGill Motorsport	10	10110	Performance Publishing	19	19201	Samsonas Motorsport	9	E680	Time Attack	6	6760
McGill Motorsport	8	8450	Perma-Grit Tools Alutight	20	2900	Santa Pod Raceway	7	7460	Titan Motorsport	7	7210
Memento Exclusives	6	6730	Petcap	6	6822	SBD Motorsport Ltd	8	8315	Titan Motorsports USA	9	E648
Memento Exclusives/Paul Oz	6	6665	Peter Gwynne Motorsport Ltd	6	6515	SBP Health	7	7332	Tom Smart	10	10552
Mercury Custom Hearing Protection	8	8741	Pioneer	19	19035	Schroth Racing	6	6650	Tom Smart	10	10553
Meteor Motorsport	10	10310	Piper Cams	8	8605	Scott Bourne	10	10555	Tom Storry	10	10558
MG Car Club Ltd	7	7434	Pirelli	20	2280	Scott Jamieson	9W	9041	Tom Waller	9W	9045
Midland Brakes	9	E784	PISTAL RACING/ITALIANRP	9	E596	SCS Delta	9	E872	Total Seal Piston Rings	9	E772
Mills Extreme Vehicles Ltd	20	2945	Planet Kart Cross	8	8650	Sean Edwards Foundation	9	E1275	Trade Garage Equipment	8	8245
Milltek Sport Ltd	8	8540	Plex Tuning	9	E490	Sean Edwards Foundation	9W	9141	Travel Destinations	6	6630
Mimirbox	6	6712	Porsche Cars GB Ltd	20	2545	Seating & Meeting Area	9	E1050	Trident Racing Supplies Ltd	9	E350
MINI Challenge	6	6750	Porsche Club Great Britain	19	19660	Semog Racing Products	7	7515	Triple X Trading	7	7755
Miracle Shammy	10	10532	Powerflex	9	E748	Serck Services Motorsport	7	7350	TRS Motorsport	9	E448
Mission Motorsport	9W	9230	PRAGA-Export s.r.o.	6	6510	Shop Motorsport	6	6820	TTV Racing Components	9	E684
Moetefindt Fahrzeugbau GmbH & Co KG	20	2200	Precision Technologies International (PTI)	9	E642	Signature Motorhomes Ltd	20	2270	Turatello Race Trailers	6	6160
Monogram	7	7660	Precision Turbo and Engine	9	E480	Simpson Performance Products	6	6251	Turbosmart	7	7630
Morris Lubricants	6	6735	PRG Trailers	6	6240	Simpson Race Exhausts	6	6840	Turbosystems – Coolerworx	8	8234
Motec Europe Ltd	9	E170	Pro Formance Metals Ltd	6	6262	Smart Tech Car Care	19	19400	University of Bolton	8	8010
MotoDirect Limited	6	6605	Project Prototypes	9	E283	Smart Tech Car Care	10	10050	University of Emilia Romagna MUNER	8	8102
Motor Sport	6	6300	Quaife Engineering	8	8500	Smiths High Performance	9	E780	University of Wolverhampton	8	8040
Motor Sports Association (MSA)	20	2845	Questmead Ltd	9	E590	Snetterton Speed Shop	6	6860	Urban Automotive	19	19045
Motor1.com	19	19360	Questmead Ltd	9	E592	Social Influencers Hangout	19	19605	V2 Sport	6	6672
Motordesign Sweden AB	8	8545	Quick Start	10	10040	Sole Mates	6	6928	Vac Motorsports	9	E792
Motordrive Seats	6	6601	Quickjack	6	6270	Southdowns Motor Caravans	6	6520	Vagabond Wear	20	2905
Motorsport Auctions	6	6475	Race and Rally.com	7	7738	SPA Design	9	E242	Van Der Lee Turbo Systems BV	9	E1162
Motorsport Electronics	8	8740	Race Engine Technology	9	E287	Space Cake (Type RA Club)	9W	9150	Variohm-Eurosensor	9	E280
Motorsport Industry Association	7	7015	Race Technology	7	7315	Spantex	20	2860	Vintage Metal Signs	9W	9022
Motorsport Marketplace	9	E80	Race to the Finish – F1 Memorabilia	20	2910	SS Tube Technology Ltd	9	E980	Viraver Technology Srl	9	E351
Motorsport News presents 60 Years of BTCC	6	6740	Race to the Finish – F1 Memorabilia	20	2916	Stakesy's Metalwork Machinery	8	8705	Vision Plus	10	10320
Motorsport.TV	8	Studio	Racecar Engineering	9	E1160	Stand 21 UK	20	2842	Vital Equipment	8	8550
MotorsportDays.com	7	7339	RaceChip Chiptuning GmbH & Co KG	19	19120	Steeda	19	19242	VP Racing Fuels Inc	8	8230
Motul	7	7650	Racelogic	7	7535	Steel Seal UK	6	6907	VR Motorsport	7	7431
Mountune Racing	9	E462	Raceparts	9	E390	Steven Bolton	9W	9044	V-Tech Dynamometers	9	E460
Movaltec – PSI – CV	9	E770	Raceworld	10	10210	Streparava SpA	9	E599	Walker Motorsport	10	10270
MSL Performance & ES Motors	19	19440	Racing Aces	9W	9155	Super B	9	E471	Wavetrac	9	E1064
M-Sport	20	2540	Racing Line Ltd	19	19340	Super One	6	6800	Weatherweave	6	6410
MStyle	19	19051	Racing Lines	19	19020	Supercar Driver	19	19630	Westfield Sportscars	19	19232
MTEC Brakes	7	7510	Radical Sportscars	20	2670	SuperPro Europe Ltd	8	8330	Westwood Cylinder Liners	9	E862
Mylaps Sports Timing	7	7752	Rage Motorsport Ltd	8	8200	Supertech	9	E546	Willans	9	E499
National Autograss Sports Association	9W	9060	Rally Design	8	8345	Surf & Turf Instant Shelters	7	7250	Wiseco	9	E790
National Autograss Sports Association	10	10510	Rally For Heroes	9W	9310	Swanflight.com	6	6450	Woodford Trailers	6	6870
National Motorsport Academy	6	6260	Rallying History	9W	9120	SWAVE/SUMMIT UK	8	8320	WRC	6	6000
ND Precision Products	9	E933	Rallyist Publications	6	6476	Swift Group Limited	6	6245	Wrights Auto Supplies	6	6812
Neil Rawlinson	9W	9053	Rallyme.co.uk	7	7433	Swift Group Limited	6	6250	www.autoadrenalin.co.uk	9W	9320
NEOS	7	7231	Random Imports	10	10140	SXS Racing	7	7260	Xing Mobility	8	8152
Newman Cams	9	E847	Randstad Ltd	8	8000	Symdeck	19	19130	XITE	19	19215
NGK Spark Plugs (UK) Ltd	20	2850	Reis Motorsport Insurance	19	19010	System Store Solutions Ltd	9	E740	Xpel Ltd	19	19240
Niche Vehicle Network	20	2660	Renapur	19	19202	Syvecs Ltd/Life Racing Ltd	9	E284	Xtrac Ltd	9	E160
Nicky Grist Motorsports/Stilo Srl	6	6470	Renault Sport Club	19	19650	Talk Shop	8	8020	Xtreme Clutch	7	7630C
Noble Automotive Ltd	19	19310	Repack-S	9	E1061	TCT/Junior Saloons	9W	9142	XYZ Machine Tools	9	E1240
Noble Owners Club	19	19540	RetroArtz	9W	9211	TE Connectivity	9	E440	Yamazaki Mazak UK Ltd	9	E1250
North West Tractor Pulling Club	9W	9350	RetroRacer	6	6709	Team McLaren	6	6272	YCW Suspension/Swift Springs	8	8711
Obp Motorsport	7	7545	Reverie Ltd	8	8610	TECMATE	8	8208	Yellow Speed Europe	6	6611
OCRDA	9W	9131	Revive	8	8242	Teesside Karting	4	4010	Yokohama HPT Ltd	20	2750
Ohlins	6	6670	Revolution Wheels International Ltd	8	8618	Teknofibra	9	E961	Young Calibration Ltd	9	E232
Omega Design Solutions UK Ltd	8	8406	Richard Dickerson	10	10557	The Awning Company	6	6715	Zeitronix Inc	9	E393
OMP Racing Srl	9	E883	Richardson Racing	20	2840	The Chocolate Fondue Company	9W	9015	ZF Race Engineering GmbH	9	E620
OPEN MIND Technologies AG	9	E761	Rimblades Ltd	19	19000	The Firefighters Race Team	9W	9216	Zircotec	9	E562
Optimax Image Inspection & Measurement	9	E1042	Rimstock Ltd	20	2640	The Italian Job	9W	9130	ZRP	9	E646

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F1/GOODBYE MASSA



Farewell Felipe Massa

After a false start to his planned retirement, the Brazilian has called time on Formula 1 for good. How will his career be remembered?

By Ben Anderson, Grand Prix Editor

[@BenAndersonAuto](#)

The past year has been a strange one for Felipe Massa. His Formula 1 career is meant to have been over for 12 months already. As the 2016 season neared its end, he made that memorable and emotional trudge through the pitlane in Brazil, as grand prix racing began to bid a fond farewell to one of its most likeable stars.

Massa signed off that season by outqualifying Williams team-mate Valtteri Bottas and resisting Fernando Alonso's charging McLaren in the Abu Dhabi finale, looking very much like a driver still with something to offer. Alas, no-one had wanted to take the punt. At 35, Massa's best days were meant to be behind him. *C'est la vie*. Life goes on.

Except that life did not go on as expected for Massa. When Nico Rosberg retired unexpectedly, Mercedes prised Bottas out of his Williams contract, and suddenly Massa was back in F1 for another season. His was the sort of short-lived retirement that would have made Ferrari-era Nigel Mansell proud.

Having postponed retirement for one last shot, Massa drove as well as he did during any of his previous three campaigns with Williams. F1's faster 2017 cars suited his committed and reactive driving style much better than the tippy-toe tyre-shredders of recent years. Massa suddenly seemed more like the driver who had almost beaten Lewis Hamilton to a world championship, rather than the busted flush most took him for in 2016.

Massa looked re-energised, and was so enthused by this new breed of F1 that he wanted to stay on for at least one more season. Williams refused to commit, as it courted Robert Kubica and others. Massa could see which way the financial winds were blowing at Grove, so finally decided to call time on his F1 career – for the second time, and this time for good.

By any measure, Massa's has been a very fine career. He was no Stirling Moss – perhaps the greatest driver never to win the world championship – and never reached the same heights as F1's best Brazilians, Ayrton Senna, Nelson Piquet and Emerson Fittipaldi.

But on his day – and there were many of them – Massa could compete with and beat the best. He drove for F1's biggest team for most of his career, drove head to head at Ferrari against Michael Schumacher, Kimi Raikkonen and Fernando Alonso. Massa could easily have retired a world champion had the 2008 Brazilian Grand Prix played out ever so slightly differently.

Such are the fine margins that matter so much in F1. Massa had one real shot and didn't quite make it. But it is in his nature to look back and feel no regret.



Massa's speed was never in question, but he "crashed a lot" during 2002 Sauber stint

Ferrari tames a wild child

It's funny how history repeats itself. Charles Leclerc is on a path that likely will lead him to racing for Ferrari in the near future. Leclerc is a fully fledged Ferrari junior about to make his F1 debut with Sauber. Sixteen years ago, Massa graduated to F1 with Sauber having won the European F3000 championship, fated to be Ferrari's next F1 star.

"It was eight years," says Massa of the length of his first Ferrari contract. "I raced three years for Sauber and one year as a Ferrari test driver, then raced for eight years with Ferrari, so I passed my contract!"

"It was fantastic to sign a young-driver deal with Ferrari. I was the only one and the first one Ferrari did that with. For the first two to three years it was secret, so I had to keep quiet."

Massa tried to do his talking on the track instead, but was "quite wild and immature". He "crashed a lot" and lost his Sauber drive to Heinz-Harald Frentzen at the end of 2002, only finally making the grade at Maranello after a three-year stint as Ferrari test driver, coupled with two more seasons racing with Sauber in '04 and '05.

That stint on Ferrari's test team, with "proper testing every week", is where Massa says he learned the crucial foundations needed to forge a long and successful career in grand prix racing. It was also where he began working with Rob Smedley, the engineer who became synonymous with Massa's F1 professional life, as well as his great friend off track.

Having had his interest "piqued" by Massa testing for Sauber at Mugello in 2001, then-Jordan test engineer Smedley took what he calls a "passive interest" in Ferrari's junior driver, before meeting him for the first time at the end of Massa's first season in F1. >>



Massa's first tearful farewell: Interlagos 2016

DUNBAR/LAT



Celebrating maiden F1 win – Turkey 2006 – with Smedley

BELLANCA/LAT



Massa turned down three-year BMW deal for one-year Ferrari contract

COATES/LAT

“He crashed a lot but he was really, really quick,” Smedley recalls. “I was thinking, ‘Wow, that’d be a really nice project to get a hold of’ – smooth those edges out; knock the rough edges off.”

Smedley encouraged Eddie Jordan to test Massa, who went to Silverstone for a seat-fitting at the end of 2002. “That’s the first time, really, we spoke and got to know each other,” Smedley explains. “He was this infectious kid – really nice personality, always happy, smiling, friendly guy.”

Massa’s Jordan test never happened, as Ralph Firman stole in, but Massa was reunited with Smedley on Ferrari’s test team in 2004 and Smedley could see immediately that Massa had benefited enormously from that season away from racing.

“It did get him into that top-team regimentation, and an understanding of what’s actually expected from the driver, which is something entirely different to what young drivers believe is expected when they first come into Formula 1,” Smedley explains.

“All those rough edges I think existed in 2001-02 were still there, to a certain extent, but he was a lot better – a much more rounded, improved driver. He was still missing the armoury that eventually made him that great racing driver we saw in ’07-08, but he was much more regimented in his approach, much more mature.”

The heir to Schumacher

Massa hit his stride upon promotion to Ferrari’s race team in 2006, replacing Rubens Barrichello alongside Schumacher and winning two races. When Schumacher retired at the end of the season, Massa was retained as Kimi Räikkönen joined from McLaren. But it all could have been so different had Massa made a different choice at the end of ’05...

“I raced another two years for Sauber, for 2004 and ’05, then Sauber sold the team to BMW,” Massa explains. “I had a three-year contract with BMW to carry on, so they didn’t want me to go. I had a very good contract salary-wise to go with BMW. I had an opportunity with Ferrari for a lot less money, but it was a good bonus. In the end, I made

good money because of that bonus!

“It was only a one-year contract and the only way I could stay was if Michael stopped, because Kimi signed before me, and with more than one year, in secret. It was done two years before he joined Ferrari.

“I had a three-year deal in one hand, one-year in the other. For sure I thought about it [leaving Ferrari], but I was in Formula 1 also because of Ferrari, so one year at Ferrari was, at that moment, more important than three years with BMW.”

Massa’s best results in 2006 came after a mid-season reshuffle that put Smedley onto his engineering team. Together they forged a working relationship and friendship that would endure beyond their careers at Maranello.

“He started off with Gabriele Delli Colli,” says Smedley. “Gabri’s a really good engineer, very talented. I’ve known

Gabri for many years. We worked together at Jordan. He’d been very successful with Rubens. For whatever reason, him and Felipe didn’t fit; didn’t quite gel.

“We hit it off straight away. One of the first things I did when I got

to the Nurburgring was just to say, ‘OK let’s just calm it all down. Nobody expects you to win. Nobody expects you to beat Michael. Nobody expects you to put it on pole and be three seconds in front of a seven-time world champion.’

“He wasn’t quite ready mentally to take on the challenge of being a Ferrari driver. He was talented enough – there was no doubt about his speed – but it was mentally a huge ask for him. We just set smaller, more manageable objectives, and once he realised he was able to do those smaller, more manageable objectives, it became a lot easier for him to manage in his mind.

“We just went from there. We worked on his racecraft, his tyre management, on how to approach qualifying mentally; what part of the race he needed to push and what part he didn’t need to push – just put a structure in place.”

Armed with that structure, Massa morphed from promising young talent, and grand prix winner, into a title contender.

“One year at Ferrari was more important than three years at BMW”



LAT IMAGES

Dignity in losing '08 world championship was remarkable and a measure of the man



Massa says he felt no different after 2009 crash, but downturn in form was real

ETHERINGTON/LAT



2010 German Grand Prix now infamous for 'Fernando is faster than you' team order

ETHERINGTON/LAT

Almost world champion

Scenes of Massa beating his chest defiantly on the Brazilian GP podium, eyes still wet with tears from the pain of losing the 2008 world championship to Hamilton by a single point, define the summit of Massa's F1 career.

This was Massa at his peak — consistently fast, a regular winner, a driver capable of competing with someone who has since gone on to rewrite F1's record books.

"I firmly believe he could have been a double world champion in 2007 and '08," argues Smedley. "Midway through '07, he was almost the finished article, and he definitely should have won that championship. He had a lot of stuff that didn't go his way. By the end of the season he was the quicker driver. He pulled over a few times and let Kimi past. He's a good team player.

"In 2008 he hit the ground running and he was away. It was circumstances. We made a lot of mistakes. He made one, which was in Malaysia [where Massa spun out of second place after clipping a kerb]. Apart from that it was a lot of drop-offs from the team.

"He didn't win either world championship, but he was a world champion in waiting at the time."

But for a damper failure at Monza, it's likely Massa would have been anointed Ferrari's chosen contender for the 2007 championship that Raikkonen stole away from Fernando Alonso and Hamilton at the final race. Those fine margins again — the difference between Massa matching Fittipaldi, rather than vying with Barrichello for tag of best Brazilian never to take the crown.

The Alonso effect

Massa's downturn in form after the terrible head injury he suffered during qualifying for the 2009 Hungarian GP is stark. In the 62 grands prix he had started for Ferrari until that point, Massa had won 11 races, qualified on pole 15 times and scored 28 of the 41 podiums he amassed during his career. From returning for the first race of '10 to leaving Ferrari at the end of '13, Massa added only eight more podiums from 77 starts.

Much is made of the effect of Massa's injuries on his subsequent form, but he can pinpoint no ill-effects, and both he and Smedley believe the way Ferrari moulded itself around 2010 star signing Alonso played the greatest role in Massa's decline.

"I didn't feel as important within the team as I did before," >>

F1/GOODBYE MASSA

Massa confirms. “The respect wasn’t the same. People say I was never the same after the accident but, to be honest, if something’s changed, I don’t know. I did all the necessary tests, I felt the same as I was feeling before, physically and mentally. I haven’t won a race after my crash, but I don’t feel different and I can’t prove there was a change. Maybe I changed, but I don’t know!”

Massa’s difficulties during his post-accident spell at Ferrari are best encapsulated by the events of the 2010 German GP at Hockenheim, where Massa was on course to mark the anniversary of his accident with victory, until Smedley was asked to deliver Ferrari’s infamous coded team order to let Alonso past: ‘OK, so, Fernando is faster than you. Can you confirm you understood that message?’

“The team had changed to be much more centric around Fernando,” Smedley adds. “Fernando was doing an amazing job, but they were concentrating on one car. Imagine going to work and you’ve got another person in your office who does a similar job, and your boss treats you like a piece of shit all day, every day – not overtly, but the other guy is well favoured. How does it make you feel, how good are you then?”

Massa thought about quitting the team during those dark years, but “didn’t have a good opportunity elsewhere to leave in a good way, that’s why I stayed.”

Until Williams came calling to offer Massa a way out.



Williams revival

Massa and Williams needed each other. Theirs was a marriage of convenience that allowed two once-great entities, downtrodden by years of underachievement, to help each other attempt to rediscover their form.

The Williams revival has not quite sustained itself after a superb 2014, but things are consistently much better than before, and the same can also be said for Massa, who grabbed pole in Austria in that first year and could have won the Canadian GP but for a late crash with Sergio Perez. Massa twice made Autosport’s Top 10 F1 drivers ranking during his spell at Williams, and almost made it a third time in 2017.

“The difference coming here was that people respected him,” says Smedley. “They respected his abilities as a driver, they were very appreciative of his input into the team, into the rebuilding of Williams, which is ongoing. He’s played a huge role in that.”

“He’s brought that professionalism of how a modern F1 driver should approach his job. He’s taught the team how that role pans out in modern F1. And I think the team was appreciative of him from the outset. That little bit of appreciation changed his mindset completely, and he started to deliver for them.”

Massa has twice been there for Williams when it really needed him, but now the financial realities of racing in the midfield have begun to bite and it is finally time for Massa to bid farewell for good. He is set to take up work with the FIA while looking towards a future racing in Formula E. Massa is not done with racing yet, but he is done with Formula 1.

“I’m really proud of what I did in my career,” Massa reflects. “I achieved more than I thought I could in the beginning. I dreamed of being world champion, and I was close, maybe the closest guy ever in history! But I’m really happy and proud. I have a lot of amazing memories.”

Formula 1 will miss him – this immensely likeable man, who so very nearly conquered the world. 🌟



Why Massa's greatest strength was also his biggest weakness

IT WAS OFTEN MADDENING TO OBSERVE Felipe Massa's latter-day Williams performances up close. He would usually look all over the place in practice, before pulling things together, seemingly out of nowhere, in qualifying.

Massa is a driver of extraordinary ability, but one who appears to live almost entirely on his wits. He will wring everything he can out of his car, regardless of its faults, but he is not the sort to drive the team's technical direction, nor unpick the technical intricacies to explain his own part in why those faults are there in the first place.

He is a driver with absolutely no fear, capable of maintaining unusually high cornering speeds, but the details can often

trip him up. He does not seem cut from the sort of hyper-analytical cloth that stitches together the likes of Fernando Alonso, Sebastian Vettel and Michael Schumacher. That's part of the reason Williams was initially so keen on Robert Kubica for 2018, despite Massa's strong performances in the underdeveloped FW40.

"I think his strength is pure natural talent, and his weakness is pure natural talent," explains Massa's long-time F1 engineer Rob Smedley. "There's a multiple world champion [Lewis Hamilton] in this paddock that I think operates at a similar level. They've just got an innate capability to do it. And because they've got that innate capability to do it, they perhaps don't work as hard as other people.

"They don't necessarily understand it. They just know that they can get in the car, they can turn it on and go quicker than most other people, without a great deal of hard work. That's exactly Felipe's strength, and weakness."

FIVE MEGA MASSA MOMENTS IN F1



DUNBAR/LAT

2008 BRAZILIAN GP

The race that defines Massa's career. Victory in front of his adoring Brazilian fans briefly made him world champion, before Lewis Hamilton overtook Timo Glock's scrabbling Toyota on the run to the finish line.



DUNBAR/LAT

2014 AUSTRIAN GP

Massa was re-energised by his move from Ferrari to Williams, and repaid the Grove team's faith by scoring his first pole position since Brazil 2008. Massa almost beat Hamilton to win the Abu Dhabi season finale too.



BELLANCA/LAT

2006 TURKISH GP

Massa won three Turkish GPs in a row from pole between 2006 and '08, the first of which marked his maiden win in F1. "Everything changed after my first victory," he says. "It helped me massively. I loved the track."



COATES/LAT

2008 HUNGARIAN GP

During his best F1 season, Massa did something few drivers manage – passing Lewis Hamilton around the outside for the lead of a race. Massa was set for victory until his engine failed with three laps left.



ETHERINGTON/LAT

2004 BRAZILIAN GP

The best of Massa's Sauber seasons finished with him briefly leading his home race. "I was always very competitive at Interlagos," he says. "I won two, almost three there in 2012, and there were many podiums."



TEEL/LAT

RACE CENTRE



Despres led for Peugeot after the opening weekend in Peru

Peugeot on the up after low-key start

DAKAR RALLY (INTERIM REPORT)

LIMA (PE)-CORDOBA (RA)

JANUARY 6-20

CYRIL DESPRES AND 13-TIME WINNER Stephane Peterhansel gave Peugeot an early advantage in the 2018 Dakar Rally as the French marque recovered from a low-key first stage. But nine-time World Rally champion Sebastian Loeb faced an initial deficit to his team-mates after a suffering through a “terrible” first day due to brake problems on his 3008 DKR.

It was Nasser Al-Attiyah who topped the opening Lima-Pisco stage on Saturday in his four-wheel-drive Toyota Hilux. The two-time Dakar winner completed the timed section of the stage – the day was made up of a 150-mile road section between the ceremonial start in Lima and Pisco, and a 19-mile timed special traversing sand dunes – in 21m51s. That put Al-Attiyah 25 seconds in front of his Toyota Gazoo Racing team-mate Bernhard ten Brinke and Peruvian hero Nicolas Fuchs, a WRC2 event winner, who completed the top three in the Stuttgart manufacturer Borgward’s BX7.

Bryce Menzies led the way for X-raid Mini on day one, driving the team’s all-new two-wheel-drive buggy and finishing four seconds behind Fuchs, with 2014 overall winner Nani Roma the best of Mini’s four-wheel-drive John Cooper Works Rally cars in fifth. The two other Mini buggies in the field finished the first day in eighth and 13th in the hands of Mikko Hirvonen and Yazeed Al-Rajhi respectively.

All four of Peugeot’s factory entrants missed the top 10 in the team’s muted showing on the opening stage. Last year’s winner Peterhansel finished two minutes behind Al-Attiyah in 11th, just a few seconds up on Despres and Carlos Sainz.

“I was not really confident in the dunes,” said Peterhansel. “The sun was really high, so there was no shadow at the top of the dunes, which made them difficult to read. I decided to take these 30 kilometres at the speed of a tractor. With the light and these type of dunes, I went on the defensive. Proportionally we lost a lot of time to Nasser. Two minutes in 30km is a lot, but we have to ease into the race.”

Loeb ended up almost six minutes slower than Al-Attiyah after encountering a brake issue in the first miles of the day-one timed section. “It was terrible for me because I lost the brakes completely after three kilometres, and I did 28km without brakes at all,” he said. “I had to go very slow because it was quite tricky over the crests of the dunes: you couldn’t see the downhill and it was easy to make a mistake. It was important not to take any risks in this situation, so I just finished the stage; this is what I wanted after the problem.”

But on day two, on the first proper marathon run of the event – a 166-mile loop that started and concluded near Pisco and was largely made up of off-road sections – things turned around significantly for Peugeot.

Stage-winner Despres vaulted from his

overnight 15th place to the overall lead, 27s ahead of Peterhansel, who finished the second stage in second place – 48s slower than his team-mate’s run of 2h56m51s. Toyota’s Giniel de Villiers (sixth on day one) finished the stage third fastest, over a minute ahead of the recovering Loeb, who climbed from 29th to fourth overall, 6m09s adrift of the overall lead. De Villiers finished Sunday third in the standings.

Al-Attiyah lost almost 15 minutes, saying this was partly down to his co-driver Matthieu Baume being unwell. Sainz led stage two early on, but had two slow punctures and navigation problems, while his co-driver, Lucas Cruz, also became ill. The double World Rally champion ultimately dropped 13 minutes and ended the weekend eighth overall.

The second stage was a particularly bruising one for X-raid Mini, with two of its three buggies sustaining damage and dropping out of contention. Menzies rolled just over a mile into Sunday’s timed section and was unable to carry on, with his Red Bull-liveried two-wheel-drive challenger reduced to a torn-up wreck. The American was unhurt, but his co-driver Peter Mortensen suffered a broken ankle.

“My co-driver called out a double caution, and I checked up and I looked at it – and it just looked like a smaller bump than I thought it was,” said Menzies. “We hit it pretty fast; it just unloaded the rear and stuck the front bumper, and I think we flipped seven or eight times. It’s not the way I wanted my first Dakar to go. I was so excited to race the rest of this rally with the car and just keep improving it, but I made a terrible mistake on my part. It’s just my ego and my emotions are hurt – my co-driver ended up breaking his ankle. My heart’s off to him, he’s the one that called it out and I should’ve listened to him. So we’ll go back and work on our navigation, on our notes, together, and hopefully come back stronger in 2019.”

Menzies’s fellow buggy driver Al-Rajhi got further into the stage before colliding with the X-raid Mini John Cooper Works Rally machine of Boris Garafulic, with both crews stranded as a result. Orlando Terranova, driving a regular Mini four-wheel-drive car, ended the second stage as the top X-raid representative, finishing between de Villiers and Sainz in fifth. The remaining Mini buggy of ex-WRC ace Hirvonen was seventh fastest on Sunday and occupied the same position overall.

VALENTIN KHOROUNZHIY, JAMIE KLEIN AND SERGIO LILLO

RESULTS

POSITIONS AT END OF SUNDAY JANUARY 7

- 1 Cyril Despres/David Castera (Peugeot 3008 DKR) 3h21m18s;
- 2 Stephane Peterhansel/Jean Paul Cottret (Peugeot) +27s;
- 3 Giniel de Villiers/Dirk von Zitzewitz (Toyota Hilux); 4 Sebastian Loeb/Daniel Elena (Peugeot); 5 Nasser Al-Attiyah/Matthieu Baume (Toyota); 6 Orlando Terranova/Bernardo Graue (Mini John Cooper Works Rally); 7 Mikko Hirvonen/Andreas Schulz (Mini John Cooper Works Buggy); 8 Carlos Sainz/Lucas Cruz (Peugeot); 9 Bernhard ten Brinke/Michel Perin (Toyota); 10 Nani Roma/Alex Haro Bravo (Mini Rally).

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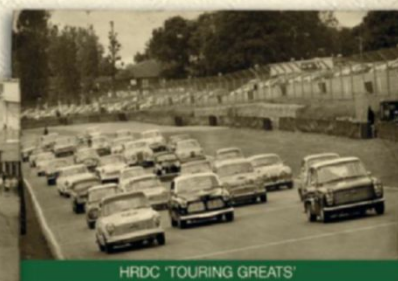
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26-Mar	Goodwood Track Day	Track Day	HRDC	Full Day							
06-Mar	Goodwood Track Day	Track Day	HRDC	Full Day							
01-Apr	Silverstone Club	Race Day	Coys Trophy	45/25							
01-Apr	Silverstone Club	Race Day	Allstars	30/15							
4-6 May	Donington Festival	Race Day	Coys Trophy	45/25							
4-6 May	Donington Festival	Race Day	Touring Greats	45/25							
03-Jun	Brands Hatch	Race Day	Touring Greats	45/25							
03-Jun	Brands Hatch	Race Day	Allstars	30/15							
08-Jul	Snetterton	Race Day	Coys Trophy	45/25							
08-Jul	Snetterton	Race Day	Allstars	30/15							
02-Sep	Mallory	Race Day	Allstars	30/15							
02-Sep	Mallory	Race Day	Academy / A-Series Challenge	30/15							
14-Oct	Donington	Race Day	Touring Greats	45/25							
14-Oct	Donington	Race Day	Allstars	30/15							
14-Oct	Donington	Race Day	Coombs	30/15							



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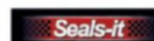
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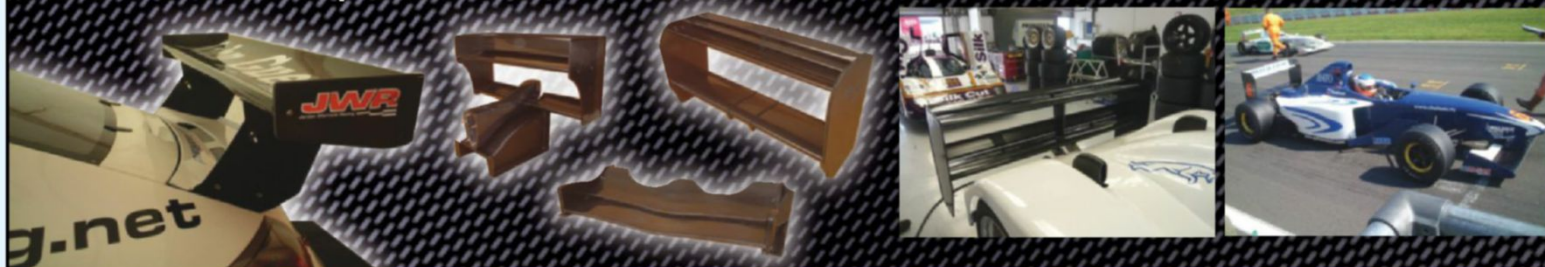
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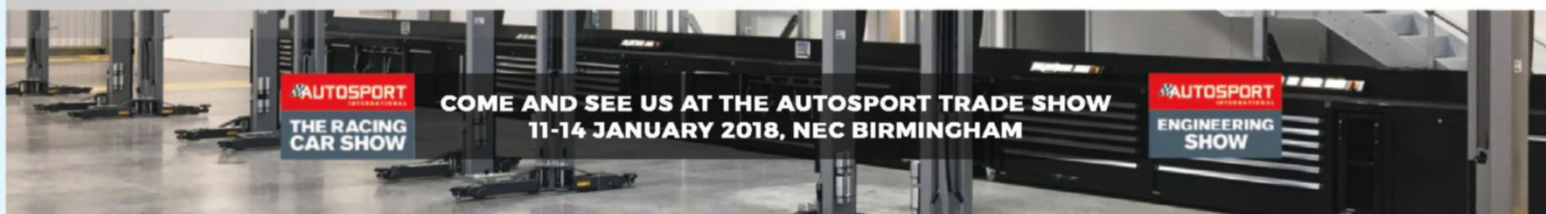
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BRDC BRITISH F3

British Formula 3 allowed to retain name

THE BRDC BRITISH F3 CHAMPIONSHIP has been allowed to continue using the British Formula 3 name for 2018.

The FIA took ownership of the British Formula 3 and Formula 3 names over 2014 and 2015, and the BRDC series run by MotorSport Vision has received an extension to use the name through 2018.

The news comes as the FIA moves towards its aim of introducing a new set of regulations for Regional F3 series.

At the World Motor Sport Council meeting in December 2017, the FIA and its Single Seater Commission confirmed the regulations for Regional F3, with one series in the Americas and one in Asia.

Autosport understands that, should British F3 have wanted to become an FIA regional series, the turnaround would have been tight within the timeframe given. The 2018 season is set to begin on March 31, just over three months after the regulations were ratified.

Giles Butterfield, head of operations



at MotorSport Vision, said: "The whole regional F3 thing is still evolving and I don't think the die has been 100% cast for the future yet. From our point of view there were no expectations that we would be [recognised as a regional championship in 2018].

"That's something that's 12 months further down the road and we're assessing what we do in the UK.

Ben Hurst will drive for Hillspeed in British Formula 3 this season

The championship will be called British F3 in 2018, as it was in 2017 and 2016.

"There are just too many unknowns to see any further [into the future]."

The Motor Sports Association, the sport's governing body in the UK, added: "We are pleased to confirm that the FIA has agreed to allow the 'British F3' title to be used by MotorSport Vision's single-seater championship once again in 2018."

• Hillspeed has confirmed reigning Canadian F1600 champion Ben Hurst and German karter Jusuf Owega as two of its drivers for this season's BRDC British Formula 3 campaign.

Twenty-year-old Hurst reached the final of last year's Formula Ford Festival at Brands Hatch after winning the Team Canada Scholarship to enter the event.

He and Owega — making his debut in cars — have both tested with Hillspeed over the past few months.

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FORMULAFORD 1600

Foster and Martin to National FF1600

MULTIPLE FORMULA FORD FESTIVAL winner Joey Foster will return to the category for a full season in the British Racing and Sports Car Club's National championship this year.

The 35-year old, overall Festival victor in 2003 and in the Kent category in '04, made a winning return to the Brands Hatch event at the end of last season, and was challenging for victory in the Walter Hayes Trophy at Silverstone before suffering a mechanical problem.

He will now contest a full single-seater season for the first time since he won the Australian Formula 3 Championship back in 2009.

"I've been talking about it for a long time," said Foster, who will race a Ray GRo8 run by Don Hardman and Keith Bodicoat. "It just seems right this year. I had a good run at the end of last season and had lots of fun."

"It's about enjoying myself and I want to get on the track. Formula Ford is a series which is affordable and the competition is there. Not just between the drivers but between the chassis and engine builders too."

"I've never won the National championship – the closest I came was second in 2003, so it's the only thing missing off my Formula Ford CV."

Also competing in the National series will be Ross Martin, the Scottish Motor Racing Club's 2017 Formula Ford champion, as well as the runner-up in that series, Sebastian Melrose.

Graham Brunton, who will continue to run the pair this season, said: "The logical thing is to concentrate on the National FF1600 Championship."

"I firmly believe Ross is one of the favourites for the championship this season. He got a win last year and led another couple of races. He's quick enough, and we've worked all winter on the weaknesses."

BRITCAR

Switch to Britcar for Mini driver Hughes

REIGNING MIGHTY MINI champion Alice Hughes will switch to a Ford Fiesta in the Britcar Championship for 2018.

Hughes took last year's Mini title despite suffering a serious ankle injury in the penultimate round at Cadwell Park. Having crashed out of the race, she vaulted a barrier and fell into a pothole. Nevertheless, she drove from the back of the grid to fourth place in the second race.

The triple autograss national champion has

raced the Fiesta before, but not in Britcar. She will compete in the Sprint element of the series, which comprises double-header 50-minute races at each round.

"The initial plan was to be in the Renault Clio UK Cup this year, but we've decided Britcar is more realistic and will give me a chance to try endurance racing," she said. "With Minis I felt the races ended too soon so I'm looking forward to this."



PORSCHE CLUB CHAMPIONSHIP

BWRDC award goes to McGloin

NATHALIE MCGLOIN, THE FIRST FEMALE driver to hold an MSA competition licence while managing a serious spinal injury, has been awarded the British Women Racing Drivers Club's Lord Wakefield Trophy.

The award recognises outstanding achievement by women in motorsport, and previous winners include Susie Wolff, Claire Williams and Katherine Legge.

McGloin, who was injured in a road-traffic accident aged 16, competes in the Porsche Club Championship and has been appointed as the inaugural president of the new FIA Disability and Accessibility Commission.

"I continue to be surprised by where my motorsport journey takes me and I'm extremely grateful for the continuous support," she said.

Return to driving for Monger at ASI

BILLY MONGER WILL APPEAR AS PART OF a stunt display in the Live Action Arena at the Autosport International Show in Birmingham this week.

The 18-year old, who lost both his legs as a result of a British Formula 4 crash at Donington Park last year, will join forces with experienced stuntman Terry Grant to take part in the display. Grant has a long association with the Mongers, having raced against Monger's father in the past.

A team of drivers from Mission Motorsport – the charity that helps injured service personnel rehabilitate through involvement with motorsport – will also be involved.

This will be the first time Monger has driven in public since the crash. His only other outing was a test in Fun Cup machinery at Brands Hatch last year.

Other sequences of the Live Action Arena performance will feature 2000 NASCAR Cup champion Bobby Labonte and BriSCA F1 cars.



IN BRIEF



APPEARANCE AT RACE RETRO FOR REDMAN

Brian Redman (above) will be one of the star guests at Race Retro at the end of February. Now 80, Redman raced in Formula 1 and the World Sportscar Championship, winning the 1970 Targa Florio, the Sebring 12 Hours twice and the Spa 1000Km four times. He starred in the Formula 5000 single-seater category and won the US F5000 title three times in a row.

INTEREST GROWS IN HERITAGE FF1600

Fifteen drivers have already registered for the inaugural season of Heritage Formula Ford, which will race at five rounds across the UK. The new-for-2018 series is open to Formula Ford cars manufactured before 1993 and will race at Donington Park, Silverstone National, Oulton Park and Brands Hatch Indy as well as another track that is yet to be confirmed. One driver from the series will also get the chance to travel to Australia and compete in a Formula Ford race there.

FIRST DRIVERS CONFIRMED FOR CLIOS

Brett Lidsey, Sam Osborne and Luke Reade will all remain in the Renault UK Clio Cup this year after making their debuts last term. Former Michelin Clio Series frontrunner Lidsey competed in three rounds last year with the MRM squad but will take part in eight of the nine race weekends this season. Osborne and Reade will both remain with WDE Motorsport.

MAYBIN STEPS UP FROM KARTS TO MINIS

Karting graduate Jac Maybin will compete in the Mini Challenge JCW championship this year with ExcelR8 Motorsport. The 16-year-old started his testing programme with the car in late 2017 at Brands Hatch, Silverstone and Donington Park.

HOCKLEY CIVIC GETS MAJOR UPGRADE

Former Civic Cup pacesetter Rich Hockley has significantly upgraded his car for 2018, and introduced the modified version in the Plum Pudding event at Mallory Park on Boxing Day (below). The Lincolnshire driver has swapped in a new K20 two-litre engine twinned with a six-speed gearbox in his Honda Civic.



US FORMULA 4

Raven and Dempsey test US F4 car

EX-FORMULA FORD FESTIVAL winner James Raven will take part in the official US F4 pre-season test in Texas this weekend as he plans a switch Stateside this season.

Raven, whose Festival victory came in 2014, has not competed full-time over the past two seasons owing to work commitments.

He will test with DEForce Racing on Saturday and Sunday at the Motor Speedway Resort in Houston.

The test was set up in part thanks to Peter Dempsey, whose father Cliff has run Raven's FFord. Dempsey Jr has raced extensively in the US and works for DEForce.

"I test on Saturday and

Sunday," said Raven. "Pete says it will be a good measure of how quick I am, given that it's a full championship test."

Dempsey Jr's nephew Jordan, another British FFord competitor, will join Raven at the test. He has already driven the Honda-powered Onroak cars before Christmas with the Primus Racing team.



Raven is looking to switch from Formula Fords

FORMULA 4

Caldwell quits Britain for Europe

BRITISH FORMULA 4 RACER OLLI Caldwell will focus on the German and Italian championships this year rather than race in the British.

Caldwell contested all three series after turning 15 in June last year in order to get as much experience as possible, racing in Germany and Italy with Mucke Motorsport and in the UK with Arden. He is in talks with several teams for 2018.

"We decided we are going to do the full

German and Italian series and focus on those, rather than, say, the British and the Italian," said Caldwell.

"I decided to do that because the tracks I'll be driving on are where I'll be driving at a later point, perhaps in F3. It makes sense to race at them now. The more laps I can do, the more prepared I'll be, especially as when you go up the testing is more limited."

Caldwell added that he plans to begin testing F3 machinery later this year.

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Jochen Rindt took part in the Thruxton F2 round just after it opened in 1968



HISTORICS

Thruxton celebrates 50 years

FIFTY YEARS OF RACING AT THRUXTON WILL BE marked on June 2-3 with a high-profile weekend of historic competition at the Hampshire track.

Categories rarely, if ever, seen at the high-speed circuit will headline a special race programme designed to celebrate five decades of racing at Thruxton.

Among the grids will be the Royal Automobile Club's Woodcote Trophy, the Stirling Moss Trophy and the Historic Touring Car Challenge, featuring grids of pre-'56 sportscars, pre-'61 sports-racing cars and pre-'91 touring cars from Motor Racing Legends.

From the Historic Sports Car Club will be the Super Touring Trophy, Historic Formula Ford and Guards Trophy, with further race content to be confirmed.

Thruxton managing director Bill Coombs said: "We will have a mixture of racing and demonstrations over both days, all of which will echo five decades of the circuit.

"This is going to be more of a festival than just a traditional race meeting."

To mark the occasion, a new hospitality building will be officially opened on the inside of the first corner, Allard.

Thruxton was developed as the British Automobile Racing Club's new home track after Goodwood closed for racing in 1966. The first race meeting at the circuit was on March 17 '68, and it hosted an international Formula 2 race a month later. Half a century later, the track layout remains unchanged while a programme of investment continues to improve facilities.

ALFAROMEOS

ALFA SERIES OPENS UP TO MORE ITALIAN MARQUES

THE BRITISH RACING AND Sports Car Club's Alfa Romeo Championship will allow cars from other Italian marques to score points and compete for the title this year.

Fiats, Abarths and Lancias will be accepted into the Modified and Power Trophy classes to boost numbers, while the Twin Spark Cup class will remain unchanged.

"We thought if we opened out the other two classes, which is where the numbers have been a bit disappointing at times, that might encourage more to come forward," said championship coordinator Andy Robinson. "What we'd love to do is average [fields of] 20-plus."

Chris McFie and brother Simon raced Fiat Puntos in the invitational class last year, with Chris taking outright wins at Oulton Park and twice at Cadwell Park.

"The McFie brothers tell us there's quite a few Fiats around," added Robinson. "And they thought we could get more of them out if we offered incentives like making them eligible for championship points."

Further changes for 2018 include subsidised entry fees for regular competitors and the introduction of a code of conduct. Anglesey and an extra Silverstone visit replace Mallory Park and Donington Park on the calendar.

OBITUARY

Bob King 1938-2017

BOB KING, THE FOUNDER OF Royale Racing Cars, died shortly before Christmas aged 79 after a long illness.

King raced in the late 1950s and took a Cooper to New Zealand for the '57 Grand Prix. But a broken camshaft in qualifying cost him the start money that would have been his fare home. He sold the car to

Denny Hulme and spent 18 months in New Zealand before returning to the UK.

His fledgling Racing Preparations company later acquired the rights to Coventry Climax, but then branched out into racecar construction for 1968. Over 25 years, Royale built hundreds of cars from Formula Ford to Formula 2

and GTP sports-prototypes.

King was instrumental in supporting the young Tom Pryce and promoted young designer Rory Byrne, who in turn was succeeded by Pat Symonds.

He is survived by his wife Pamela and three children, including former single-seater racer Stuart, now a respected race engineer.



King (right) founded Royale Racing Cars

How Porsche GB chooses its next junior

STAR

Dan Harper was picked to follow in the footsteps of scholarship drivers – and Carrera Cup champions – Josh Webster and Charlie Eastwood. Here's how he was selected

By Stephen Lickorish, Special Correspondent

[@sdlickorish](#)

“Where did Dan Cammish finish in the 2017 Porsche Supercup standings?”

“What do you think about Porsche’s withdrawal from the LMP1 class of the World Endurance Championship?” Two far-from-straightforward questions for any aspiring Porsche racer to face. Factor in the time of the interrogation – 0745 on what could be a career-defining day – and you get an idea of just how seriously Porsche takes its decision on who will be its next GB Junior driver.

Those questions – and other potential banana skins – came in the media element of the assessment day that decides who will benefit from two years of funding, support and training in the Carrera Cup GB. It’s a scheme that clearly works. Josh Webster and Charlie Eastwood, the previous two Scholarship drivers (as the programme used to be called) both won the championship. So no pressure on this year’s finalists, then.

Making it to the final this time around were Ginetta Junior title contender Dan Harper, Ginetta GT4 Supercup star George Gamble, British Formula 4 champion Jamie Caroline, British GT4 racer Dean Macdonald and GT Cup

regular Esme Hawkey. It was clearly a very talented quintet, and the fact that it was a final five rather than the usual four shows how competitive the process was.

“The number of applications was very high, and generally the standard of those was the highest we have ever had in terms of the drivers’ ability and in terms of the way they applied for the role,” says Porsche GB motorsport manager James MacNaughton. “We had a final five not a final four, and we said we would interview 12 but we interviewed 15 [the judges assess a larger pool of shortlisted drivers before choosing those who will go forwards to the assessment day]. We did that because we felt we had to.”

The final five had a very long day at Silverstone, facing a broad array of challenges to determine the winner. They all had the opportunity to impress behind the wheel of the new second-generation 911 GT3 Cup car that will be introduced to the series this year. They also had to undertake extensive fitness assessments at the Porsche Human Performance Centre, as well as medical tests and the media training.

“We get experts in each of the disciplines we think are relevant, and those experts are free to create their assessments in their areas of expertise based on what they think is important,”

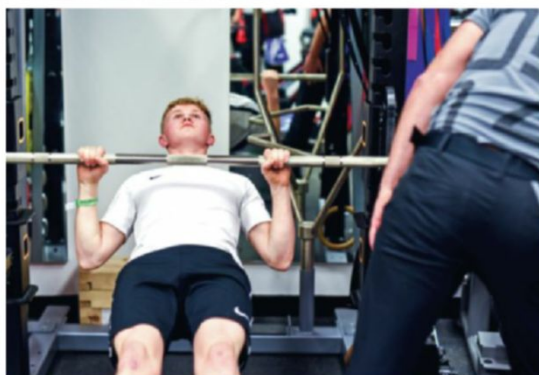
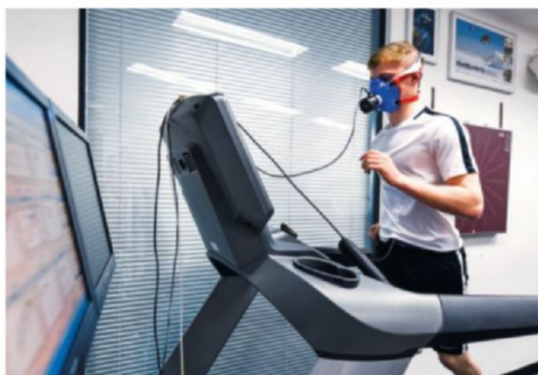
says MacNaughton. In this case, that panel includes Eliot Challifour, manager of the Human Performance Centre, British Touring Car Championship circuit commentator Alan Hyde, TOCA doctor Paul Trafford, as well as previous ‘graduates’ Webster and Eastwood.

Dr Trafford’s role was to ratify the general health of the finalists, making sure there were no hidden concerns that could cause a problem. Challifour then put them through their paces – quite literally. A brutal regime of press-ups, pull-ups, planks, side planks, grip tests and running, followed by the BATAK (reaction-test) machine, left them palpably drained by the end.

“They did some reaction testing looking at precision, movement and general hand/eye coordination and speed,” says Challifour. “And we looked at strength. We were looking at their explosive power in their lower body, how strong they were in push, how strong they were in pull and how strong their torso is – which is obviously very important.”

The media training didn’t just feature those initial questions in a demanding interview, it was monitored how the finalists improved over the course of the session – and that did include some more forensic questioning. »





And then there was possibly the most important factor of all: driving aptitude. To show that nothing was being left to chance, Eastwood and Webster drove both of the cars before the finalists to ensure they had identical set-ups.

But what exactly was Porsche looking for? “The person doesn’t necessarily have to be the fastest one in the car — if they started fastest and flatlined all day and didn’t make any improvements at all, then that wouldn’t necessarily be the right person for us,” explains MacNaughton. “It’s that raw talent [we are looking for]. It’s the ability to be a spokesperson for the brand and to be a brand ambassador. It’s the person who you can see a lot of potential with. It’s the person who you think you can really work with, and we spend a lot of time with them.

“They are very big boots to fill but we aren’t looking for a new Charlie [Eastwood], we’re looking for a new

Junior. Look at the difference between the top F1 drivers and the way they go about it — we don’t necessarily need everyone to be the same.”

Very quickly on that cold Wednesday morning back in November, it was clear that not all of the finalists were the same. There was one standout.

The first two drivers to get a run in the car were Hawkey and Harper. Nerves were running high, but Harper reckoned “it’ll be fine once I’m in the car”.

Eastwood remembers how he felt when it was his turn to be assessed in 2015. “Porsche as a brand are quite daunting in a way, because when you look at everything they do there’s perfection, so you feel that pressure to deliver,” he says. “It’s massive pressure and you don’t really know what’s going on elsewhere. You don’t know what the others have done and don’t even know what they’re assessing. Millions of things are going around your mind.”

The finalists are put through their paces (top), as Dan Harper tackles running, strength and reaction tests (l-r)

Both Hawkey and Harper passed the first test: they didn’t stall. MacNaughton recalls that things were very different two years earlier on the previous assessment day. Then, two of the drivers did stall, one revved the car so much in a bid not to that they did a burnout, and one almost managed to crash into the garage wall.

The first, short run is on old tyres and focuses on familiarisation. Most of the finalists had spent very little time in the previous car, let alone the new one. With that experience banked, each driver had a longer ‘push’ run on new tyres.

And it was at this point that Eastwood and Webster reached peak excitement as they studied the times. Hawkey was impressively competent but Harper was something else. In fact, he was on a par with Eastwood’s and Webster’s times — with the caveat that these had been set earlier in the day, on a colder track and with older tyres. What makes it all the more remarkable is that the only car



ALL PICS: BATHIE

Harper had previously raced was the Ginetta G40 – some way off the 911 GT3 Cup's performance envelope.

"He was really impressive," says Eastwood. "He had never been on a brand-new set of slick tyres so there were a lot of unknowns. They do one circulation session and then in the second session he was on it. Straight away he had six tenths over the rest.

"In his race run of 10 laps every one was faster than anyone else did all day. He clearly had a lot to work on as he's still quite new to it all. But what if he did know the technical side? It's huge.

"When you speak to people, the Porsche Carrera Cup car is one of the hardest GT cars to race in the world; there's no ABS and it's so easy to lock wheels. His braking and reference points were bang on compared with me and Josh. I'm looking forward to seeing how he fares this year. He was the only one to get so close to us."

That pattern was reflected through all the activities: the finalists were all evenly matched, with the exception of Harper, who was always that bit ahead. He performed well in the fitness tests – having a personal trainer since the age of 12 really showed. And he was just as accomplished on the media side too.

That has been the story of his career so far – he won as early as his fifth race in Ginetta Junior in 2016, demonstrating that ability to learn quickly.

Harper thought he entered the final at a disadvantage because he was the youngest – just 16 at the time – and his only experience was in junior racing, but in the end he was a clear winner.


"The only thing I expected to go against me was my age since I have so little experience compared with the others," he says. "I felt the assessment day couldn't have gone better. To get a run in the car was amazing – it was so good compared with what I've driven in

All of the finalists got behind the wheel of the new Carrera Cup car, but Harper's times really stood out

the past. The fitness I had worked on for five or six years so I got used to the pain. I think it seemed to go to plan.

"The programme seems to set the drivers up quite nicely for the future and I would love to try and stay with Porsche given how big a brand they are. They are one of the most successful manufacturers in motorsport so my aim is to try and progress up the pyramid."

Considering the success the previous two scholars have achieved, it certainly appears that Harper is well placed to follow in their footsteps and deliver on his targeted progression.

And, just in case you couldn't answer that opening question, Cammish finished fourth in the Supercup standings last year. A crash in Mexico when fighting for vital points meant he failed to take a top three spot. Harper, when he faced the question, said Cammish was third. It was just about the only thing he got wrong all day. 

WHAT'S ON

The secrets of Newey's F1 success

WITH 10 CONSTRUCTORS' TITLES IN a 22-season period, it's no exaggeration to say that Adrian Newey is one of Formula 1's finest technical brains, and his recently published book, *How to Build a Car*, does him full justice.

The title is a tad misleading, suggesting a Haynes manual-esque approach, but this is primarily a memoir. Newey's personality shines through the pages — colourful, energetic, artistic, fun-loving — and it's clear he always tries to think in unorthodox ways. But, above all, it's clear that he is very driven — the book even concludes by explaining that 'how can I do this better?' is his mantra. He also demonstrates that there's far more to him than just the aero prowess with which he is mostly associated.

The prose is sharp, punchy and lively. The book never drags, and Newey doesn't dwell on things unnecessarily, but dusts the story with amusing anecdotes. He almost never pulls punches or shirks scrutiny, nor gives the impression he is settling scores or deluding himself. The passages are always searingly honest, including his thoughts on his own role and methods, those who have helped him, as well as, sometimes, his shortcomings and conflicts. We understand that Ayrton Senna's death in a machine Newey designed still weighs upon him: "Even now I struggle to talk about it without my voice wavering."

All points have a searchlamp-like glare swung over them. This includes Newey's early days at Fittipaldi — in a different F1 age both in terms of team scale and aerodynamic understanding — then his career in America, at March and briefly Haas, Williams, McLaren and then Red Bull. We learn about how things fell apart at March, how Newey found it working with Sir Frank Williams and Patrick

Head, and about his relationship with Ron Dennis at McLaren. He also covers the impact of the construction of the McLaren Technology Centre and the team's 'matrix' structure, as well as the circumstances of his move to Red Bull and what he did to build the team's sustained success in the first half of this decade. Newey's in-depth style is also applied to his childhood, as well as his personal life, while his exploits as an amateur racer are also along for the ride.

There's plenty in *How to Build a Car* a reader may not have known, including things that feel current. For example, Newey writes that just three years ago both Mercedes and an LMP1 squad sought to tempt him away from Red Bull.

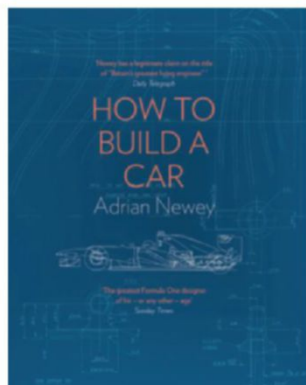
He is candid for good and ill on drivers, rival teams — including Benetton's exploits in 1994 — and on the FIA, which he suspects at points somewhat lived up to what he cites as the "Ferrari International Aid" moniker, such as in the bargeboard controversy late in 1999, among other criticisms.

The 59-year-old is also frank on the current state of F1,

to which he attributes his decision to partially step away, mournfully declaring his "diminishing passion for the sport as it currently finds itself". His gripes include restrictive chassis and proscriptive engine regulations. "Why not go further and say, 'Okay, here's 100 litres of fuel, you build whatever you want?'" he asks. Good question.

Technical details on Newey's works are unavoidable — and *How to Build a Car* is therefore part textbook. If this makes it sound heavy-going for the non-technically minded, fear not, as the accessible prose and sketches ensure that everything is seamless — you learn almost without realising.

GRAHAM KEILLOH



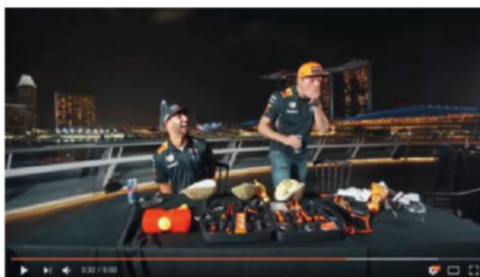
Newey covers his life and career, his relationships with key people including Patrick Head (below), and explains how Ayrton Senna's death still affects him



SUTTON

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HOT ON THE WEB THIS WEEK

RED BULL'S FUNNY SIDE OF F1

Search for Some off-track highlights! Red Bull Racing 2017 with Daniel Ricciardo and Max Verstappen

Here's Red Bull's 2017 alternative highlights reel. This could have lapsed into contrived zaniness, but the comedic chemistry between Ricciardo and Verstappen appears as genuine as it is properly guffaw-inducing.



NEXT WEEK



F1 2018

The biggest talking points of the new season

INTERNATIONAL MOTORSPORT

DAKAR RALLY

Lima, Peru to
Cordoba, Argentina
January 6-20

TOYOTA RACING SERIES

Rd 1/5
Ruapuna, New Zealand
January 13-14

FORMULA E

Rd 2/11
Marrakech, Morocco
January 13
TV Live 1545-1715 C5.
1600-1715 Eurosport 1

ASIAN LE MANS SERIES

Rd 3/4
Buriram, Thailand
January 13

ANDROS TROPHY

Rd 4/7
Isola 2000, France
January 12-13

DUBAI 24 HOURS 24 HOUR SERIES

Rd 1/8
Dubai, United Arab Emirates
January 12-13

FORMULA E







FROM THE ARCHIVE

Jochen Rindt (Lotus-Ford 72), Jack Brabham (Brabham-Ford BT33) and Jacky Ickx (Ferrari 312B) blast off the line at the start of the 1970 British Grand Prix at Brands Hatch, pursued by Jackie Oliver (BRM P153), Denny Hulme (McLaren-Ford M14D) and Ickx's team-mate Clay Regazzoni. The race was won by Rindt, after Brabham ran low on fuel on the final lap. It was also notable for marking Emerson Fittipaldi's grand prix debut and the final appearance of Dan Gurney.

INTRODUCING



JARI HUTTUNEN

HYUNDAI JUNIOR IS FINLAND'S LATEST UP-AND-COMING RALLY STAR

Finland has no shortage of prodigious young rallying talents. Esapekka Lappi and Teemu Suninen turned in eye-catching World Rally Championship performances in 2017, and this year another of the country's youngsters is set to step into the limelight: Jari Huttunen.

But Hyundai's recent junior recruit — a past winner of the Future Rally Star of Finland award and who will enter a programme of WRC2 rounds in 2018 — originally had no intention of being a rally driver.

"When I started karting I dreamt of racing in Formula 1, then I realised it wasn't possible because there was no money to drive in junior formulas," Huttunen explains of the 11 seasons he spent plugging away in karting.

Instead he turned to rallying in 2013, bought the cheapest Rallisprint-eligible car he could find and hit the gravel. A front-wheel-drive title in the Finnish championship came in 2015, followed by a dominant run in the ADAC Opel Rallye Cup (he scored six wins from seven) in '16.

Opel was sufficiently impressed and placed him in its junior team for a crack at the European Rally Championship U27 title last year. Huttunen couldn't make it three titles in a row — he narrowly missed out to Opel team-mate Chris Ingram — and he felt an opportunity had been missed. "It was not my best year," he concedes. "My results were not so good."

Huttunen's determination is one of his key attributes, scoring him the coveted WRC support-series drive with Hyundai over fellow Finnish prodigy Kalle Rovanpera, among others.

"Every time I'm not the fastest I am sad, that's true," he says. "I think it's good, because it gives you lots of motivation to do things better. That's my style."

The 23-year-old's introspection should not be mistaken for a lack of self-confidence, as he expects to be competitive in WRC2 despite having an experience deficit to much of the field.

"My target is to win the championship," Huttunen states. "It won't be easy because almost every rally is new, so I need to learn fast, but I trust we can. I think I need to be more clever, taking all the points I can. That is the biggest thing. We can't win every rally, so we need to be clever." ❧

ALASDAIR LINDSAY



CV

Age	23
2017	ERC Junior U27 (Opel Junior Team Opel Adam R2) 3rd, 1 win; WRC 2 (Printsport Skoda Fabia R5) 1 win
2016	ADAC Opel Rallye Cup 1st, 6 wins
2015	Finnish Rally Championship SM3 class (Printsport Citroen C2 R2) 1st, 2 wins
2013-14	Assorted Finnish rallies, member of AKK Driver Academy
2002-12	Karting, twice Finnish Rotax DD2 champion

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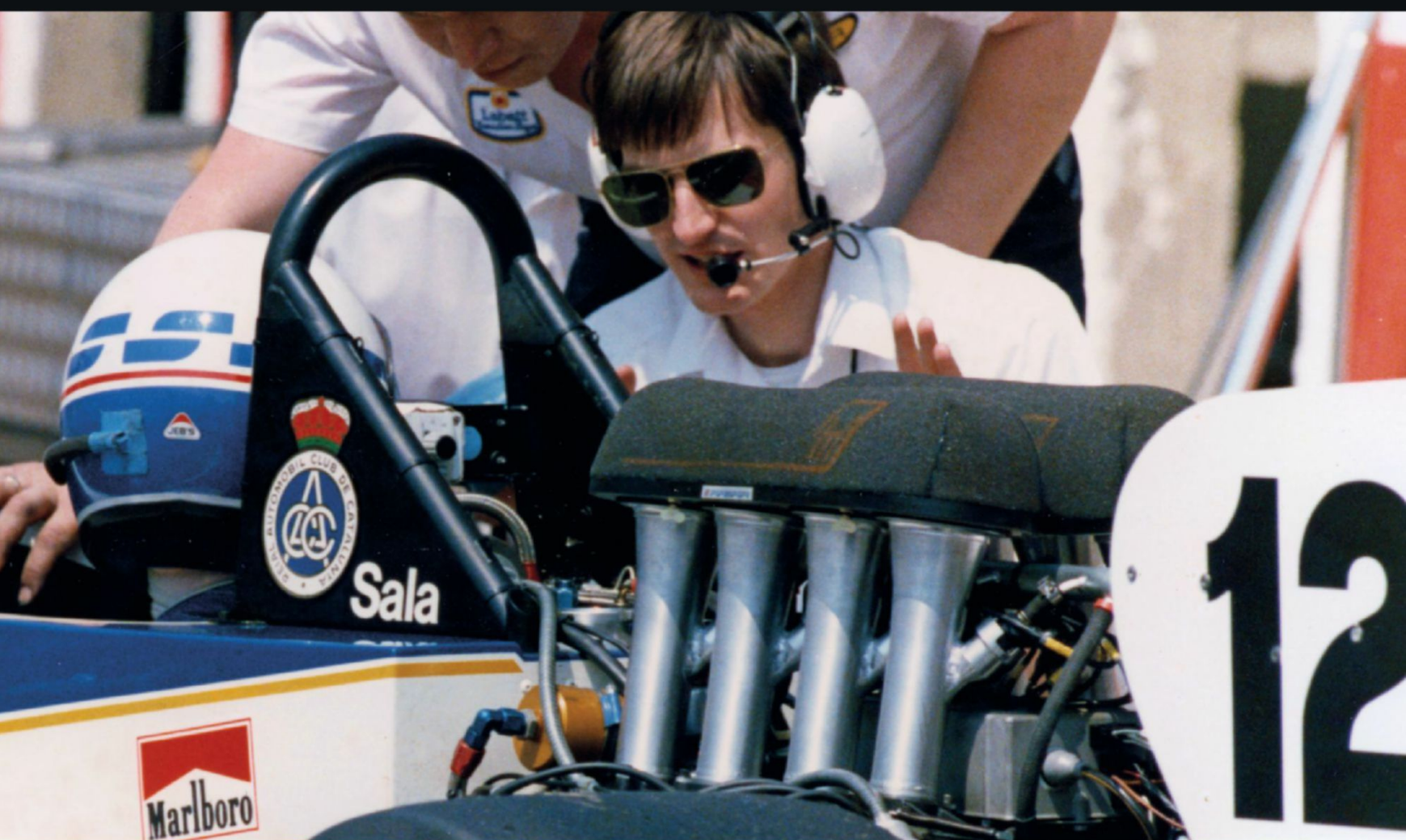
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Machine-tool manufacturer Mazak hosts the annual TDI Challenge for students aged 14-19

KARLA GOWLETT



04 NEWS

Industry update The latest developments in the world of motorsport engineering

08 MARK WILLIAMS

Unsung hero An in-depth look at the career of Autosport Engineering's new columnist

18 STEPPING UP

Year of Engineering How motorsport can play its part in inspiring the next generation

22 AL KAMEL

Making FE tick How a small group of Spanish technicians keeps FE running like clockwork






24 ALAN DOCKING

Radiating passion F3 legend is still active in motorsport even after closing his race team



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AUTOSPORT ENGINEERING A NEW YEAR AND NEW OPPORTUNITIES

It's that time of year again, as Autosport International brings the spotlight back onto the world of engineering in the designated Autosport Engineering hall.

These are exciting times for the industry – and for motorsport especially. With the government's Industrial Strategy committing extra funding for innovation to the tune of £4.7 billion over the next four years, motorsport companies are well-placed to reap the benefits, but as MIA CEO Chris Aylett points out on page 18, the sector is not immune from the skills shortage afflicting the industry-at-large.

There is no magic bullet, no overnight cure to securing the future of engineering. Instead, motorsport companies must be prepared to actively engage with young people and initiatives like The Year of Engineering, which seeks to raise the profile of engineering and inform people about what modern engineers do.

As the UK's leading motorsport weekly since 1950, it is important for Autosport to be part of this push too, so it is with great pride

that the Engineering supplement will become a regular fixture in the magazine, this year rising to six issues, as well as having a dedicated online section to provide additional insight into some of motorsport's top companies and its brightest minds.

This issue is no different, as Kevin Turner sits down with Autosport Engineering's new resident columnist Mark Williams to discuss his career as an engineer and designer.

We also go under the skin of Al Kamel Systems, the timekeeping organisation that has embedded itself within the fabric of Formula E, and Jake Boxall-Legge takes a tour of F3 paddock luminary Alan Docking's Silverstone HQ to see how motorsport has influenced the design of drone radiators.

I have greatly enjoyed putting together my first issue as editor of Autosport Engineering, and I hope you enjoy reading it too.



James Newbold

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LAT IMAGES

COSWORTH TURNS 60

The British powertrain and electronics manufacturer celebrates landmark anniversary at Autosport International

It's been a remarkable journey for the Northampton company since it was founded by Mike Costin and Keith Duckworth in 1958. Only Ferrari has accumulated more grand prix wins as an engine supplier than Cosworth – despite not adding to its tally of 176 since 2003 – while no fewer than 12 Formula 1 drivers' titles and 10 consecutive Indianapolis 500 wins between 1978 and '87 were scored by the all-conquering DFV/DFX.

Aside from its exploits as an engine builder, which also translated into two Le Mans victories and numerous touring car successes with the Ford RS500 in the BTCC, DTM and at Bathurst, the brand has also carved a niche

in electronics, used by teams and organisers alike in IndyCar, rallying and sportscars, having won the FIA/ACO tender to supply all 2017-spec LMP2 cars.

Specialists in data capture and analysis of vehicle dynamics, Cosworth has also developed software for production Chevrolet and Cadillac machinery that displays key driver inputs, making data that was previously the domain of specialist racing teams accessible to everyday road users. Called Toolbox, it measures braking, throttle and steering angle for improved driving performance and is part of a suite of software that includes lap metrics and

real-time vehicle dynamics overlays.

But for all the work it is doing in partnership with automotive OEMs, F1 is where Cosworth's roots lie and CEO Hal Reisiger may clarify the brand's future participation in F1 at Autosport International.

Cosworth remains the most recent independent engine supplier in 2013 and has played an active role in shaping the new engine rules for '21. Should those formative plans materialise, then we'll be hearing a lot more from Cosworth in its diamond anniversary.

● You can find Cosworth at Autosport International in Hall 8 on Stand 8350.



BURKE/LAT



LAT



HORSBURGH/LAT

NANKANG GOES GREY

Nankang has developed the world's first non-marking 'grey compound' tyre for use in Fast & Furious Live, the global arena tour based on Universal Pictures' long-running film franchise.

The Taiwanese manufacturer will be the official tyre partner for Fast & Furious Live until 2022 and will produce more than 5000 tyres per year for the tour.

The state-of-the-art 3D projection mapping

that features in the show and allows the audience to experience locations around the globe requires a clean floor area to function correctly, and conventional tyres leave black marks when driven vigorously.

To counter this, Nankang's R&D department was tasked with designing a ground-breaking 'grey compound' tyre exclusively for use in Fast & Furious Live that left no visible mark on the arena floors.

"We're incredibly proud to be able to bring new tyre technology to Fast & Furious Live, and to have

the opportunity to help this exciting, new, live production reach even greater heights," said Nankang general manager Kevin Chuang.

"To devise, test and deliver an all-new, high-performance compound of tyre was the kind of challenge we relish, and we're really excited to see our new tyres in action in the Fast & Furious Live show."

● The global tour premieres at London's O2 Arena on January 19.



WILLIAMS PARTNERS WITH AIRBUS ON ZEPHYR

Williams Advanced Engineering will collaborate with Airbus to develop ultra-lightweight materials, battery technologies and electrical cell chemistries for use in the aerospace giant's Zephyr High Altitude Pseudo-Satellite (HAPS) programme.

The solar-powered, unmanned aerial system (UAS), or drone, will fly at more than 65,000ft, above commercial air traffic, for months at a time, and will utilise weight-saving technologies developed by Williams for use in motorsport. Williams has been the sole battery supplier to the FIA Formula E championship since it began in 2014

and has previously collaborated with automotive manufacturers to develop this technology in different environments.

The first production examples of Zephyr, which has unique communications and surveillance capabilities, are being built for use by the UK Ministry of Defence.

Williams Advanced Engineering has previously collaborated with Thales to supply the MoD with a biological surveillance system, for which it was presented with a Minister for Defence Procurement Acquisition Award in November. Williams was responsible for the design and development of the Biological Surveillance and Collector System (BSCS), which is used to protect UK forces overseas using specialised sensors.

NEW TECH ON SHOW AT ASI

As the established curtain-raiser for the motorsport industry, Autosport International has long been the place for engineering companies to demonstrate new technology, and this year is no different.

Precision Turbo and Engine (PTE) will showcase its innovative new GEN2 PT7275 CEA® turbocharger in Hall 9, Stand E480.

Rated to support 1200 horsepower and using CNC-machined Competition Engineered Aerodynamics (CEA®) in its compressors and turbine wheels, the US-based company's latest offering is among the most advanced units on the market, purpose-built for improved durability, greater efficiency at high-pressure ratios, and power gains in excess of 30hp over older designs.

German chip-tuning expert RaceChip (Hall 19, Stand 19120) will also be present with the new GTS model (below, centre).

The baby brother to the GTS Black, which was unveiled in September, the GTS features seven different tuning maps programmed specifically for the engine type.

It allows the driver to access up to 30% more power, which can be activated via a smartphone app. The system comes with a two-year guarantee.





VARIAXIS j-600/5X AM

Technologies to best meet your application requirements

The VARIAXIS j-600/5X AM machining centre integrates Wire Arc AM (Additive Manufacturing) and Multi-Tasking technology to enable high-speed additive manufacturing. The Wire-Arc AM torch is mounted on the machine's headstock to deposit material layer-by-layer and grow near-net-shape 3D forms.

The VARIAXIS j-600/5X AM is capable of high accuracy and productivity from the 12,000rpm main spindle and the wide B-axis spectrum of rotation (+90° to -120°). The machine is equipped with a highly rigid and accurate structure, utilising roller linear guides on all linear axes and roller gear cams on both rotary axes.

We're looking forward to showing you the VARIAXIS j-600/5X AM in a live cutting action at the Autosport Engineering show, **11th-12th January** at the **NEC, Hall 9, Stand E1240**.



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ALCON EXPANDS PRESENCE WITH THIRD CUP TEAM

Leavine Family Racing will become the latest NASCAR Cup outfit to run brakes built in Tamworth after signing a multi-year partnership with fast-growing Alcon Specialist Brakes & Clutches.

The single-car Chevrolet operation (#95, above) will become the third Cup team on Alcon's roster from as many manufacturers, joining Toyota powerhouse Joe Gibbs Racing and stalwart Ford team Roush Fenway, which both have renewed their contracts with Alcon until 2019.

Alcon has also acquired a substantial stake in

US brake specialist Pro-System Inc, which is based in NASCAR's North Carolina heartland, with a view to expanding Alcon's American business operations.

Alcon sales director Jonathan Edwards said: "We have known Pro-System and their leaders Ashley Page and Chris Norburn for many years now, and have always been impressed by the passion, motorsport know-how, connections and skills shown by them and their team in North Carolina.

"It became apparent that both businesses could play an important role with assisting each other in achieving their growth plans; as such, we are delighted to join forces with the Pro-System team."



RICARDO TO SUPPORT MAJOR ENERGY TRIAL

Engineering consultancy Ricardo will participate in landmark research into using smart grid technology to unlock spare capacity for increased electric vehicle use.

The project, called Active Response, will be run by UK Power Networks to explore whether it will be possible to extract sufficient power from existing infrastructure to accommodate the anticipated 1.9million electric vehicles in use across London, the east and south east of England by 2030 and avoid costly network reinforcement.

Active Response will trial a responsive, automated electricity network that reconfigures itself, moving spare capacity to where the demand is. Ricardo has supported the project from the concept stages and will continue to play a key role throughout its four-year lifespan.

Sarah Carter, Ricardo's business area manager for smart grids and networks, said: "Unlocking spare capacity is essential to adapt to the predicted increase in electric vehicles in a way that is cost effective for consumers. We are delighted to be supporting the Active Response project and to help the UK to take an important step in transitioning to a low-carbon economy."

PIONEERING TEST CENTRE NEARS COMPLETION

MAHLE Powertrain took a big step in the development of the UK's first Real Driving Emissions (RDE) test centre in December with the delivery of a sophisticated altitude and climatic control system built by Weiss.

Set to open in Northampton in mid-2018, the £8million test centre will enable OEMs to develop new engines without the associated costs of travelling to high altitude and temperature extremes. It follows changes in European regulations that all cars from September '19 will be emissions-tested on public roads, as well as in a laboratory, for 90 minutes.

Once operational, the test chamber will achieve a maximum altitude simulation of 5000m, by reducing the air pressure in the whole chamber to approximately 50% of standard sea-level air pressure; a climatic range of -40C to +60C, a humidity range of 10-80% relative humidity and an air circulation capability of 70,000m³/hr.



IN BRIEF



XING'S NEW SUPERCAR

Taiwanese electric-vehicle manufacturer XING Mobility is building a rally-inspired 1341bhp supercar prototype, which is set to be completed later this year ahead of a limited 2019 release. Dubbed 'Miss R', the vehicle will be powered by four independent 350v motors and is claimed to be the world's first electric supercar with on-road and off-road capabilities.

OHLINS IN THE LINK

Renowned suspension manufacturer Ohlins has announced a technical partnership with the TRE vehicle dynamics company. Ohlins customers will have access to TRE's dynamometer machines, in return for Ohlins providing TRE with on-site damper development services, including re-valving according to settings derived from Ohlins' in-house simulation software.

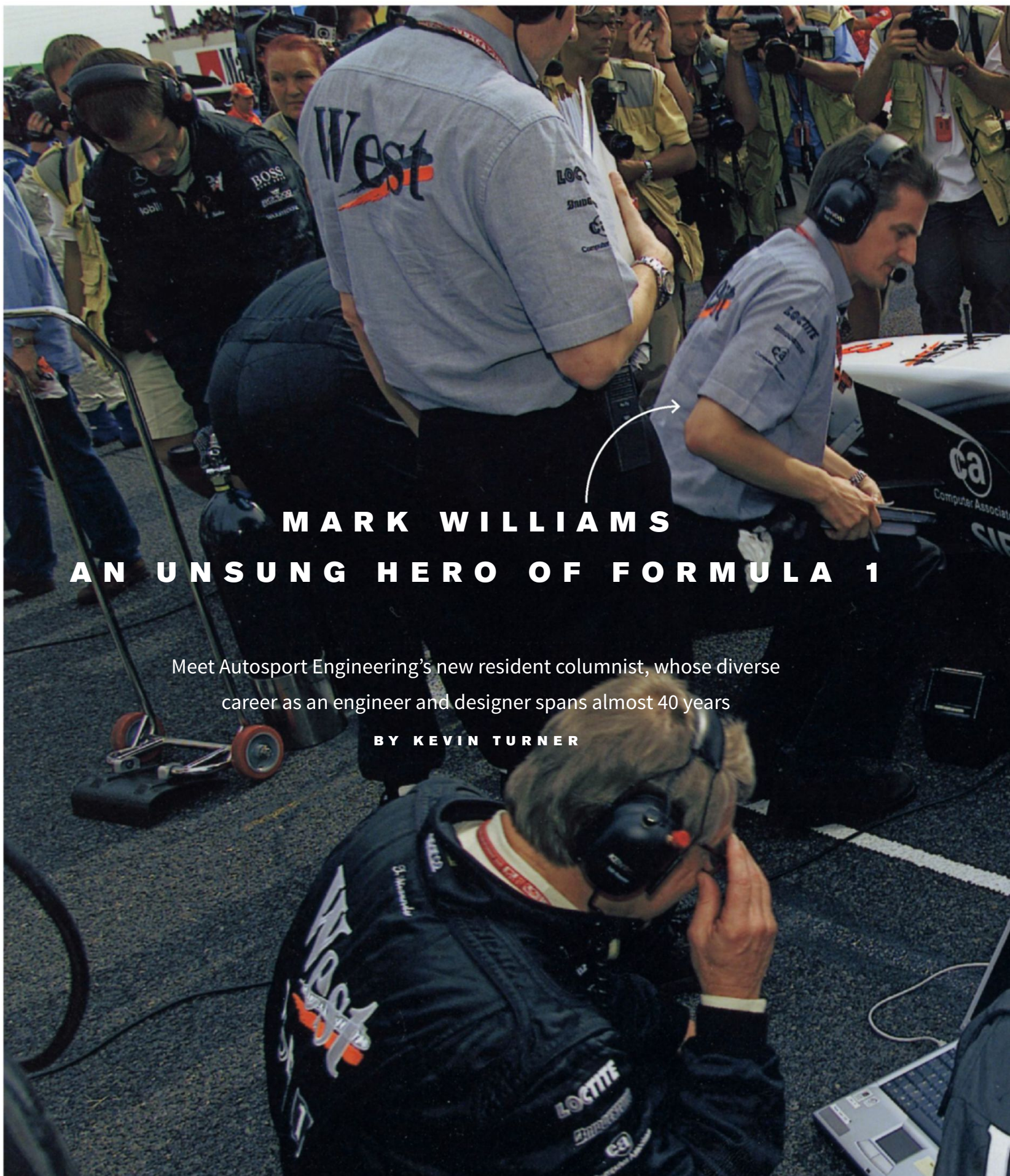
AVL BATTERY BOOST

AVL has installed four new battery testing facilities at its electric mobility testing centre in Austria to cover the development of batteries up to 1200v. The new facilities will be fully operational by the spring of this year.

ILMOR MD RETIRES

Engine-building specialist Ilmor announced the retirement of managing director Steve Miller (below, left) last month. Formerly Cosworth's chief engineer in Indycar from 1987-98, Miller continued to focus on Ilmor's US efforts after Mercedes withdrew from CART in 2000 and oversaw the Honda package that won eight consecutive Indianapolis 500s between '04 and '11. His role will be taken by Ilmor chief engineer Steve O'Connor (centre), a 23-year company veteran.





MARK WILLIAMS AN UNSUNG HERO OF FORMULA 1

Meet Autosport Engineering's new resident columnist, whose diverse career as an engineer and designer spans almost 40 years

BY KEVIN TURNER



LAT IMAGES



Williams started out at Ensign, but was advised to go elsewhere to learn



Lola Formula Ford was Williams' first opportunity to lead a programme



Williams moved to Lola's F3000 team with Luis Perez-Sala (12) and John Jones

Driver's often talk about the team, thanking the many people behind the scenes for their essential efforts. But aside from a select few – Adrian Newey and Ross

Brawn spring to mind – there aren't many that get a share of the spotlight. Or seek it.

Mark Williams is one such man. The former head of vehicle engineering at McLaren – not the two-time snooker world champion – and McLaren Autosport BRDC Award judge has had a long and successful career that has included stints in Formula 1, Indycars and touring cars.

He's been an engineer and a designer, and has seen the sport change immeasurably over the past three decades, during which time he has worked with drivers such as Jenson Button, Fernando Alonso, Lewis Hamilton, Mika Hakkinen and David Coulthard.

As our new regular Autosport Engineering columnist, it was worth downloading Williams on his chequered career to date...

EARLY DAYS

Williams was always likely to go down the behind-the-scenes route. From the very start,

his interest was in the machinery rather than getting behind the wheel.

"My father built himself a Jaguar XK120 in his youth and we always had a series of interesting cars at home," recalls Williams. "I was always quite creative – I made stuff. So having an engineering father and a creative nature I got into making things."

Williams started with radio-controlled model cars – "Dad would get it made for me provided I drew it. No sketches, proper drawings" – and he bought a lathe so he could make things himself. He also discovered motorsport.

"My father knew some people who did sprints and I'd go along," adds Williams. "All my friends would buy the magazines and be into the drivers, points tables and events, but I could tell you the size of the bolts, the rod ends, what kind of suspension they had. I'm a bit odd really..."

"There was never the drive to go racing. I was never going to be a driver, it was the engineering that fascinated me."

Williams built his own car and studied engineering at Imperial College. Prior to his final year, he got a summer job with Mo Nunn's Team Ensign in 1979.

"He built complete F1 cars," says Williams.

"Mo was a great guy. He said he'd put me in all the departments so I could spend a little bit of time in each one. The first port of call was the fabrication department and I spent my entire summer vacation in there because we were making so many bits. It was great fun."

Williams hoped that would lead to a full-time job, but chief designer Ralph Bellamy had other ideas: "I met Ralph and he went, 'No, I'm not going to give you a job. You need to go and learn how to do this properly at a real engineering company. We break all the rules here. It's not the place to learn fundamental engineering,'"

"It was hard to swallow, but he was absolutely spot on. It was great advice, but it's hard to take when you're this close to working for an F1 team."

The result was three years at Ricardo Consulting Engineers. "I stopped all interest in motorsport," admits Williams, but that didn't last long, and the processes he learned would prove useful.

THE ROAD TO LOLA

A colleague at Ricardo encouraged Williams to start chasing his motorsport dream again and he started applying to firms. One was Formula Ford 2000 constructor Delta Cars,

Williams gives Lola runner Eric Bernard some pointers in 1989



based in Hove and run by Nick Crossley.

Delta was having gearbox-casing problems due to the forces through the suspension, and Williams redesigned the rear of the cars for free in his spare time. "It worked and Nick was happy, so I became an unofficial, unpaid member of the organisation," he says. "I didn't care – I loved it. I'd go to tests and to the factory on a Saturday with lunch in the local pub listening to racing stories.

"I did that for a while and found it was far more interesting and rewarding than the day job, so I decided I had to do it full-time. Clearly Delta couldn't employ me, so I just applied to every F1 team. Bless them, a lot of them said I could come and have a chat. I got a lot of great advice. Then I opened up Autosport one day and saw that Lola were advertising for a junior designer."

Williams rang, was told the position had been filled but was invited for a chat. "Before I knew it, they'd offered me a job," says Williams, who took over Lola's Formula Ford programme in 1984. He was immediately struck by the lack of process, but also by founder Eric Broadley's abilities.

"There were no reports, no test reports, no windtunnel reports – it was all in Eric's head!" remembers Williams. "There was only one thing

that Eric kept – a cardboard box with rolls of geometry drawings. Each piece of plastic drawing film was probably about a foot high and two metres long. He'd come in the office, unroll it, make a change, then roll it up and take it back to his office. Every geometry of every car he'd ever done was on those rolls."

Williams stayed at Lola for 10 years and was quite quickly put on to other projects, including sportscars, F3 and Indycars. That meant he also got to see the mercurial Broadley at work.

"Eric was a fantastic draughtsman," he says. "In 1984 I was put on the Indycar programme with Nigel Bennett. We had too much to do between the two of us and Eric said he'd design the bellhousing.

"One Saturday, I came in and Eric was there with a turbocharger balanced on a coffee mug in front of an engine on the bench, and a ruler. He was measuring and doing a drawing, no scheme. It was an amazing drawing but I thought, 'How do you know it's going to work?' – your measurements only have to be off by a little bit. The drawing went off to Italy to be cast and machined. It came back and everything fitted perfectly. He was very good – he knew all the shortcuts, what he

could get away with and what he couldn't."

Williams also learned about aerodynamics as they became more important during the 1980s: "That was the great thing about Lola. I arrived to do Formula Ford, within weeks I was in the windtunnel doing a sportscar, and the next year I was doing Indycar with Nigel. I went to Lola to be a designer, but you always picked up windtunnel programmes, track testing, race engineering. You covered everything. How do you get that experience now? Those first few years were incredible, a great grounding."

THE CHALLENGE OF F3000

Formula 3000 replaced F2 for 1985 and Lola produced its car – the T950 – in three months. Unsurprisingly, it was not competitive.

"It never saw the windtunnel, we just built it," says Williams. "It was a real baptism of fire up against Ralph Bellamy doing the March and Ron Tauranac with the Ralt, when you've lashed something together in three months."

Bellamy helped March man Christian Danner to the 1985 title and then came to Lola. He proved the T950 wasn't as bad as the results suggested, after identifying that the wheelbearings were the main issue. He put on a derivative of ►

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Erik Comas stormed to 1990 F3000 title in DAMS-run Lola

March's ones and "we went from the back row to third row or something. Everyone asked what aero work we'd done, but we just had the wheels pointing in the right direction!"

Williams took over the programme in 1988, with Erik Comas taking his DAMS-run T90/50 to the crown in '90.

"F3000 was good because you worked with so many different drivers, so many different styles," reckons Williams. "It was good fun because it was flat-out engineering. You could change things race to race and we were all at a similar level. It did get a little bit tricky if someone came in with F1 knowledge — that's never great because if you don't have the knowledge, it skews the playing field."

"You also had customers with varying abilities. It's no good just producing cars for Erik Comas, you have to think about the other guys and understand driveability. I didn't really understand what that was — I would just look for maximum downforce however I could get it and that's wrong."

"Now you look at other things, how the car performs in yaw and steer. It's key. It's got a lot harder but more interesting for an engineer. The challenge is how do you have the general public

appreciate that — otherwise you have a load of engineers having a ball and nobody's watching."

Williams also got involved in the short-lived BMS Scuderia Italia F1 deal in 1993 with the Ferrari-engined T93/30. "That was another car in three months," says Williams of the car that scored no points. "We were on the road to recovery, but we never got there because the project was stopped at the end of the year. It was a shame because it was a good team."

INDYCAR AND TIN-TOPS

Williams left Lola in 1994 to go freelance race engineering in the US, and ended up running Scott Goodyear for Kenny Bernstein's King Racing squad. He also engineered Andrea Montermini on his two outings.

Although it was a tough season, Goodyear did win the Michigan 500 and Williams has fond memories of the CART era: "You could do whatever development you wanted. It was a great series, lots of freedom, I really enjoyed my time there."

Bernstein sold his team to Jerry Forsythe for 1995 and things did not go well for Williams. He was fired before the Indianapolis 500: "I hadn't got on terribly well with [engineer] Robin Herd."

I used to resent the fact that he'd rock up at the last minute and try to run the car; I failed to appreciate the fact that he and Teo Fabi went back a long way and had a great relationship."

Indycar constructor Reynard had shown an interest, but Williams returned to the UK and got a call from Graham Humphrys at RML, and he ended up running Anthony Reid's Opel Vectra in the 1995 FIA Touring Car World Cup.

It gave Williams an insight — and foot in the door — into tin-top competition. "I couldn't believe how much scrap was created in one race!" he recalls. "There were skips out the back with body panels and people were jumping on them to make room for more."

More importantly the outing led to a call from McLaren, and Williams was asked to run the Woking squad's BMW Super Touring development programme. "I was a bit wary because in 1991 I'd met Martin Whitmarsh and Ron Dennis and I'd turned them down," says Williams, who had passed up the chance to be Ayrton Senna's race engineer. "I've done some crazy things in my time..."

Led by Williams, the McLaren squad worked alongside fabled BMW factory team Schnitzer, with Peter Kox doing much of the testing of ►



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Goodyear's Michigan 500 win was the highlight of a tough 1994 season



Williams' fruitful stint in tin-tops included 1996 BTCC BMW, which took five wins



Hakkinen's swansong victory in 2001 gave Williams a winning start to life on the race team



Raikkonen almost won the title in 2003 with 'D' version of the MP4-17

the 1996 E36 320i, with a view to McLaren producing and homologating the '97 car. They soon made an impression at a Vallelunga test.

"We weren't quick," remembers Williams, "but we were giving Schnitzer all our data and at lunchtime they came down and said, 'You're not quick because your engine is a lemon, but in the infield section you are eating us. What's your set-up?'"

They put the much softer set-up on the full-house Schnitzer cars and went quicker. "We had a fantastic working relationship and a great year. It was amazing fun."

Audi's four-wheel-drive A4 took the BTCC by storm in 1996, but BMW still scored five wins and was second in the manufacturers' standings with Joachim Winkelhock and Roberto Ravaglia.

Williams then helped design the 1997 Super Tourer, only for the now Bigazzi-led operation to be moved from the BTCC to Germany, for which the aero package was unsuited. That made for a trying, though not unsuccessful, season.

By the time that project found real success in Germany in 1998, Williams had moved to McLaren's F1 test programme. He ran Olivier Panis and Alexander Wurz before getting a break with the race team.

McLAREN AND F1

"I got lucky. Mark Slade was Mika Hakkinen's race engineer and his wife was having a baby in 2001, so they needed a stand-in for Indianapolis."

After taking two world titles in 1998 and '99 and finishing second to Michael Schumacher in 2000, Hakkinen's season had — British GP aside — been largely lacklustre. But at the United States GP he put in his last great drive before retiring from F1.

Hakkinen qualified second to Schumacher's Ferrari, but a warm-up transgression on Sunday morning — missing a red light at the end of the pitlane — resulted in his best qualifying time being deleted. He thus started fourth.

Hakkinen ran fifth in the early stages, but put in a very long first stint and climbed to the front as others stopped. Running his Bridgestones longer than recommended, Hakkinen pumped in some blistering laps before his one stop.

"We were down to the fabric and we hardly had any rubber left, but we were still doing the lap times," remembers Williams. "I don't know how Mika did it. Fortunately we got away with it."

Once everyone had made their second stops, Hakkinen was at the front. Rubens Barrichello was set to challenge before his Ferrari suffered

an engine problem in the closing stages, leaving Hakkinen to take his 20th and final F1 victory by 11 seconds. The result did not hurt Williams' career.

WORKING WITH NEWEY

When Newey elected not to leave McLaren for Jaguar in 2002, Whitmarsh decided to restructure and support the aero ace with a group of chief engineers. Williams was one, taking care of chassis and suspension: "Adrian focused on aero and we did everything else."

"Adrian had very firm ideas of what he wanted. He would draw everything. He had a good feel of how everything would integrate. He always did what he knew would work, no compromises. I enjoyed working with him for that very reason."

The MP4-17 of 2002 was middling, David Coulthard winning just once as McLaren finished behind Ferrari and Williams-BMW in the constructors' standings. That resulted in a bold attempt for '03 in the shape of the now infamous MP4-18.

"Adrian always felt the 17 was too heavy and didn't allow enough development flexibility," explains Williams. "So he was determined the 18 would be a lightweight car. ►

WORKING WITH THE GREAT DRIVERS

Mark Williams has worked alongside some of the sport's very best during his long career. Here's what he made of a few of them

JENSON BUTTON

"Jenson and Lewis Hamilton had very different driving styles. Jenson was the perfect guy to have in your team because he's quick and he's such a team player.

"When we first met him to sound him out, we said what's really important is that we use both cars in FP1, FP2 and FP3 to improve the McLaren and then in qualifying it's down to you. Hopefully both cars have helped each other and you just shoot it out with Lewis. He said, 'That's perfect'. If I'd heard anything else I'd have been disappointed.

"It was open-book engineering, it's the only way you do it, otherwise you might as well be running two teams, but you need the drivers to be on board. They were very supportive of each other.

"Jenson had his good days and bad days. There was always a reason, you just had to understand it. The rear of the car had to be really planted for JB to really deliver his best. That's the same for every driver and some can handle something that's a bit more lively, but why should you if your engineers can nail it?"

FERNANDO ALONSO

"I have massive respect for Fernando. He really drives the team on. When he first came to us in 2007, he was very focused; he knew what he wanted and helped the team get there. On car development and car set-up, he was very, very good. You can see why he's a double world champion, he has what it takes.

"He's a points accountant. He'll take the points when he can and he won't take big risks at the chance of losing points. He's super-talented and really smart. He does great card tricks too, as we discovered at one wet Monza test!"



ETHERINGTON/LAT

KIMI RAIKKONEN

"A man of very few words, too few. We tested a new power-steering concept once and he came in and said, 'No, I don't like it, it's the same as I had at so-and-so and I didn't like it then.' Why didn't you give us all that information before we embarked on this project?! Super-quick, unbelievably fast, but a man of too few words. Not enough information."



COATES/LAT

MIKA HAKKINEN

"It was all about your relationship with Mika. The first time I ran him was at a Monza test. We spoke on the phone and I said I'd got a set-up I thought he'd like. He stopped me and said, 'Put David's set-up on the car.' I said, 'You won't like that, it's not your style', but he insisted. So we did that, Mika goes out, bangs a time in – very slightly quicker than David – comes in and says, 'You're right, I don't like it, change it.' Then he worked solidly all day until the circuit closed. I'm not sure if he was testing me or trying to outpsyche David. Probably both.

"I found the best way to get lap time from Mika was to send him home early. Don't keep him at the track of an evening, he gets bored – he doesn't do data. Engineers do data."

DAVID COULTHARD

"I enjoyed working with David, a lovely guy, but he's the encyclopaedia of car handling! Too much information, more than I could ever handle. He was always quick on the high-braking circuits with big stops, but always seemed to have poor luck. If something was going to go wrong on the car, it'd be with DC.

"At Monaco in 2001 [when Coulthard was on pole], he got onto the launch sequence too soon. He realised, came off the throttle to reinitialise and as he got off the throttle the engine revs dropped, they just plummeted and it stalled.

"We'd never seen that in testing so we took a car to Silverstone and we said to Alex [Wurz], 'See if you can do that.' He could do it at will, but we'd never ever seen it before. He said, 'Well, you never normally do that', so then we had to put systems in place so the engine would not die when you lifted off under no load.

"David deserved to have had better success. He was quick and had enough about him to be world champion."



ETHERINGTON/LAT



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ETHERINGTON/LAT

OLIVIER PANIS

“The other guy I really enjoyed working with was Olivier. He’d been written off and he was having doubts about his ability. Before he arrived, the team decked his car out in onions and all the French stuff. He saw it and burst out laughing and said, ‘You guys are really nice, I’d looked from the outside and seen this frosty team, but really you’re just normal guys.’

“We had a good first test at Magny-Cours and then we went to Silverstone, when Bridge corner was still on the lap. He did his first new-tyre run, came in and said, ‘I am so happy. Bridge is easy flat in this car, I have no problem’, as in, ‘When I drove here before I kept saying the car had a problem and no-one would believe me.’

“We had a fantastic season of testing. His commitment to the programme was just outstanding.”



Williams, pictured in 2013, is also a judge of the McLaren Autosport BRDC Award



“Mike Coughlan had joined us and he said he’d do a light car. And everything just got smaller. I don’t know why we weren’t focusing on it because there were enough of us to look at it. I think we were too busy trying to win the championship with the 17 and the 18 was just too flexible in every department – aero flex, mechanical flex. I don’t think at one point it could leave the pitlane without catching fire because everything was too close. It was a step too far.”

The MP4-18 was therefore never raced, leaving the team to battle on with the upgraded MP4-17D. Nevertheless, Kimi Raikkonen only lost the drivers’ title to Schumacher by two points after a campaign built on consistency.

“If the development of the engine hadn’t been switched off I think we may have actually done the business with it,” reckons Williams. “It would have been remarkable to have taken a year-old car to a championship win.”

Thereafter, Williams continued to become an ever-more essential part of the McLaren machine. He worked with Steve Hallam as head of vehicle performance, overseeing both cars at GPs from 2007. When Hallam left in ’08,

Williams picked up race engineering and strategy as well. There aren’t many sides of the sport he hasn’t seen.

Lewis Hamilton won the 2008 drivers’ crown and McLaren narrowly missed out on the constructor’s championship, but the next few seasons had highs and lows. In ’10 Williams got involved in the GT3 project with McLaren’s MP4-12C, splitting his time between that and F1.

Then, in November 2014, he was one of the victims of the ‘new broom’ that swept through the Woking team. But he’s not bitter and, after some time off, has found more engineering challenges to keep himself busy. And he’s still involved with McLaren’s successful GT programme, as well as being a judge on the McLaren Autosport BRDC Award.

“I love working with drivers, setting cars up and trying to get the most out of them,” he says.

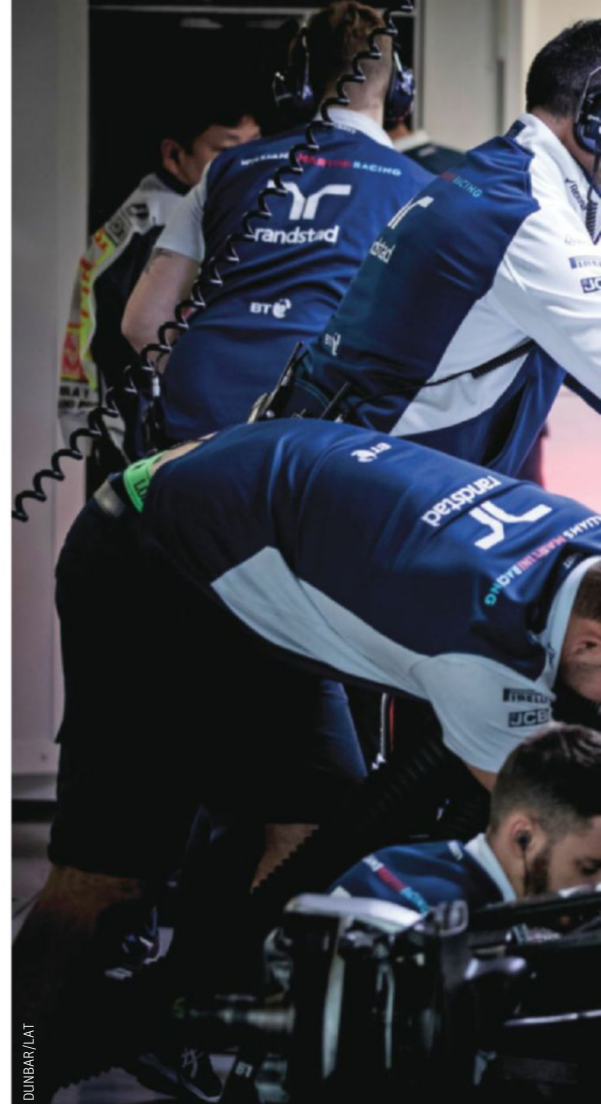
“I started out as a creative guy and that was almost a handicap because I wanted to design the best-looking upright, for example, but there’s no lap time in that. Just design it well once and carry it on.

“Now I’m only interested in what’s going to make the car go quick.” ■

THE YEAR OF ENGINEERING – AND WHY MOTORSPORT SHOULD CARE

The government has mandated that 2018 is the Year of Engineering, but will it fix Britain's well-publicised engineering-skills shortfall, and what contribution can the motorsport industry make?

BY JAMES NEWBOLD



DUNBAR/LAT

The doomsday bells aren't ringing yet, but British engineering could be facing some tough times ahead. That statement may seem improbable given that the government only recently identified engineering as a priority in its Industrial Strategy, announcing in November that it will increase investment in R&D from 1.7% to 2.4% of GDP by 2027, create an independent Industrial Strategy Council and invest a further £725 million into the Industrial Strategy Challenge Fund – but the elephant in the room can be ignored no longer. Genuine concerns abound that the needs of the sector may not be met in future due to an estimated shortfall of 20,000 graduates per year, which is not a problem that will be solved overnight.

According to the Engineering UK 2017 report, 265,000 skilled workers will be required annually until 2024 to meet the demand of engineering enterprises, so it should come as little surprise that the same report stated that 69% of businesses are not confident of finding the high-skilled employees they require.

Technical innovation has always had a home in the UK, with seven of the 10 Formula 1 teams based in the so-called 'Motorsport Valley' around Oxfordshire and Northamptonshire, but the motorsport industry cannot assume it is exempt from the concerns of the sector at large. Unless fundamental changes are made

in the way engineering and technical roles are perceived by younger generations, the knock-on effect could potentially impact Britain's place as a world leader in the development of performance technology that is directly relevant to the standing of UK motorsport.

"Engineering in the supply chain of motorsport is critical, be it aerodynamics, IT, data capture or simulation," says Chris Aylett, CEO of the Motorsport Industry Association. "Motorsport is in all of those and it will be affected – and is affected – by the difficulty in finding people who are suitably qualified."

"This is a mechanical-engineering sport where hands-on people are absolutely essential,

not just out in the paddock, on the pitwall or in the garages, but right across the industry.

"We're not going to be immune to the difficulty [in finding people] and we're not currently immune to it. It is the single largest issue that continually comes up in every MIA business survey that we run each year – the thing that depresses future growth most is the lack of skilled employees."

Given the reality of an ageing population, which is a contributing factor to the UK being less productive than other developed nations including the US, Germany and Italy, change needs to start sooner rather than later – and that's even before considering the implications



STALEY/GP3

“Anything that raises the awareness and image of engineering across the country has got to be welcomed”

Clockwise from left: Williams is based in the heart of ‘Motorsport Valley’, but will not be immune from the skills shortage; Dare to be Different benefits from input of STEM Ambassadors; motorsport is dependent on the supply of engineers



of Brexit and the well-publicised diversity problem, with women making up less than one in eight of the engineering workforce.

Engineering UK’s report made two main suggestions, based on promoting the role and contribution of engineering to the UK, while also improving the supply of engineers through emphasis on diversity and encouraging students to pursue science, technology, engineering and maths (STEM) subjects in schools.

The Year of Engineering is one step towards making those recommendations a reality. Targeted at students aged seven to 16 and their parents and teachers, the government-led initiative was launched to improve the

perception of engineering and engineers through “inspiring experiences of modern engineering” that will encourage young people to consider pursuing a career in the industry.

The fruits of such a scheme are obvious if successful, but how would it work?

GRAND INTENTIONS

In essence, the Year of Engineering represents the union of industry and the government – Stephen Metcalfe MP, a former chairman of the Science and Technology Select Committee, is confirmed as the government’s official envoy – to increase the visibility of engineering by placing a spotlight on projects directed at

young people and encouraging more within industry to follow suit.

There are numerous projects of varying scale across the UK that hope to benefit. These range from the Big Bang Young Scientists & Engineers Fair – the UK’s largest STEM-focused event combining theatre shows, interactive workshops and exhibits – to nationwide competitions such the Technology, Design and Innovation (TDI) Challenge for D&T students aged 14 to 19 and efforts to engage young people at a regional level, such as the Worcester Skills Show based on the site of the historic hillclimb event at Chateau Impney.

Machine-tool maker Mazak, a partner of McLaren since 1999, is among those showcasing at Worcester, and non-executive director Marcus Burton believes improved visibility will be invaluable to the success of such programmes.

“The important thing is to get national recognition of all the efforts that are already going on and see if we can get a kind of cumulative effect of all the efforts under this brand name,” says Burton.

“Anything that raises the awareness and image of engineering across the country has got to be welcomed.”

The Year of Engineering will also aim to harness the expertise of STEM Ambassadors, a 30,000-strong network of volunteers made up of graduates, apprentices and university lecturers who share their experiences with students in schools and colleges across the UK.

At drivetrain expert Ricardo, all graduates ▶





joining the company are qualified STEM Ambassadors and are required to support at least two STEM activities per year to meet their objectives, a personal development strategy that's increasingly common among some of the larger engineering enterprises.

Susie Wolff's Dare To Be Different initiative to inspire the next generation of female talent in motorsport is just one of the many to have benefited from the input of STEM Ambassadors, with female role models from different sectors in industry giving girls aged eight to 14 a solid grounding in STEM-based tasks at its activity days.

"Dare to be Different's agenda is to try to

"Motorsport can show what fun engineering can be. We have this fabulous brand"

get more young girls thinking about the motorsport industry as a destination for them in terms of a career, not just driving a car but more importantly being an engineer helping to develop and design cars," says STEM Learning's regional network lead for London and the South East, Dr Ajay Sharman.

"The motoring industry does suffer hugely from having a diversity agenda, so Dare to be Different and STEM Learning came together to try to encourage some of the engineers and role models to come and support them.

"It's really important that young people meet with a good range of people from different backgrounds and from different aspects of engineering because they bring real-life industry into context and enrich young people's knowledge in all kinds of ways."

ENCOURAGING INDUSTRY PARTICIPATION

To capture the imagination of young minds and be more than just a grand title, the Year of Engineering will require support from

industry, and a shift in attitudes to boot.

The Institution of Engineering and Technology's 2017 Skills and Demand in Industry survey reports that 75% of employers believe tackling the skills problem will be essential for the government's plans to be realised, but only 21% said they would be willing to get involved or become more involved with taking proactive measures to improve the supply of skilled workers. More concerning is that only 17% of employers currently attend careers events or organise school visits to encourage young people to consider a career in engineering.

The belief that young people can offer little to engineering companies is deep-rooted, but ultimately shortsighted and must change for the industry to remain competitive.

Laura Pickering, education and development coordinator for the Manufacturing Technologies Association, hopes the increased visibility for projects such as the TDI Challenge resulting from the Year of Engineering will help bring about a shift in philosophy, and is working to encourage MTA members to engage in STEM activities.

"What I'd really like to do is to encourage industry to engage with schools and colleges a lot more," says Pickering, "whether that's holding open days for them to come in, or the variety of work-experience programmes they can do such as Industrial Cadets, which is like a Duke of Edinburgh Award for the engineering and manufacturing industry."

Motorsport has a key role to play here too. Formula 1 teams are gradually beginning to recognise the worth of apprenticeships, and high-profile prizes such as the Autosport Williams Engineer of the Future Award, won last year by Bath University student Martins Zalmans, show that the sector is actively engaging with young talent.

But Aylett believes that motorsport remains an underused resource for showcasing engineering to young people and wants to see more initiatives like Greenpower — a challenge for students to design, build and race their own electric racing car, which is featured in Year of Engineering promotional videos — launched in the UK.

"That indicates the role we can play —

undoubtedly one of the most stimulating and exciting sectors of engineering in that age group, from 12 to 15, is motorsport, in all its forms," he says.

"Motorsport can be used to demonstrate what fun engineering can be. We're not British Aerospace or Airbus, we are a bunch of relatively small companies, but collectively we have this fabulous brand for young people."

Aylett confirmed that the MIA plans to become an official partner of the Year of Engineering and says the organisation is "100% supportive" of its intent to mobilise industry.

"There's no question that heightening the awareness of this genuine shortage of





INDUSTRY FOCUS

Clockwise from left: Ricardo graduate employees are required to support at least two STEM activities per year; budding engineers were recognised at the TDI Challenge finals; Martins Zalmans receives the Autosport Williams Engineer of the Future Award; F1 teams are starting to appreciate the value of apprenticeships

20,000 engineers on a national scale will help motorsport in simply raising the level of interest," he says.

"We want to engage in the campaign and will encourage our members to do so individually, as well as collectively."

Collaboration will be key to bringing this vision to life, and the Year of Engineering presents opportunities for motorsport companies to partner with major OEMs (original equipment manufacturers) in different sectors of industry, whether through existing links with automotive companies or forging new links with marine, military and aerospace firms.

"All engineering-based sectors are very well aware of the shortage of engineers and every sector is trying to push engineering as a professional career, so the next step on that journey is for the sectors to join up more," agrees Ricardo director of powertrain systems and McLaren programmes Jason March.

"Motorsport has a really good opportunity with its links to the automotive industry to support the push in a more joined-up way, especially as we've seen more OEMs coming into motorsport. Having more of a cross-sector perspective is going to be very important – the more publicity and the more we get everyone working on it together, the better."

CHANGING PERCEPTIONS

If all elements combine to successfully raise the profile of engineering, it will be equally important to capitalise on this by improving the public perception of modern engineering and what engineers do. Today, advanced automation means engineering is more integrated than ever, allowing students to be exposed to the full breadth of industry from electrical to civil and mechanical engineering.

"We're trying to dispel these myths, more than anything, that it's not just about dirty, oily rags," says Sharman. "For example, most cars today have more technology and software engineering in place than I've ever known before in my life."

It's not just young people who need to be convinced, but their parents and teachers too.

"The skills shortage in engineering is partly a throwback to the image of engineering going through those changes that happened in the 1980s, where a lot of manufacturing closed down or was outsourced," says Burton. "Today's generation of parents and grandparents still have a rather old-fashioned and outdated view of engineering."

STEM Learning is acutely aware of this and wants to extend the campaign further to parents and teachers, with a view to improving the careers advice students receive before selecting their GCSE options.

"Parents are some of the biggest influencers for young people and we don't do enough with them," says Sharman.

"Part of the campaign should be about getting the messages out to a much wider audience, not just schools, not just to young people, but to parents and influencers as well."

Although question marks remain over some of the finer details of the initiative, hopes are high that the Year of Engineering can make a tangible difference in increasing awareness of the highly skilled careers that are available within engineering, as well as tackling the skills gap by promoting STEM.

"The key thing is getting people to be interested in the STEM subjects and to leave all their doors open through their education so they can pursue engineering careers later on," concludes Burton. "We've got to start young." ■





AL KAMEL SYSTEMS THE TECHNICIANS THAT MAKE FORMULA E TICK

Timing and scoring is largely taken for granted until the moment it doesn't work. Al Kamel is responsible for its smooth running at Formula E events, and far more besides...

BY JAMES NEWBOLD

The Trulli GP debacle proved that Formula E could survive the mid-season collapse of a team and continue relatively unscathed. This year, the championship has weathered the storm of Sao Paolo and Montreal dropping off the calendar, but the absence of a merry band of technicians from Spain would be impactful for an entirely different reason. So keenly is its influence felt across several different elements in FE – from timing to TV graphics, race control and IT services, used by teams, drivers, media and fans alike – that without Al Kamel Systems, the show would descend into farce.

Established in 2004 by Jose Luis Garcia, a former director of timing at MotoGP commercial rights-holder Dorna, Al Kamel has developed a reputation for accuracy and reliability that is reflected by its impressive

portfolio of series, including the FIA World Endurance Championship, Le Mans 24 Hours and IMSA SportsCar Championship.

With responsibility for timing solutions at the Circuit de Catalunya, Monza and Qatar's Losail International Circuit also under its remit, Al Kamel frequently operates across multiple time zones on the same weekend and is continuously evolving its software to stay ahead of the curve.

"It's not a big market because the most important racing series already have their own timing department or TV graphics or technical department, like FOM or like Dorna in MotoGP," says Garcia.

"There is a high second tier available where we are well positioned because we can offer a turnkey

solution. Flexibility is our main asset."

Timekeeping can be a thankless task that is typically only noticed when it malfunctions and detracts from the on-track product, but a lot of time and effort is invested to ensure it remains firmly in the background.

This is especially true of the urban environments visited by Formula E, as Al Kamel technicians are required to install CCTV cameras and lay fibre wiring under the road surface in addition to their regular duties.

"In each event we have different services," explains software development and TV graphics director Nacho Puig.

"Our main service is of course timing and scoring and results, but we also have other solutions like the on-track map, TV graphics, or the signalling system that we have installed



AL KAMEL



“We have a lot of pressure, because there are a lot of parts that depend on our good work”



at the Losail Circuit in Qatar. Some of them are not related 100% to timekeeping.

“We have a lot of pressure, because there are a lot of parts that totally depend on our good work. We are doing live services and the race is on Sunday, not on Monday, so you cannot fail.”

Al Kamel takes a team of 20 people and around 10 tonnes of equipment to each FE event. Typically they arrive a week before the race to allow for up to five days of set-up, often working through the night when the cities are quieter, to be ready in time. As Garcia puts it, “We are not a normal company”.

“We have crazy schedules to cut the street and work during the night; it’s very hard work and if you are not passionate for motorsport, if you are not in a team like a family, then you cannot survive,” he says.

“If you ask a [big] technology company to do the same things we are doing in a Formula E race, they will say, ‘That is not possible with only 20 people, you will need 60’.”

The company works closely with MyLaps, pioneer of the original automatic sports timing system in 1982, to deliver optimal accuracy to its customers, but what sets Al Kamel apart from other distributors is its ethos of innovation away from the circuit.

With a dedicated team of seven software engineers working to find improvements and develop new solutions between events, Al Kamel’s operational expertise and attention to detail is allowed to shine through when it matters most.

“The hardware we are using for timekeeping is from MyLaps, it is a well-known company and a leader of the market, but now the accuracy is coming more from the side of the network, the set-up and the quality of the devices,” says Garcia.

“It’s how you build your software, how you set up the communication systems and how you use all the information you have.”

Before it is exposed to the unpredictability of live race conditions, all new or updated software is first subjected to rigorous beta-testing at Al Kamel’s Barcelona offices using reruns of race footage and telemetry to identify any weaknesses. If it passes the simulation stage unscathed, the new programmes are run in parallel with the existing software at two race events, after which it is then approved for use.

“During an event there is a high-pressure environment and when we face any issue, sometimes it is difficult to understand what happened in that moment, so simulation permits us to replay it and find where the problem is,” says Puig.

“The last step is to test the new piece of software in parallel with an event. Sometimes it is the same software that we are using for the timekeeping, but with small changes we want

Clockwise from left: Al Kamel technicians take 10 tonnes of equipment to each FE event; fibre cables have to be laid beneath the road surface in urban environments FE frequents

to test. We test it in two consecutive events, then if we get the green light, we do the release of the software and it is available for everyone.”

The direction of development is largely informed by the feedback from Al Kamel’s various clients, including drivers or teams that need access to the right data to improve, championship coordinators, circuits and even FIA WEC race director Eduardo Freitas, the man responsible for enforcing track limits.

Garcia is in the process of conducting a survey for championships and teams about how they receive their information “so they feel like we are partners, not only a supplier”, and each has a different perspective that helps Al Kamel to improve its services.

“For us it is very important to have the feedback from our customers – if something is wrong, these things help us to improve and we want to improve continually,” he says.

“Each championship is different. We started to work with IMSA last season and they have another vision of timesheets or monitor layout or live timing to what we have at Le Mans. Those are very important challenges for us to understand.”

Garcia has no plans to slow the company’s rate of growth and is targeting further expansion into affordable automated marshalling systems, in addition to the one already installed in Qatar.

Even if Al Kamel Systems would prefer to stay in the background, we’ll be seeing much more of its work in the near future. ■



RADIATING PASSION

Legendary F3 team owner Alan Docking might not have an active race operation these days, but he's still involved in motorsport through his fabrication business

BY JAKE BOXALL-LEGGE

To motorsport-types of a certain age, Alan Docking needs no introduction. Arriving on Britain's shores from his native Australia in 1973, Docking became a huge player in the European racing scene across 30 years, running teams in Formula 2 and Formula 3, interspersed with fleeting programmes in sportscars. But after a foray into the World Endurance Championship, he elected to step away from the pitwall five years ago and now focuses his attention on his own engineering businesses.

Based in one of Silverstone's myriad surrounding industrial parks, Docking is the managing director of two companies:

Earls, which imports and manufactures components for hydraulic products, and Docking Engineering, which fabricates radiators and fuel tanks for a vast range of applications. Collectively, they employ around 25 people, including machinists, fabricators and office staff.

Although still tangentially involved in the motorsport industry through both businesses, Docking relished the idea of a new challenge away from the cut-and-thrust of racing.

"I had a chap running the fabrication business who was retiring," explains Docking. "There was me trying to find someone else to take his position, and I realised that I'd probably enjoy doing it myself!"

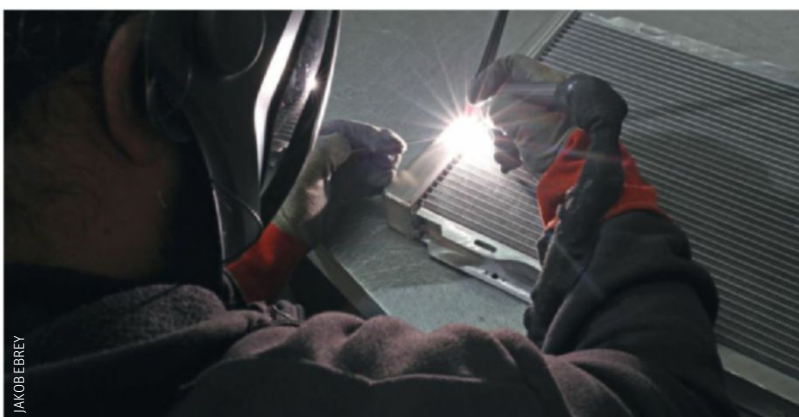
Docking Engineering has been in business since the early 1980s, having become something

of an offshoot of the Alan Docking Racing team, which joined the ranks of British F3 in 1976. Following early years of sustained success, winning titles in its first two seasons with Rupert Keegan and Stephen South, Docking proceeded to set about making his fledgling operation more self-sufficient.

"I'd always had an interest in welding and fabricating, and during the early 1980s we'd expanded a little bit and had two or three cars and drivers," he says.

"I set up a fabrication area to support the race team, so if we broke something we could repair it. It was just a necessity for the team; rather than take the job to somebody else and having them fix it, we could repair things in-house.

"It was in that same period that aluminium



radiators had started to get popular — around 1981-82 — and we got onto that fairly early. I was very interested in the process and from there it evolved. We'd built the first one, and another racing team wanted one — so we built that. And it grew, and people wanted aluminium radiators to replace their copper/brass ones."

Soon, Docking had larger automotive concerns asking for his aluminium radiators. Lola, a huge presence in motorsport in the 1980s and '90s, became his first "biggy" client, along with a number of small racing teams across a broad range of categories.

Primarily dealing with fabricated products, Docking Engineering is able to provide tailor-made parts to a range of customers — and not just to those in the motorsport industry.

Radiators, as well as aluminium fuel tanks, are also produced by Docking for companies in the aviation and military sectors. Commercial aeroplane manufacturers and drone builders are among Docking's customer base, diversifying his portfolio.

"Our business has evolved, about 40-50% [of our customers] would mainly be motorsport and the rest is all aviation and military, the military side being predominantly UAVs [unmanned

Clockwise from top: ADR won 2002 British F3 title with Robbie Kerr; each unit is subject to strict quality controls; Docking Engineering builds bespoke products for customers at its Silverstone HQ

aerial vehicles]," Docking says.

"The UAV builders have come to the motorsport engineering and motorsport fabrication companies to assist with the development of their parts.

"When I first came to England, just about every village in the country had a Formula Ford factory, or people making bits for Formula Fords. It seems to have gone offshore today, and it's now like UAVs are the new Formula Fords — they're the new village industries!"

Docking's motorsport experience and nous have provided his company with a great understanding of how to produce high-performance components for a range of industries, and his fabrication workshop is packed to the rafters with assorted ▶

DOCKING'S HALL OF FAME



ACROSS HIS THREE DECADES OF RACING exploits, Alan Docking gave chances to the likes of Formula 1 race winner Mark Webber and 2014 IndyCar champion Will Power (above), among a number of other hugely gifted drivers.

"They're all special in some way," Docking says. "I don't like to say any driver was the best, all different characters, and it was just about getting the best from them."

Webber is arguably the most high-profile name and, like Docking, arrived from down under with little money. He joined ADR for the 1997 British F3 season, finishing fourth.

"Mark worked very hard at it," recalls Docking. "When I'd first met him, he'd laid out this plan in front of him to get to F1. He didn't want to waste time because the budgets were minimal, but he knew he'd get there if he could do certain things and take these steps. He put the hard yards in, fought tooth and nail with his manager Ann Neal, and they both wanted it – and both got it."

Docking also has fond memories of 2002 British F3 champion Robbie Kerr, who he describes as "a real, real talent".

"Robbie should've gone further, but the opportunities weren't there," Docking says. "He was as quick as anybody, but was just in the wrong spot at the wrong time. He's a proper bloke, very professional with his coaching work. I think he's the best that never made it."

Another of Docking's former drivers never to reach F1 was Marcel Albers (below), the highly rated Dutchman who was killed at Thruxton in 1992.

"Losing Marcel was a huge blow to the team and to me personally," he says. "He was really progressing well with his development as a driver and was going to dominate that year, I think. It was terrible."



components, ranging from Formula 1 turbo intercoolers to tiny target-drone radiators.

"The little radiators were probably one of our earliest aircraft jobs, in about 1996," he explains. "The people who built these drones had an issue with the increased sizes of rotary engines and needed some cooling. They were expecting to go to China to get these things made, because they didn't know of anywhere in the country who could make these little radiators."

"A chap I knew from motorsport knew the drone company, and he said, 'Actually no, I think there's a bloke at Silverstone who could probably make them'. We went down to them in Kent, presented two radiators to them and they were over the moon! We've made about 4000 now."

Providing a tailored service for independent clients too, Docking explains the process that his team of fabricators goes through to ensure that they deliver a consistent stream of quality products across a diverse range of applications.

Like all manufacturing companies, Docking technicians put together the tooling required to make the correct shapes and profiles for the radiator to be welded together. These are made out of wood, and are then sent off to be cast in metal to shape the aluminium sheets.

"Quite often," says Docking, "some customers come to us – they might be an amateur racer and he's got an old radiator, a copper-brass one, and they want it in aluminium. So we will take the measurements of that and repeat it."

"Others come to us with a drawing, so we'll make it from those drawings. Some will have a cardboard cut-out or wooden mock-up – lots of things come in different ways, but the majority of our customers provide drawings."

With the required tooling to correctly shape the parts, the aluminium sheets are formed using a press. After some final adjustments,

the fabricators can begin to weld everything together, before the components go through the final finishing processes, are tested and rubber-stamped for shipping.

"This little fella here," says Docking, as he picks up a completed piece, "is going away for alochroming. This is an aircraft cabin heater, and it gets a green finish on it that prevents corrosion."

"Our components are all built, checked carefully, and then sent off for the alochroming process before we send them off to our customer. They'll check it over again, just to be sure."

Docking's three decades of expertise with high-performance radiators extends to the after-sales service too, offering cleaning and maintenance for radiators to extend the product's life.

"We get customers who send in their radiators for ultrasonic cleaning, and that's inside and outside before we straighten up the radiator fins, just to give it another round," he says.

"They probably lose about 15-20% of their performance with the rubbish that gets built up in them, so cleaning them is another service we provide."

Docking's passion for his company's craft is palpable and, since putting his racing team on ice after its brief LMP2 exploits, he values the contact with the motorsport industry that Docking Engineering gives him.

"I do enjoy the racing, it's in your blood," he says. "It's a bit of a problem, but I'm containing it with all these other activities, which are all motorsport-related."

With his obligations and current schedule, would Alan Docking Racing ever make a full return to the track?

Docking ponders, then grins.

"If the right opportunity came to the door, by golly I'd be working with it!" ■

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