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AUTOCAR

The original car magazine, published since 1895 'in the interests of the mechanically propelled road carriage'

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COMMENT

GOOD THINGS TO LOOK FORWARD TO IN 2020 - OR NOT



FROM THE FIRST of January 2020 two vehicle safety laws will be enforced: the mandatory use of seat belts by rear seat passengers, and child car seats for children. Will this be a case of some backbone at last or is the government then going to take the usual path of no resistance and put slack standards ahead of public welfare? Countless studies have shown that seat belts when used properly save lives. In the most famous car crash in the world, the sole survivor was the one wearing a seat belt. Are people who refuse to put on seat belts part of nature's bigger plan to correct its mistakes?

I won't be holding my breath for the enforcement of the new restraint laws any more than for the one prohibiting smoking at food places. There has already been a climb down on child safety seats to make allowances for larger families.

If the authorities start paying attention to what motorists get up to, enforcement officers would also have to notice drivers using their mobile phones while driving, driving through red lights, and, a particular favourite of mine, parking where ever a driver deems convenient. That's a lot of extra work on a salary that's not performance related.

Pessimist, whinger or cynic, call my lack of confidence what you want. In the meantime, stay safe on the road and all the best for 2020.



Lisa Kuok Managing Editor

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CARS OF THE YEAR

Our testers assemble their choices and hash it out over lunch, p80



150MPH. REALLY

That's how fast this tractor will go. Can we break the record? p50



IT'S A SMALL WORLD

Discovering treasures in a model carshop, p120

NEWS

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New Jag F-Type ditches V6 but doubles down on V8

Newly revised sports car will arrive in early 2020 with 296bhp four-pot and V8s in 567bhp and 444bhp guises, but no V6. Prices start at £54k



EXCLUSIVE PICTURES

Jaguar has overhauled the F-Type sports car with new styling and technology to take on the latest Porsche 911.

The targets were to give it a "more assertive" look, to improve key elements like the infotainment system and to lift materials quality to the level of more recently launched models, such as the I-Pace.

One major surprise is the disappearance of the F-Type V6. From 2020, the Jag sports car will come with a choice of either two 5.0-litre supercharged V8 power levels (retaining the 567bhp at 6500rpm version, and a new unit with 444bhp at

6000rpm) or the continuing entry-level 2.0-litre turbocharged Ingenium four-cylinder engine producing 296bhp at 5500rpm.

In a reorganisation at the top of the F-Type's three-tier range, the 567bhp performance versions of the coupé and convertible are available with only all-wheel drive and the plunkest, sportiest R specification - which also gets a complete rethink of spring and damper settings. This flagship can cover 0-60mph in just 3.5sec and has a top speed of 186mph.

The 444bhp and 296bhp versions are available in either middle-level R-Dynamic trim

or entry-level guise. The lower-powered V8 can turn a 4.4sec 0-60mph time and hit 177mph, while the 2.0-litre's 0-60mph time is a respectable 5.4sec and its top speed is 155mph.

The 444bhp V8 buyer gets to choose between rear-wheel and four-wheel drive systems, while the 2.0-litre customer is offered rear drive only.

One major advantage of the smallest-engined model is its 120kg-lower kerb weight (it weighs 1520kg against 1640kg for the rear-drive V8), which lightens the nose and improves steering response. The heaviest F-Type is the full-house R convertible equipped with four-wheel

drive, weighing 1760kg.

For the first year, the F-Type will be offered in First Edition guise with either 444bhp or 296bhp engines. They will be based on R-Dynamic equipment levels but with a collection of special colours, unique trim details and First Edition branding.

All F-Types have active exhausts and the V8s have a special 'quiet mode' to help prevent neighbourhood disturbances when owners leave home early or arrive late.

Jaguar design director Julian Thomson, who was heavily involved in the 2011 concept that introduced the first production F-Type, said the original mission was to

"design the most beautiful sports car, with purity, proportion and presence that's unmistakably Jaguar". He described the latest model as "more dramatic than ever, with even greater clarity of purpose".

The most important exterior changes are ahead of the windscreens, with the aim of giving the body a greater apparent length (it's no longer) and giving the car an even wider, more planted stance (it's no wider). A new clamshell bonnet keeps its central bulge but now has a softer, "liquid metal" appearance. Each of the three models now gets a unique lower bumper shape - clean and sculptural for the ➤

“
The new flagship F-Type can cover 0-60mph in just 3.5sec and has a top speed of 186mph
”



Slimmer headlights, a wider grille and a new bonnet feature

“
Prices start at £54,060 and rise
to £97,280 for the quickest coupé
or £102,370 for the convertible
”



R cars get a mean-looking diffuser and bespoke quad pipes

entry model, bolder with aero blades for the R-Dynamic and with black bezels for the large and sporty-looking lower air scoops on R models.

That new treatment allows the introduction of slimmer LED headlights framed by ribbon-like daytime-running lights for which Jaguar claims a "calligraphy" effect. The running lights are slim along their horizontal element but widen as they sweep upward and outward.

There are also various subtle changes to badges and textures on trim parts, which, like the rest of the new F-Type's changes, add neat touches of modernity.

The new headlights leave room for a wider and deeper

grille, still very much in the F-Type Jaguar idiom. "Everyone's shouting louder these days," said exterior design boss Adam Hatton, "and we need to do the same. We don't want to be brash, but we don't want to shrink from the opposition, either."

The haunchy rear shape remains intact, partly because of the F-Type's mission to be a timeless design and partly because Jaguar's design team (along with buyers) continue to like the original shape.

The tail-lights have adopted a slimmer, 'chicane' design introduced on the I-Pace and there are adjustments to the numberplate recess and the diffuser shapes.

The three F-Type models

continue with powertrain-specific exhaust tailpipes. The 296bhp version retains a handsome central quadrilateral-shaped outlet and the V8s have quad systems that differ slightly in detail.

Inside, the F-Type catches up with other Jaguar models, notably with materials of more obvious quality, and adds some unique details. There's now a 12.3in driver display, with unique F-Type graphics, that can be configured as a large central tachometer.

Jaguar Land Rover's familiar 10.0in Touch Pro system is in the centre fascia, now with refinements like Apple CarPlay compatibility, but the 2020 model retains the three rotary heating and ventilation

controllers Jaguar regards as essential to a good driving machine.

The 2020 F-Type also incorporates new, subtle details the designers believe owners will enjoy: there is now 'Jaguar est 1935' lettering on the seatbelt guides, repeated on the glovebox release surround, to mark the year in which the company's founder, Sir William Lyons, first used the Jaguar name on his cars.

Two seat designs, Sport and Performance, are offered, both described as "lightweight and slimline". The base and R-Dynamic models come with Sport seats as standard, while the Performance seating - with more pronounced support around shoulder height - is

standard on R and First Edition.

The F-Type interior keeps its snug, occupant-friendly character: low supportive seat locations, relatively high window sills and a particularly stirring view over a carefully improved instrument layout, down the shapely new bonnet.

Prices start at £54,060 for the entry F-Type (or £5500 more for the convertible) and rise to £97,280 for the quickest coupé (£102,370 for the convertible). In the middle of the mix, the rear-drive 444bhp V8 coupé is £69,990 and the four-wheel-drive version just under £5000 more. Orders are being taken now and deliveries should begin in the first quarter of 2020.

STEVE CROPLEY



WHAT NEXT FOR THE F-TYPE?

The 2020 F-Type looks increasingly likely to be a swansong – not just for the V8, but for the combustion-engined Jaguar sports car altogether.

JLR is mulling a radical revision for the second-generation Porsche 911 rival, not due until 2022 at the earliest. It will include either an electrified or fully electric powertrain, with a possible engine layout change too. It is understood that two

design approaches are being progressed – one with a short-nosed body and mid-mounted electric powertrain and another with a front-mounted and hybridised internal combustion engine.

Details have yet to be finalised, but bosses are believed to be watching the market closely and will have to make a decision soon in order to progress with development.



Q&A ALAN VOLKAERTS, VEHICLE LINE DIRECTOR, JAGUAR F-TYPE

Why have you dropped the V6 F-Type?

"The decision not to offer the V6 in the UK and Europe follows a sales review showing demand is by far the heaviest for the four-cylinder engine. Also, we believe the introduction of a new 444bhp V8 in both AWD and RWD forms still offers customers a strong range."



Has the F-Type production process at the Castle Bromwich factory changed much in six years?

"The core processes at Castle Bromwich are largely unchanged but we've recently updated our rolling road, calibration and paint validation facilities, with special emphasis on quality. We're very pleased with the results."

Why didn't you use the new Ingenium straight six?

"It's a simple question of packaging. With demand for the four-cylinder so strong, we simply couldn't justify the significant investment needed."

How are F-Type sales doing?

"Last year, we sold around 7900 cars, mostly in the UK, US and Germany. Our record of 12,000 sales was set in 2015. The most popular F-Type derivative is the four-cylinder R-Dynamic, which is why we're offering a First Edition based on this model as well as on the new 444bhp V8."

Will Jaguar continue making sports cars?

"At heart, we're a sports car company. The market has diversified over the years and we've had to do the same, but I think we're stronger for it. For me, Jaguar just wouldn't be Jaguar without a sports car in the line-up."

OFFICIAL IMAGE

Murray's F1 successor set for 2020 debut

Radical £2.3m three-seat 'fan car', with a 12,400rpm V12, will be launched next May

Gordon Murray plans to unveil a production-spec version of his revolutionary T50 ground-effect 'fan car' in May.

The £2.3 million 'analogue' hypercar, to be built at Murray's new Dunsfold factory, will move immediately after launch into a prototype build and development phase, before production build-up begins during 2021.

The first of the planned 125 cars - 100 road cars and 25 purely for the track - will reach its new owner at the beginning of 2022 and production will continue for a year.

Under a deal just announced, the T50's all-important aerodynamics package is being developed with the assistance of the Silverstone-based Racing Point Formula 1 team, formerly Force India. Access to the team's moving-floor wind tunnel, plus the expertise of its F1-trained technicians, will allow Murray to use large-scale models to refine the T50's revolutionary active aero package.

A three-seater with a central driving position, the car combines the unique qualities of Murray's two most iconic creations in a stellar

50-year, 50-car career: the seminal, ultra-light McLaren F1 three-seat supercar of 1992 and the Brabham BT46B grand prix 'fan car' of 1978, whose extraordinary levels of downforce briefly stood F1 on its head and took one race win before the team withdrew it in the face of opposition from rivals.

The new T50's most striking feature is a 400mm rear-mounted electric fan, designed to extract air rapidly from beneath the car, radically increasing downforce and grip. The aero set-up can be configured in six different

modes, two of them automatic, the rest driver selectable. They vary from the super-slippery Streamline mode to the High Downforce setting, for use when exceptional stability and traction are needed.

The first details of the T50 emerged last summer, when it became clear that it would use much of the packaging and technology of the F1, simply because, in Murray's view, there isn't a better way of doing it. The car has an all-new carbonfibre tub and is powered by a bespoke mid-mounted normally aspirated 4.0-litre V12, built by Cosworth,

producing around 650bhp.

The engine revs to 12,100rpm, with a 12,400rpm hard limit, which will make it the highest-revving road car engine yet built. Experimental versions are running at full speed on the dynamometer and said to be producing exhaust notes whose quality



Murray's F1 is a crucial influence

FORD ANNOUNCES MK3 KUGA PRICES

Ford's third-gen Kuga will start from £23,995 in Zetec trim with a 1.5-litre turbo petrol engine. First Edition variants will be prioritised for deliveries early next year. The new, 222bhp plug-in hybrid is available from £33,095 in Titanium trim.



RISING EV SALES BUCK MARKET TREND

Hybrid and fully electric models had a record market share of 10.2% in November, despite a shrinking UK car market. Over 16,000 hybrids or EVs were registered, with battery-electric vehicles up 228%. Diesel's share fell to 23.6%.



“
It's powered by a bespoke naturally aspirated 4.0-litre V12 producing about 650bhp
”



Official image shows the T50's prominent rear-mounted fan

very much matches the high output.

At the front of the engine, a 48V integrated starter/generator connects directly with the crankshaft. It acts as a starter motor, then converts to a generator to produce the power needed to spin the lightweight fan at speeds of up to 8000rpm.

The V12 is mounted very low in the T50's all-carbonfibre tub, driving the rear wheels through a six-speed H-pattern manual gearbox built by Xtrac. Murray says most buyers are "relieved" by the presence of a proper stick shift, but he directs those who prefer paddles to the 25 late-build

track cars, which will probably use them.

In another nod to traditional driving, the T50 avoids hybrid technology: Murray says it would increase kerb weight far beyond the current figure of just 980kg, with many knock-on disadvantages. He wants the T50 to be seen as the spiritual successor to the F1 in its lightness, compactness and space efficiency, with those properties all enhanced by the use of modern materials and techniques.

The T50 is just 30mm wider and 60mm longer than the F1, having about the same road footprint as a Volkswagen Golf. "No one else makes supercars

our way," said Murray. "I'm happy about that."

The car needs very little obvious upper-body aerodynamic addenda, allowing for a purer front-end shape. Although the frontal styling has yet to be revealed, Murray says its relationship to the F1 will be clear.

Downforce is generated either by an active tail spoiler or via a large venturi beneath the body, a system of slots and ducts with the 400mm fan at its rearmost extremity. The feed of underbody airflow can be varied by the opening or closing of slots ahead of it.

The T50's two automatic aero modes are Auto (which

WHY THE FAN MAKES SO MUCH SENSE

Aerodynamic downforce is a great thing to have when you need it, explains Gordon Murray, and that's principally between 60mph and 100mph, the point at which your car benefits most from greatly enhanced cornering adhesion. It would be nice to have downforce that works lower down, too, but passive aero gadgetry doesn't provide it.

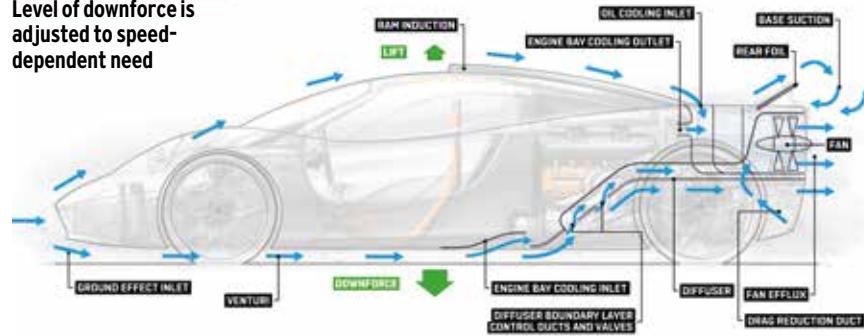
When going faster, you could often do with less aero effect. "Aerodynamic load

rises as the square of speed," Murray says, "and so does drag. Which means many cars with serious performance use up their suspension travel at high speed, which is about the last thing you need. You can reduce it with expensive, bulky variable-rate complexity, but who wants that?"

All of which, in a nutshell, makes the case for the T50's brand of variable, fan-based downforce. It can be strong

at 30mph. (Murray says the T50 sucks hard enough at full-fan speed to stick itself to the ceiling.) But the system is tunable and delivers exactly as you want it to. You can use it to help stop your car from seriously high speeds. And you can adjust it for decent stability yet good ride quality while cruising autobahns at 150mph. In short, it looks like one of those things, once explained, that every serious future fast car will need.

Level of downforce is adjusted to speed-dependent need



Use of fan for aero will allow bodywork to look 'pure' and uncluttered

optimises use of the fan, the rear spoiler and the underbody diffusers) and Brake (which opens the spoilers and runs the fan at high speed, sucking the car onto the road and increasing both stability and rolling resistance).

The driver-select aero modes are High Downforce and Streamline, which cuts drag by about 10% by closing underbody vents and speeding the fan to create a 'virtual longtail'. There's also a Vmax mode, a kind of 'push to pass' setting that adds 30bhp for up to three minutes. Near the top speed, the ram effect of a roof-mounted induction air scoop (a Murray favourite) boosts power

to about 700bhp. The final aero mode is Test, which allows an owner to demonstrate the functioning of the aero system when the car is stationary.

Most T50s are already sold, although there are still "a few" opportunities for buyers. Murray said he is pleasantly surprised at the comparative youth of the latest crop of buyers: 40% are under 45 and three are buying their first-ever supercar. "People tell us the McLaren F1 was their poster car when they were growing up," said Murray. "Now that they've built successful businesses, T50 has become their F1. We're very happy with that."

STEVE CROPLEY

JAG UNVEILS FRENCH-FLAVOURED XE

Jaguar has revealed a special XE named in honour of the Reims-Gueux circuit in France. Priced from £38,295 with the P250 petrol engine and limited to 200 units, it brings back the firm's French Racing Blue paint alongside equipment upgrades.



BMW U-TURN: APPLE CARPLAY NOW FREE

BMW has reversed its decision to charge Apple CarPlay users £85 a year, making the system free for the lifetime of the car on all models operating the latest infotainment set-up. People who have already paid will get an unlimited subscription.



Audi RS Q8 covers
0-62mph in 3.8sec
and can hit 189mph



OFFICIAL PICTURES

RS Q8 squares up to X6 M

New 591bhp Audi Sport flagship SUV lays down performance gauntlet to BMW

Audi Sport has unveiled the new 591bhp RS Q8 SUV, powered by a 4.0-litre V8 engine and with styling inspired by the rally-derived Sport Quattro S1, as the 'spearhead' of its range.

The BMW X6 M rival, revealed at the Los Angeles motor show, is the first large SUV produced by Audi's performance arm. It joins the recently revealed RS Q3 and RS Q3 Sportback in a planned line-up of hot crossovers and Audi Sport boss Oliver Hoffmann claims it features "the genes of a true high-performance sports car".

The RS Q8 has received a substantial makeover from the regular Q8, including a revamped single-frame grille and large front air intake. Although the track width is unchanged from standard

versions, bespoke trim strips widen the body by 10mm at the front and 5mm at the rear. The hot SUV also features custom sills and a bespoke downforce-generating RS roof spoiler. The rear of the car has a bespoke diffuser and large quad exhausts.

Several key design elements of the RS Q8 – including the air intakes, panel on the rear and 'hockey stick' design details on the rear corner – are intended to echo the Sport Quattro, effectively the first Audi Sport model, developed in the 1980s as a 'homologation special' for the Group B rally car.

RS Q8 product manager Markus Eberle said making a true RS model out of the Q8 was a tough challenge because of the SUV's size and weight and its breadth of ability. He said: "It demanded a lot. We

didn't want to lose the comfort and drivability of the Q8, or its off-road ability, but we wanted to add performance so that it was suitable for the race track."

The biturbo V8 powerplant is boosted by a 48V mild-hybrid starter/generator to offer 591bhp and 590lb ft of torque, with a claimed 0-62mph time of 3.8sec and a governed top speed of 155mph (189mph with the optional Dynamic package).

Power is delivered to all four wheels by an eight-speed automatic gearbox and a



Sport Quattro was an inspiration

mechanical centre differential that's able to distribute power as needed. There is also torque control and an optional quattro sport differential that can shift torque between the rear wheels. The mild-hybrid system allows engine-off coasting between 34mph and 99mph, and regenerates energy under braking.

Eberle said the RS Q8's V8 petrol engine ensured it would feel notably different from the current range-topping SQ8, which is powered by a 429bhp mild-hybrid V8 diesel.

The flagship SUV features 22in wheels as standard – with 23in optional – and large composite disc brakes, which can be upgraded to ceramic versions.

The RS Q8 has five-link suspension at the front and rear, with adaptive

air suspension featuring controlled damping as standard. The ride height can be altered up to 90mm to adjust for track or off-road use. All-wheel steering is also standard on the RS Q8.

The Drive Select system features eight modes, including two RS performance settings and an off-road option.

Inside, the machine follows the trend of recent RS models by having bespoke Audi Sport trim, badging and digital display settings. There are leather and Alcantara sports seats and an RS leather-covered flat-bottomed steering wheel. The SUV retains a sliding three-seat rear bench, giving an unchanged seats-down storage capacity of 1755 litres.

The RS Q8 is due to launch in the UK in early 2020.

JAMES ATTWOOD

NEW RAV4 TO BE RAPID OFF THE MARK

Toyota's new RAV4 plug-in hybrid will be its second-fastest-accelerating car when it goes on sale in 2020. Its 2.5-litre petrol-electric system develops 298bhp and promises 0-62mph in 6.2sec. It will also emit less than 30g/km of CO₂.



RISE REPORTED IN UNTAXED VEHICLES

The Department for Transport estimates that 1.6% of vehicles on UK roads are untaxed – a 1% rise since 2013 – suggesting it is linked to the eradication of the paper tax disc. It's estimated that the result is a £94m shortfall in revenue.



Q & A FRANK LAMBERTY, AUDI EXTERIOR DESIGN CHIEF
How challenging was the RS Q8 to design?

"It was really a challenge. It's truly the first RS Q model, so we needed to find an identity for whatever else comes in the future. It's an SUV, but we looked at rally car coupés. SUVs are the coupés of today."

**How was it inspired by the Group B Quattro?**

"The RS Q8 is a reinterpretation of the Sport Quattro. The Quattro blisters really come out at the front, for example. We're playing with the details of racing cars: you can see links to the Sport Quattro and even in the old Auto Union cars."

There's much less chrome than on a regular Q8. Why?

"Chrome means prestige, but not from a sporting point of view. Race cars don't have chrome, so we got rid of it because it's not sporty. There are still odd bits, but you don't need it all over."



Alcantara and leather seats and bespoke Audi Sport trim feature



Eight-speed automatic and mechanical centre diff delivers power

GENEVA DEBUT FOR RIMAC HYPERCAR

Rimac will unveil its production C_Two electric hypercar at the Geneva show next March, and will sell the 1900bhp EV in the UK through the HR Owen dealer group in 2021 for about £2 million. A British R&D centre is also mooted.

**'Intent to build' Karma hypercar**

KARMA'S SC2 CONCEPT car unveiled at the LA motor show has been created with production intent and will be built should there be demand.

Speaking to Autocar at the reveal, lead engineer Ben Marquart said that all the technology in the SC2 was feasible and was an update of hardware found in the California-based marque's Revero GT and GTS models.

The four-wheel-drive concept produces a combined 1085bhp and Marquart said these were "real numbers". The electric drive tech is said to be similar to that used by Rimac, and allows for precise individual control of

each wheel. Karma claims a 0-60mph time of less than two seconds and a range of around 350 miles from a 120kWh battery. Carbon-ceramic brakes, motorsport-inspired pushrod suspension, a torque-vectoring gearbox and an ultrasonic dynamic regenerative panel all feature. The SC2 also uses fingerprint and facial recognition, biometric seats and a biometric steering wheel.

"There is an intent to build it," said Marquart, acknowledging that many of the car's features are ready for production, and that the concept runs and is drivable.



SC2: 1085bhp concept could make production

SEAT UNVEILS ITS LATEST EV, THE TWO-WHEEL E-SCOOTER

Seat has expanded its mobility programme with the reveal of a new e-Scooter electric bike, set to go on sale next year with a UK launch under consideration. It's the first move into two-wheeled transport for the maker, which also unveiled a two-seat electric quadricycle, called the Minimo, in the spring. The e-Scooter uses a 7kW motor, offering roughly the same power as a 125cc bike, a top speed of 62mph and a 71-mile range. The battery can be removed for charging anywhere in the home.

**CORSA TIPPED TO BE ELECTRIC-ONLY**

Vauxhall MD Stephen Norman "truly believes" the next Corsa will be offered as an electric-only model. He claims there will be a "tipping point" in the coming years where governments will quickly embrace charging infrastructure developments.





GLE 63 S will go on sale in the UK early next year

AMG pumps GLE to 603bhp

Mercedes-AMG gives BMW X5 rival a high-performance makeover for 2020

Mercedes-AMG has pulled the covers off three performance SUV debutants at the Los Angeles motor show, with the range-topping GLS 63 (below) joined by two 63 versions of the smaller GLE.

The GLE 63 makes use of AMG's familiar 4.0-litre twin-turbocharged V8 petrol engine, this time mated to a mild-hybrid EQ Boost starter/alternator system that brings an extra 22bhp and 184lb ft when called on. The result is 563bhp in the standard GLE 63 and 603bhp in the GLE 63 S.

That translates to a

0-62mph time of 4.0sec for the 63 and 3.8sec for the 63 S, with a top speed of 155mph or, on the S with the optional AMG Driver's Package, 174mph. Only the 63 S figures are relevant for the UK, which will not be taking the non-S model, the brand has confirmed.

With the benefits of the mild-hybrid system including boosting and regeneration, cylinder shut-off and seamless restarting with the engine stop/start, Mercedes-AMG quotes fuel economy figures of between 24.5mpg and 24.7mpg and CO₂ emissions from 261g/km. It makes use

of a nine-speed automatic gearbox that is said to have been further developed from previous applications to improve reaction times.

Standard equipment on both GLE 63s includes AMG Ride Control+ air suspension and three-mode adaptive dampers, all configured specifically for this car to "combine outstanding agility and excellent vehicle dynamics with maximum traction and super day-to-day comfort", according to Mercedes.

Pneumatic self-levelling makes the BMW X5 M rival maintain a constant ride

height regardless of load, with Comfort mode lowering the car by 10mm at over 75mph, while Sport and Sport+ modes do the same from the get-go. There are also seven Dynamic Select drive modes.

Further handling-focused features include a 48V active roll stabilisation system and an electronic locking differential for the rear axle. To rein the GLE 63 in, the hot SUV features six-piston 400mm front brakes, with a ceramic braking package optional.

As with the larger GLS, the GLE 63 benefits from model-specific design touches

such as a new grille, redesigned front apron, side skirts, flared wheel arches, a diffuser-style rear bumper and twin black chrome tailpipes.

Inside, there are AMG-specific nappa leather seats, an AMG steering wheel with aluminium shift paddles, control panels and instrument functions specific to AMG and new AMG badging elements.

Expect the GLE 63 S to be available to order in the UK from the beginning of next year, with customer deliveries starting in the middle of 2020.

LAWRENCE ALLAN

Merc-AMG fires up flagship SUV

MERCEDES-AMG HAS ALSO revealed its new performance SUV flagship, the GLS 63, at the LA show. Joining the new Maybach version (see p16), which was revealed separately in China, the GLS 63 features the same 4.0-litre twin-turbo V8 with mild-hybrid tech as the hot GLE (above).

As a result, it has 603bhp, with AMG claiming up to 627lb ft. That's enough to take the 2.6-tonne seven-seater

from rest to 62mph in 4.2sec and on to a top speed of up to 174mph if you opt for the AMG Driver's Package.

The fully variable all-wheel-drive system allows up to 100% of power to come through the rear axle, while multi-mode AMG air suspension with a unique tune for the GLS features three-mode adaptive damping.

The flagship SUV benefits from a similar array of external

and internal upgrades as its GLE sibling, with AMG-specific grilles and bumpers, flared wheel arches, a diffuser-style rear end and new AMG sports seats and badging.

It's described by AMG boss Tobias Moers as a vehicle for customers "not willing to accept compromises when it comes to versatility, effortless superiority and spaciousness" and will go on sale in the UK towards the end of the spring.



GLS 63 covers 0-62mph in a claimed 4.2sec



Hyundai's Vision T is a concept version of the new, 2020 Tucson

Vision T gives early taste of new Tucson

THE VISION T is effectively a preview of Hyundai's next Tucson, which will appear in the second half of next year and is likely to be offered with the plug-in hybrid option that this concept is said to have.

The model on the LA show stand was just that: a model, with no interior and no drivetrain beyond a slave electric motor.

However, apart from being the seventh in Hyundai's new series of 'sensuously sporty' models, the Vision T carries plenty of visual interest, not least a set of so-called parametric grille shutters. Hyundai has built the shutters

into the grille itself and the airflow volume is altered depending on whether the car is running on electric, hybrid or combustion power.

Distinctive lighting is another feature, and although the production version of the Tucson may not feature the multiple front-end illuminations of this concept, the end product should nevertheless be very recognisable.

The original concept sketches for this car were done by a young female designer within the firm's Seoul design studio, as revealed by design boss Luc Donckerwolke some months ago.



Record-breaking 304mph Chiron made its public debut at LA

Bugatti backs petrol

BUGATTI BOSS STEPHAN WINKELMANN believes the internal combustion engine will remain the pinnacle of the automotive world for at least the next decade, until legislation forces even his firm towards electrification.

An electrified Bugatti would be "the best in the market", said Winkelmann at the LA show. "[Until that day] I see the internal combustion engine as having a considerable future."

He also poured cold water on the suggestion of an imminent decision on a second model

line for Bugatti, claiming the brand first "needed the full support and the decision of the Volkswagen Group supervisory board". He added: "I hope it will happen and we will speak then. The VW Group has a lot on its plate with developing electrification."

Bugatti announced in LA it will offset its carbon emissions as a company, planting 4000 trees annually in partnership with a French environmental organisation. Its Molsheim factory will switch to using only clean gas and green electricity.

UNDER
THE SKIN
JESSE CROSSE

DIESEL WILL ALWAYS BEAT PETROL IN ANY EFFICIENCY DRIVE. WHY?



DIESEL ENGINES ARE more economical than petrol engines, which still haven't caught up despite advances like direct injection. So what exactly is the difference between petrol and diesel engines and how do diesels work? First off, diesel and petrol both come from the same source, crude oil. They're both hydrocarbon liquid fuels, but diesel does have different properties from petrol. Diesel is more dense than petrol and contains about 15% more energy by volume. That means, litre for litre, you literally get more bangs for your buck.

But that's not the whole story. Diesel engines are still far more efficient than petrol engines at converting fuel to mechanical energy. In fact, including the energy advantage of the fuel itself, diesels are up to 40% more efficient at doing that. Both types of engines are classified as 'heat' engines because they convert heat energy from fuel into mechanical energy. But diesels have better thermal efficiency than petrol engines, which means they convert more of the heat into mechanical energy and waste less of it into the environment.

Diesel engines work by compressing air so tightly in a small combustion space that it gets hot enough to ignite diesel spontaneously when it's injected. The petrol engine relies on a spark for ignition at lower compression. The higher compression ratio of the diesel engine means it has a high expansion ratio – the difference between the compressed space and the space opened up when the piston reaches the bottom of its travel. That equates to higher efficiency.

Diesel engines are also unthrottled. Most petrol engines throttle the amount of air going into the engine because the air-to-fuel ratio needs to stay at the optimum point of 14.7:1, so the quantity of fuel and air entering the engine are both regulated. A diesel engine runs very lean (much more air) and can draw in as much air as it wants, controlling the power only by injecting more or less fuel. The petrol engine is attempting to suck in the same amount of air at low throttle openings but can't, causing 'pumping losses'. It's like sucking through a squashed straw: the engine can't

Diesel engines may have fallen out of favour recently but they will always be more frugal than petrol engines.

win but it uses energy trying. The unthrottled diesel engine doesn't have that problem, which also increases efficiency.

On the thorny and controversial question of emissions, the diesel generates less CO₂ because it's more efficient and burns less fuel. It does create more oxides of nitrogen (NOx) inside the combustion chamber but that has nothing to do with the composition of diesel fuel. NOx is formed in any high-temperature combustion process because nitrogen in the air combines with oxygen (it oxidises). Because diesel engine combustion is hot and runs lean, it makes more NOx. This is cleaned up by exhaust after-treatment, such as SCR (selective catalyst reduction), and the latest diesels produce extremely low amounts of NOx. The diesel may have had a bad press over the past few years, but lower fuel consumption will make it a tough act to follow between now and whenever combustion engines finally bite the dust.

VW'S TWO-FOR-ONE SCR DEAL

Conventional SCR catalysts for ridding the exhaust of NOx are normally close coupled near the engine to work quickly after start-up. The trade-off is the exhaust is about 500deg C at that point but SCR is most efficient at 220-350deg C. VW's twin-dosing set-up has another SCR catalyst behind the engine where exhaust is 100deg C cooler, giving a claimed 80% improvement over conventional, single-dose systems.





Minimalist cabin
echoes the angular
look of the bodywork



Tesla shocks with bold pick-up

Top-spec version covers 0-60mph in 2.9sec, tows 6350kg and has a 500-mile range

Tesla has stunned the pick-up truck world with the unveiling of its Cybertruck, the US brand's long-anticipated first foray into the popular full-sized truck market.

The all-electric Cybertruck is the same length (5.87m) as traditional competitors, but that's where the similarities end. For starters, it features a radical wedge-shaped design that's unlike anything seen before and, Tesla CEO Elon Musk insists, it isn't far from production readiness.

The Cybertruck's promised specification is equally stunning. Three powertrain options will be offered, with one, two and three electric motors. The single-motor rear-drive-only version is said to do 0-60mph in 6.5sec, with no quoted battery size but a claimed range of 250 miles. It

can also tow 3400kg and has a 1360kg payload. This model is said to cost from \$39,900 (roughly £31,000) before any government incentives.

A mid-range dual-motor variant offers all-wheel drive, a claimed 0-60mph time of 4.5sec and the ability to tow over 4500kg. This version is said to cost \$49,900 (about £38,750) before incentives.

The top-level model uses Tesla's latest tri-motor 'Plaid' EV powertrain. Priced from \$69,900 (roughly £54,250), its staggering stats include a claimed 500-mile range, 0-60mph in 2.9sec and the ability to cover the quarter mile in just over 10sec. Towing capacity is a claimed 6350kg.

The Cybertruck's angular body is made of "ultra-hard 30X cold-rolled stainless steel". It's said to be bulletproof up to 9mm rounds and Musk

stressed the body's ability to resist damage, with multiple implements (including a sledgehammer) used to try to break it on stage in LA. However, this plan backfired at the launch when Tesla's head of design threw a metal ball at the window, smashing both left-side windows in the process.

The load bay is 6.5ft long, the same as a standard Ford F-150's, and features a raisable

cover. Tesla claims over 2800 litres of lockable storage space.

The Cybertruck can seat up to six adults. The cabin is pure Tesla – with the dashboard dominated by a 17.0in tablet-style touchscreen. The steering wheel is the classic concept car joystick style, but it's expected that this will become a traditional wheel by the time the pick-up enters production.

The truck's suspension is an adaptive air system with adjustable ride height: Musk claimed the maximum height will be 16in, with the capability for it to be adjusted up and down by 4in.

Further details of the specification have yet to be revealed. However, the Cybertruck will be able to use Tesla's Supercharger network, with the ability to charge at speeds of up to 250kW.

Production is still a fair way off. Tesla claims the base, rear-drive Cybertruck will arrive in late 2021, with the faster, pricier versions following in 2022. A European launch is unconfirmed. Despite the delay, the Cybertruck is likely to be one of the first electric pick-ups on sale, beaten by the Rivian R1T and, potentially, the Ford F-150 Electric.

LAWRENCE ALLAN



Cybertruck: said
to be close to
production ready

Lexus breaks EV duck with UX

LEXUS'S FIRST ELECTRIC production car, the UX 300e, will go on sale in the UK in 2021. The model was revealed at the Guangzhou motor show in China.

The electric version of the UX crossover, understood to be based on the electric Toyota C-HR that's offered in China, features a 201bhp, 221lb ft front-mounted electric motor. Power comes from a 54.3kWh underfloor battery,

which enables a claimed range of around 250 miles and charging at up to 50kW.

The styling of the regular UX has been largely retained, the only additions being new aerodynamically influenced wheels and the charging port located on the rear pillar where the fuel filler usually is. The 300e features multiple drive modes to manage the powertrain, with paddle shifters to control

regenerative braking modes.

Lexus claims it has been developed with a focus on quiet, refined driving. There's extra bracing for the dampers, increased sound insulation and an Active Sound Control system that "transmits natural, ambient sounds".

The model is due on sale in China next year and is part of a plan for Lexus and its Toyota parent to launch three EVs by the end of 2021.



UX 300e has
201bhp and a
250-mile range

Two-tone
paintwork
is optional



Mercedes GLS gets Maybach treatment

MERCEDES-BENZ HAS extended its Maybach line-up with the unveiling of a plush new 550bhp flagship version of the GLS at the Guangzhou motor show in China.

The Maybach GLS 600 is scheduled for UK delivery in the first half of 2020 as a rival for the Bentley Bentayga and Range Rover. It features a series of unique styling cues, a mild-hybrid drivetrain and an upgraded interior.

Taking many of the styling elements of the Maybach S-Class, it gets details such as a vertical louvre chrome grille, optional two-tone exterior paint and electrically extending running boards. The 5202mm-long model also

gets an upgraded interior with nappa leather and unique trim elements. Options include reclining and massaging rear seats and a fridge.

The model is available with just one engine at launch: a detuned version of the mild-hybrid twin-turbo 4.0-litre V8 found in the AMG-tuned GLS 63 (see p12), making 550bhp and 538lb ft. It can cover 0-62mph in 4.9sec and is capable of 24.1mpg on the WLTP cycle.

Power is channelled through a nine-speed automatic gearbox to all four wheels.

No price has been quoted, but it is expected to exceed six figures by a significant amount, adding a substantial premium over the regular GLS.



Nappa leather and unique trim feature inside

Maybach GLS 600 packs a 550bhp V8



UNDER
THE SKIN
JESSE CROSSE

PETROL DIRECT INJECTION GIVES CAR MAKERS A SHOT IN THE ARM



PETROL DIRECT INJECTION (also known as gasoline direct injection, or GDI) is fast becoming the car manufacturer's best friend. It gives better fuel economy and lower CO₂ while improving low-end torque but, like most things, it's not perfect. GDI engines generate more particulates in number (PN) and mass (PM) than a conventional port-injected engine.

One way to fix that is with higher-pressure fuel injection systems. Current GDI systems work at 200 bar but an industry first from Delphi Technologies is a 350-bar system. Delphi, Magneti Marelli and Bosch are all working on future 500-bar systems as well. First, though: what is it about GDI engines that makes them generate more particulates than a conventional port-injected ones? The fuel is identical, so what's the difference?

The traditional method injects a metered mist of fuel into each inlet port as pistons draw air in on the induction stroke. The fuel rushes through the tracts of the inlet manifold, evaporating into the rush of air as it goes, and arrives inside the cylinder as a lovely, evenly mixed (homogeneous) charge ready for ignition.

GDI engines, on the other hand, draw in fresh air only and inject the fuel directly into the combustion chamber as the air inside the cylinder is being compressed, just before combustion is due to happen. The inlet ports are designed to tumble the air into the cylinder so the fuel arrives in the middle of a tiny swirling storm that mixes the air and fuel together. But there's still much less time for the droplets of fuel to evaporate than during that long journey the two make travelling into a port-injected engine, and incomplete evaporation of fuel droplets equals more particulates.

Increasing fuel injection pressure to reduce the droplet size of the fuel achieves better evaporation in the shorter time allowed inside a GDI engine. Delphi claims that its industry-first 350-bar system reduces the size and number of particulates by up to 70% and that its forthcoming 500-bar system betters the former by a further 50%. But doing that isn't as easy as it sounds

– it's not just a question of turning up the tap.

For a start, the higher the pressure, the greater the energy needed to produce it and that uses up a small proportion of the engine's power and has a slight impact on fuel economy. It can also generate more noise and puts a much greater stress on all the injection components. New, more powerful injectors meter fuel more accurately, as well as coping with the extra pressure and detail changes to the fuel rail (tube) that feeds the injectors.

Delphi's new design of injector pump delivers the extra pressure without increasing noise and minimising energy consumption. It also avoids increasing the load on the drive mechanism and subsequent costly modifications to the engine itself. The 350-bar system from Delphi is the first step and more – both 350 and 500 bar – should appear from other major suppliers in the next couple of years.

PORSCHE COMES CLEAN

Particulate filters like this one from Porsche are already being fitted to new cars to reduce particulate emissions leaving the engine by 90%. The filters are close-coupled and mounted very close to the engine so they 'light off' (get hot and start working) quickly. They also double as three-way catalytic converters already fitted to petrol-engine cars to clean up oxides of nitrogen (NOx), carbon monoxide (CO) and hydrocarbons (HC).





Customers are happy with X7's big grille, says Henrich



BMW defiant on style shift

Product boss stands by "strong characters and bold design"

BMW has received "very positive" feedback to its radical shift in styling for certain models including the X7, according to product boss Peter Henrich.

Henrich told Autocar that he was "convinced" this bold styling direction under design boss Adrian van Hooydonk was the right way to go, and that customer data showed it was being well received.

"This is crucial for success," said Henrich. "BMW customers are demanding. They want to express something and are not afraid of vehicles with strong characters. They are looking for it. So we have decided to focus even more on strong characters and bold design."

"The design team with Adrian van Hooydonk do an excellent job in designing and defining that character. The feedback received has been very positive. When first shown the X7, people said:

"How big is the kidney grille?" But customers never reacted like that and the car is a great success. It's sold out for a very long period and people love it.

"There are always people specifically looking for something critical and afraid of something new. But we are very self-confident and will continue."

When asked if BMW would

apply such radical design to next-generation versions of its traditionally more conservative models such as the 5 Series, Henrich said it was important each model got its own character.

"Each car has its own positioning," he said. "In the early stages of development, we sit down – product, design and engineering – and

define the character and the positioning. This is then the base for the design and engineering team. Some cars are more extroverted, more bold than others as they have different messages to transmit.

"The customer is looking for a different type of a car with a 3 Series to a Z4 or X6."

MARK TISSHAW

DESIGNERS DITCH CONTROVERSIAL GRILLE

The unusual grille of BMW's 2018 Vision iNext, which previews a large electric SUV due in 2021, has been abandoned following feedback, design chief Domagoj Dukec has revealed.

Most of the two vertical bars that separate one kidney from the other made way for the iNext's arsenal of sensors required for

autonomous driving. "We test what works aesthetically," said Dukec of the iNext, which "reinvented our



icons and form language. We connected the kidneys because of sensors, but we've decided not to do it. It wasn't considered to be a BMW kidney grille any more.

"The grille is critical, so the iNext, the i4 and the iX3 will get separated kidneys – we spent the money to have sensors that can see through the chrome."

MERCEDES IS predicting the Chinese car market will grow again over the next five to 10 years, despite it dropping significantly in the past 18 months. "Of all markets, it remains the place we see the biggest growth potential," said Mercedes CEO Ola Källenius. "We have been fortunate as we have not experienced a large fall, but for everyone I still see potential for expansion."

DESPITE THE resurrection of the Mazda RX-8-style rear-opening doors on the new electric MX-30, there are no plans to introduce them more broadly across the range. Brand and design boss Ikuo Maeda explained: "The idea of the MX-30 is openness, and when you step out of this vehicle, these doors help you feel that. We haven't decided if we will use these doors elsewhere but, for the MX-30, it was the best choice."



AUDI WON'T LAUNCH wireless charging in this generation of E-tron models, instead choosing to focus on class-leading fast charging. E-tron product boss Jens van Eikels said: "There is no standard in the industry [for wireless charging]. It's not so easy to find a solution for both higher and lower level cars. Charging power is less consistent – and expensive."

THE TOYOTA PRIUS isn't likely to evolve into a fully electric model, leaving a question mark over the popular hybrid's future. "It's not decided but probably unlikely," said Toyota's European VP, Matt Harrison. "It was the pioneer – our hybrid mix is where it is because of Prius – and it can still be the pioneer for new technology, but is unlikely to be full electric."

F1 tycoon eyes major stake in Aston Martin

BILLIONAIRE LAWRENCE Stroll is preparing a bid to buy a major stake in Aston Martin, Autocar has revealed following a joint investigation with RaceFans.net.

Stroll, father of Formula 1 driver Lance and owner of the Racing Point F1 team, is estimated to be worth in excess of £2 billion. His reputation for building up brands and his famed car collection are believed to have given him the contacts to head a consortium looking to



DBX will be built in newly opened St Athan plant

take control of Aston Martin by taking advantage of the brand's current low stock value. Both Racing Point and

Aston Martin currently have bases at Silverstone. Stroll declined to comment on the report, while Aston CEO

Andy Palmer was also staying silent at the time of going to press, but he would be forced by stock market regulations to confirm if a formal takeover bid has been launched.

Aston's stock price rose by almost 20% in a day after the story went live on autocar.co.uk but remains well below the original flotation value.

Autocar understands the order books for Aston's new DBX are filling healthily, with Palmer commenting the SUV is selling "like hot cakes".



New looks, fresh tech spruce up Insignia

VAUXHALL HAS UPDATED its Insignia large hatch with a refreshed exterior and a raft of tech upgrades. Visual tweaks are focused on the front end, with a wider chrome-edged grille design and new Intellilux adaptive beam LED headlights that have a claimed industry-leading 84 LEDs in each unit.

The Ford Mondeo rival also receives a more extensive list of driver assistance functions, such as a new rear-view camera and optional rear cross-traffic alert. The navigation system's graphics have been updated, too, and wireless smartphone charging has been added.

Vauxhall has not listed any engine changes. Currently, the model is available with a 1.6-litre diesel with two choices of output and a range-topping 2.0-litre unit, which in flagship Biturbo guise puts out 207bhp.

The recently updated Astra gained a new range of engines first developed under the brand's General Motors ownership, so similar units could be brought to the Insignia line-up later in 2020.

The revised Insignia goes on sale next month, with first deliveries due in May.



Revised Insignia: on sale January

Fisker SUV in wings

AMERICAN START-UP Fisker's new Ocean electric SUV will be unveiled in production guise next month. It will be offered primarily through a leasing programme, with US prices starting from the equivalent of £295 a month with a

deposit of £2335. Potential customers can pay a fully refundable £194 deposit.

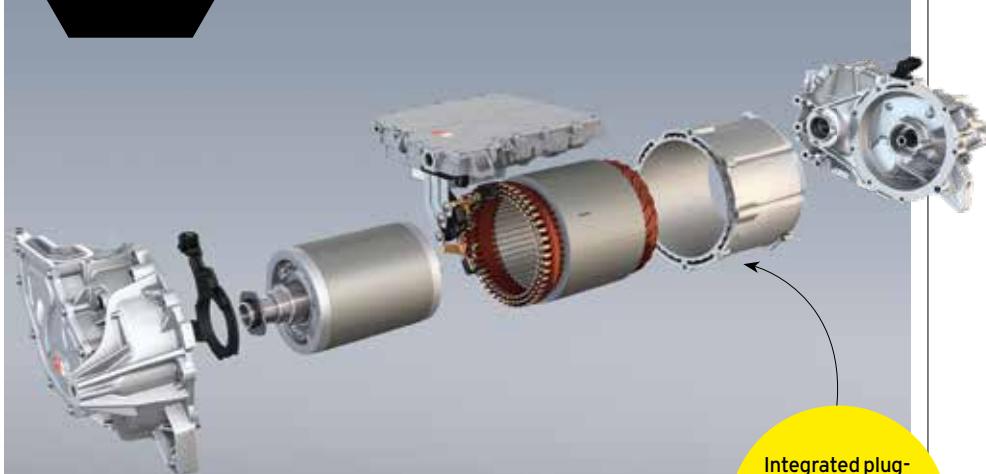
It's claimed to be the world's most sustainable vehicle, with recycled, vegan and other natural products used, a solar roof and a range of up to 300 miles.



Fisker Ocean has a solar roof and up to 300 miles of range

UNDER THE SKIN
JESSE CROSSE

WHY MIX AND MATCH IS A GOOD IDEA FOR ELECTRIC POWERTRAINS



TURN A PROFIT on electric cars yet still offer them at a price more people can afford: that's one of the major challenges facing the car industry. As things stand, it's difficult to make inroads into the cost of the battery, but in most other areas, such as the architecture and powertrain, there are savings to be made by integrating components into modular units that can be used in different applications. Volkswagen's modular electric drive matrix (MEB) describes not just the body and chassis architecture but the entire platform, including the drivetrain.

The forthcoming ID 3, the first of Volkswagen's new EV range to go on sale, will be powered by an integrated drive module called APP310. APP describes the way it's installed across the rear axle and 310 refers to its torque of 310Nm (229lb ft). In the ID 3, it will develop 201bhp and is a complete plug-and-play bolt-in powertrain.

Traditional, combustion-engine powertrains consist of an engine, gearbox and final drive with differential. On front-wheel-drive cars, the final drive unit is usually integral with the gearbox, but in a rear-wheel-drive car, it's located in the rear axle.

Although the components can be mixed and matched to an extent (same engine, different gearboxes and final drives) to suit the model derivative, they're not integrated in the same way as an electric drive unit can be. The petrol or diesel engine is normally made by the car manufacturer, while the gearbox may come from a supplier like ZF, Getrag or Aisin AW. The APP310 will be manufactured at Kassel for European and North American markets and Tianjin for China and Volkswagen plans to make up to half a million units a year.

The AC motor/generator (electric machine) is a synchronous permanent magnet brushless machine consisting of a rotor (which rotates to produce the drive) embedded with permanent powerful magnets and a stator (static) that surrounds it. Labelled 'hairpin technology' by Volkswagen, the stator is made of copper wire windings laid in a laminated frame, which generates a rotating magnetic field. The opposite poles of the rotor and stator are attracted to one another and the rotor spins in sync with the rotating field rather

than lagging behind it like an asynchronous machine. The preformed flat copper coils produce greater torque density than conventional coils wound using copper wire. Both the rotor and stator are produced in-house at Volkswagen's component plant at Salzgitter.

The rotor drives the integral single-speed reduction gearbox, which is all that's needed for high-torque, lower-speed motors like this one. Smaller high-speed motors generally require a multi-speed gearbox. The other major component of an electric drive – the inverter, which converts DC current from the battery to AC for the electric machine and vice versa – is also integrated with the unit and sits on top of the motor.

Apart from the relative simplicity of assembling the integrated drive unit into the car, it's small and light, too. The combined weight of only 90kg is likely to be substantially less than if the electric machine, inverter and transmission were all built as separate units.

ONE CAR'S RUBBISH...

Renault has developed a new textile product made from old seatbelts, scraps of textiles and recycled plastic bottle tops. The 'carded yarn' will be used to cover eight square metres of the Renault Zoe interior and is claimed to reduce the carbon footprint by 60% compared with conventional materials.





New engineering centre will inspire modern Morgans



Morgan steeled for new era

Light CX-generation chassis to replace traditional ladder frames on modern cars

Morgan will next year end production of its models built on a simple steel ladder-frame chassis, a system it introduced 83 years ago with its first four-wheeled model, called the 4/4.

In recognition of modern customers' need for greater road ability, even in traditional sports cars, the company plans to replace the outgoing models - the 4/4, Plus 4 and Roadster - with "a range of models" that will utilise versions of the light and rigid CX-generation chassis it introduced with the Plus Six early this year.

"We recognise a need for a more resolved core product that meets both our customers' needs and future legislative requirements," said Morgan CEO Steve Morris.

"The advanced engineering of the new platform is a vital underpinning for the next generation of Morgan sports cars."

The chassis decision is part of a suite of changes and

improvements that follow the purchase of the Malvern Link sports car company by Investindustrial, an Italian private equity firm that is also a major shareholder in Aston Martin.

Developments include the opening in a few weeks of a modern and extremely spacious engineering and development centre (dubbed M-DEC, for Morgan Design and Engineering Centre) on a new site close to its Pickersleigh Road base.

"We need space to work on new projects," said chief designer Jon Wells. "It has to be away from the suppliers and visitors who visit us nearly every day," added Morris. "So we've made it close, but separate."

Work is also about to begin on a major refurbishment of the Pickersleigh Road visitors' centre, which annually greets 30,000 people, each of whom pays £24 for an expertly guided two-hour tour. Tours will

stop between now and March, but the new, improved centre will be back in action by spring next year.

For now, Morgan is extremely secretive about the exact specification of its forthcoming new models, though it is believed most will maintain Morgan's classic look. More details are likely to be available next March at the Geneva motor show, which the company traditionally attends.

Next year's offerings are understood to include a model priced below the Plus

Six's £77,995, powered by a four-cylinder turbocharged engine - whose supplier is still secret - and mated to a manual gearbox. Company insiders confirm that the new car will be launched next year, though they won't yet specify date, name or price range.

The performance and all-round capability of the Plus Six has proved so good that Morgan bosses regard it as a spiritual successor for the potent Plus 8 of former times, rather than the V6 Roadster.

Morgan says it won't

immediately abandon its traditional ladder chassis, however. Next year marks the 70th anniversary of the Plus 4, currently the company's biggest seller, and designers are already laying plans for a small-run special edition.

"We'll take the opportunity to mark the significance of the outgoing traditional steel chassis and its contribution to the marque," said Morris. "It has been an integral part of the Morgan story and we look forward to celebrating its significance during the year."

STEVE CROPLEY



JAGUAR FREE UPDATE ADDS ELECTRIC RANGE TO I-PACE

Jaguar has released an I-Pace update to add an extra 12 miles of claimed real-world range. Improved battery and thermal management software will be installed for free by dealers, with an added boost of 'Software-Over-The-Air' functionality and a more accurate range calculation.



Morgan leaders won't abandon traditional looks

IS THE SUN SETTING ON JAPAN'S CAR INDUSTRY?

The land of the rising sun once led the car world but looks to have stalled. So what's going on and does a new dawn await Japan's car makers? Our writers give their verdicts

When was the last time anything came out of Japan that was truly, globally innovative?" It was an unusual question for an executive at the very top of a Tokyo-based car maker to be asking a journalist, brow furrowed and eyes glistening with frustration at the point he was making. "You need to go back to the 1980s at least. Everything since then has been about refinement."

These were comments born of frustration, the words of someone who had been held to task for the ever-decreasing

benefits of, as he put it, "squeezing the same lemon for more juice". Golden years had turned to steady years and now – through the lens of a rapidly changing automotive

world – he was sat staring at what he summarised as little more than a trickle of opportunity.

It had been a long day at the Tokyo motor show and there's little doubt that overexposure to an anonymous meeting

room, spreadsheets and senior management keen to impose rising sales targets coloured the mood. Japan, lest it be forgotten, is ranked in the top three global economies, is one of the largest filers of patents in the world and is the largest producer of electronics goods globally. It is also the third-largest automotive manufacturer, behind only China and the US.

Yet here was an ungilded – and unattributable, for obvious reasons – view from a show floor that was hot on mid- to long-term conceptual visions of mobility, electrification and connectivity, but short →



Mitsubishi is now focusing on 4x4 and hybrid technology



Home-market tastes have pros and cons for Japan's car makers

↳ on cutting-edge real-world launches. "The US can point to Tesla, Europe VW, Asia Hyundai: where is Japan's leadership in innovation, investment and risk taking?"

A wide-angled view of the Japanese market highlights some of the issues the industry is facing, as well as painting a perhaps more balanced view of some of the pockets of success: from Nissan kick-starting the SUV boom with the Qashqai (albeit through its European design centre), plus its front-foot launch of the Leaf, to Toyota's unchallenged global leadership with hybrids and consequent market-bucking sales performance.

Felipe Munoz, senior analyst for Jato Dynamics, believes the latter point is perhaps the most relevant for anyone trying to plot the trajectory of Japanese automotive innovation, especially around electric cars. "It is not that they have been slow to move to EV but the focus has been different," he says. "As Toyota is the absolute leader there and it has focused on hybrids, the politics and regulation have been designed around them. Of course, the global view has shifted and so, too, has Toyota – and now it is just a matter of time before we see a rapid takeover of EVs in Japan."

It's moot, especially as to date almost every new powerhouse in



“It's still possible Japan's slow start into EVs may be a blessing”

the car industry has been driven to global success by first dominating its home market. It's why, for instance, Hyundai-Kia was able to fund its expansion beyond its home shores and why Chinese car makers have struggled to make an impression beyond their own, admittedly vast, borders.

Within that explanation, however, there is a concern for future focus as a result of famously esoteric Japanese tastes. "The breakdown of sales in Japan highlights the demand for kei cars and MPVs, which are quite useful when space is a limitation in cities," says Munoz. "They dominate, with positive and negative consequences. On one hand, they give the market stability, as they are cheap and not exposed to economic cycles. On the other hand, as they are only conceived for the Japanese consumer in Japan, they are not popular abroad and they don't have export potential."

A look at export data highlights a story of mild, recent decline after years of growth. While Japanese new car sales have been remarkably stable over the past decade, figures suggest that the impact of relatively high labour costs and frequently fluctuating currency swings for the yen have led to an export downswing. "Factories in India, Thailand, Vietnam, Indonesia and Latin America have been the beneficiaries," says Munoz.

However, it is also true that Japan remains the world's second-largest automotive exporter after Germany and it is already seeking to rebalance its efforts, most notably with the free-trade deal agreed recently with the EU, of which the UK is not likely to be a part. It is also rebalancing its global footprint to have a more domestic bias, evidenced by the closure of Honda's Swindon plant and the shift of planned Nissan

X-Trail production in Sunderland back to Japan.

Against the measure of Japan's historical success, these are, of course, significant problems. However, in a time of transition, they are also being faced by an industry that remains in a position coveted by almost every other nation and that has a line-up of individual marques with the resources to respond. What's more, it's still possible that the slow, cautious start into EVs – Nissan aside – may actually be a blessing. After all, Toyota's profit margins remain the envy of the mass market, whereas few, if any, EV makers are yet in the black. Better, perhaps, to lead in autonomous and connectivity know-how than the commoditised world of electric motors and batteries.

The difficulty is in picking a winner during this interim period of uncertainty, when even those closest to the issues don't know the solutions and a wilfully conservative culture leans further than almost any other into modest projections, preferring actions over words, and precision and understatement over publicity storms via social media. On the following pages, we analyse whether Japanese car makers are facing a long-term slide or a period of transition from which they will emerge as strong – or stronger – than ever.

JIM HOLDER



HONDA

IT'S EASY TO forget that Honda is really three separate companies. It makes cars, motorcycles and 'power products' (such as generators, pumps and agricultural equipment).

According to the latest full-year accounts (which ran to April 2019), Honda sold 5.32 million cars globally, up by more than 2%. It sold 6.3m of its power products and a massive 20.24m motorcycles. The company made a middling profit margin of 4.6%, although that does translate to more than £5 billion profit.

On the car side, Honda's profit margin may suffer from it having only a very small presence in the global premium sector, despite its US-centred Acura brand. For example, between January and August 2019, Honda US sold near 991,000 vehicles, but Acura just 102,000 units across six nameplates.

Its profit margin is also affected by Honda shifting significant numbers of vehicles in the very price-competitive Asia markets. The HR-V baby crossover sells over half a million a year, with the majority of sales in China. Motorcycles sales also produce very thin profit margins, even though the unit sales are huge.

Honda has tried to tap into the huge margins delivered by pick-ups in the US, too. It has been building the Ridgeline since 2004, but monthly sales in the US mostly average around 3000. By comparison, Ford's market-leading F150 sold over 900,000 units in 2018, which translates to more than 75,000 a month on average.

The CR-V, though, is a huge global hit for Honda. It's the best-selling model in the US, followed closely by the Civic, which is expected to sell more than 350,000 units in the



Ridgeline has failed to crack the US market



CR-V has been a global success, along with the Civic

country in 2019. Indeed, August 2019 was the company's best sales month to date in the US, with 174,000 vehicles sold, around 100,000 of them being crossovers and SUVs.

Honda also misses out on the healthy margins that usually follow commercial van production (Ford profit margins on the Transit family are far higher than BMW can

manage, for instance) as it does not have a commercial vehicle division.

In its home market, Honda was the second-biggest seller in 2018. It sold 749,000 vehicles (its N-Box kei van being a best-seller in its segment) in a market of 5.26m new cars.

Honda slipped to a loss at the beginning of the year because of the costs of closing its UK plant. And

Europe is where Honda's biggest problem lies.

It may be a super-competitive market, but it sold just 169,000 cars across the continent over 2018-19 and forecasts are even lower for 2020. For a company that sold 1.9 million vehicles in the US, that is a disaster. It's possible Honda has now lost any serious foothold in Europe. **HH**



NISSAN

NISSAN SHOULD BE in an enviable position compared with its Japanese rivals: with the Juke and Qashqai, it basically sparked the SUV craze, the Leaf is one of the longest-running and most successful electric cars going and an alliance with Renault gives it incredible scale.

Except that instead of making the most of that position, Nissan is currently engulfed by an executive drama of Hollywood proportions. It started with the shock arrest and ousting of chairman Carlos Ghosn and executive Greg Kelly on a string of financial charges.

Ghosn's court case has only just begun, but the allegations have kept coming. More revelations in an internal report prompted the



Nissan ought to be capitalising on its EV-pioneering Leaf

resignation of CEO Hiroto Saikawa and it now falls to former China boss Makoto Uchida to steady the ship.

The first tasks on his mammoth to-do list will be to stem the losses and stabilise the share price, firm up the company's behind-schedule

turnaround plan and – most crucial – repair the relationship with Renault post-Ghosn.

Once that is done, Nissan still faces a tough task defending its SUV and EV patch from a growing list of contenders. **JA**

Fallout from Ghosn's departure dogs Nissan

NISSAN





MITSUBISHI

HOW'S LIFE AT Mitsubishi Motors after the Evo? That's what we asked a year ago in an in-depth look at the car-making arm of the vast Mitsubishi Corporation (Autocar, 21 November 2018).

And we found a car company with a new lease of life that had settled on gaining as much as it could from common architectures, standards and services and associated cost savings away from the customer's eyes, while being poised to start leading development across the Renault-Nissan-Mitsubishi Alliance (formed in 2016 after Nissan bought a 34% stake in Mitsubishi) of true four-wheel-drive SUVs, plug-in hybrid technology and pick-ups.

Yet the question a year on from that should be: how's life at Mitsubishi after the fall from grace of Carlos Ghosn? The man best known for leading Nissan and Renault was also chairman of Mitsubishi and the company had quickly been built up in his image. It needed to change because, before Nissan came in, Mitsubishi was at rock bottom – share price included – after it was found to have falsified fuel economy data in Japan.

Ghosn bought in several ex-Nissan bosses, including Brit Trevor Mann as chief operating officer and Vincent Cobee as strategy boss, yet they have since followed Ghosn out the door. Long-standing CEO Osamu Masuko, who surprisingly had kept his job after the fuel scandal, is also gone.

Although small in Europe and even relatively so in its domestic market compared with the giants of Toyota, Nissan and Honda, Mitsubishi is big in other emerging markets, such as Indonesia (topped only by China as Mitsubishi's biggest global market), Thailand and the Philippines, as well as parts of the world where its rugged

off-roaders and trucks appeal, such as Australia and Russia.

That's reflected in the appointment of Takao Kato as CEO. Formerly Mitsubishi boss in Indonesia, his vast experience in emerging markets will be of benefit to the company in not only maintaining but also growing its presence there.

Look at Mitsubishi now without the rose-tinted glasses that show the Evo and it's the Outlander PHEV, first revealed in 2012, that's front and centre. Updated last year and due to be replaced by the end of 2020, it's the world's best-selling plug-in hybrid.

There's undoubtedly an element of good fortune in the success of the Outlander PHEV, which was the right car at the right time to take advantage of taxation changes in many European countries. It has fallen away in some areas, most notably the Netherlands after it changed the subsidies towards plug-in hybrids, but Mitsubishi insists sales have remained firm elsewhere, including

the UK after the government removed the £2500 plug-in hybrid grant last November.

Outlander PHEV sales in 2019 to the end of August are comparable with 2018's (4428 in 2019 versus 4521 in 2018). Mitsubishi also refutes suggestions that few owners charge them up and buy them just for the tax breaks, with a study showing 90% of owners charge their cars two to three times a week.

Post-Ghosn, Mitsubishi is sticking to what it knows: development of plug-in hybrid technology, which, it maintains, offers the best of both worlds and is a progressive step towards electric cars, four-wheel-drive technology and SUVs, three areas that sit together quite happily.

Its three SUVs in Europe – the ASX, Eclipse Cross and Outlander – will be electrified and moved further apart in size in their next generation to give each more room to breathe and a more distinct identity. The all-new L200 pick-up, launched earlier this year, is important in maintaining Mitsubishi's rugged grass-roots workhorse appeal not only here but also in south-east Asia and Australia, while the Shogun Sport is innovative



Mi-Tech: EV set-up for a reinvented new Evo?

in making an SUV out of L200 underpinnings, albeit quite crudely.

The Evo question still hasn't gone away. You sense there's a will in the company deep down to make one, yet if it's ever to return, it will likely do so as a crossover/SUV and be electric. Mitsubishi's recent Mi-Tech concept shows a powerful four-motor electric system with considerable performance potential...

Yet the repositioning of the brand as a maker of true four-wheel-drive SUVs makes the absence of an Evo less troubling than the absence of a Shogun, Mitsubishi's other icon. Reinventions of the Mercedes G-Wagen, Jeep Wrangler and Land Rover Defender in the past couple of years should have persuaded Mitsubishi that there's the appetite for such a car. **MT**



L200: an important model in Europe, Asia and Australia



SUBARU



Ascent is at the vanguard of a new Subaru generation



Forester is a kingpin in the brand's US sales

AFTER A LONG winning streak, Subaru stumbled in 2018. It made a total of 1,019,364 cars (down 5% on the year before), with 680,000 of them sold in the US. However, 2018 was also marked by its first quarterly loss since 2010 as it was forced to confront various quality issues, including recalling more than 400,000 models for faulty valve springs. The recall cost was estimated at \$500 million.

Subaru relies on American consumers, having established itself over 20 years ago with the Forester and Outback, innovative lightweight crossovers in an era of truck-based SUVs. Last year, it sold 171,000 Foresters and 178,000 Outbacks in America. Sales in Japan are a modest 100,000 units annually, 22,000 of those kei cars.

The company is now rolling out a fresh generation of vehicles based on its new global platform and has added the seven-seat Ascent crossover to its US line-up. But globally, it is a small company, which is why Toyota's decision in September to take a 20% stake in Subaru is good news. The two will develop a joint platform for a future electric crossover and will continue to collaborate on hybrid drive and all-wheel drive. **HH**



Jimny has raised Suzuki's profile in the past 12 months

SUZUKI COULDN'T HAVE garnered much more attention in the past 12 months than it has with its latest Jimny, which stays true to its quirky, off-road roots. While the new Jimny has created a 'halo' effect,

the Vitara is Suzuki's biggest-selling car in Europe, making up a third of sales and helping the maker to hold a 1.5% market share last year, totalling 245,653 units.

That's modest, but it's a different story in Japan: Suzuki is the third-biggest-selling car maker, with 714,594 units.

Worldwide, Suzuki production increased by 4% last year, buoyed by particular success in its home market, India and Pakistan.

So far, Suzuki has been slow off the electrification mark, offering just two mild-hybrid models, the Ignis SZ5 and Swift SZ5, in the UK.

A deal with Toyota, announced earlier this year, will help the cause and enable the production of two Suzuki-badged hybrid vehicles based on the RAV4 and

Corolla. The two firms will also collaborate on an autonomous driving project.

Suzuki gave a taste of its self-driving future at the recent Tokyo show with the Hanare concept, a pod-style autonomous vehicle. It was shown alongside the Waku SPO, an innovative compact car that could morph from a coupé to an estate at the touch of a button. **RB**



Vitara is the company's best-seller in Europe

MAZDA

MAZDA'S BOLD APPROACH to reducing fuel consumption and emissions is ensuring it carves out a niche in this increasingly electric world.

While many makers are moving away from traditional powertrains, Mazda couldn't be more effusive about petrol and diesel. It quotes research showing that, even in 2050, more than half of the cars sold globally will use an internal combustion engine.

Its innovative spark-plug-controlled compression-ignition Skyactiv-X petrol unit, launched on the Mazda 3 this year, relies on two technologies – lean-burn combustion and compression ignition – to reduce fuel consumption and CO₂ emissions while delivering good performance.

Mazda insists that diesel has plenty of life in it yet. Although most makers will happily say that diesel still has its place, few are investing in major R&D. Mazda UK boss Jeremy Thomson explains: "We've been affected, as everybody has, by the downturn in consumer confidence in diesel, but I think there will be a bounce back. Whereas many manufacturers are walking away from it, we see a place for it."

Next year, we will see a new-generation Mazda diesel engine that's likely to use similar technology to the Skyactiv-X unit. "In 2020, we have a new approach to diesel engines," says Europe

R&D boss, Christian Schultze. "We will show you how clean and very efficient diesel engines can be."

Global R&D boss Ichiro Hirose adds: "In terms of the evolution of the diesel engine, we have always been consistent: how can we mix the air and fuel in a very good manner for emissions? When it comes to fuel economy and emissions in diesel, we still have a lot of room to improve."

Of course, Mazda can't ignore electrification and recently announced its strategy, including revealing its first EV, the MX-30. Beyond the MX-30, which will be launched in the UK in early 2021, no electrified models are confirmed but expect a plug-in hybrid within the next 18 months

on a high-volume car such as the 3.

Mazda is basing its EV strategy on life-cycle CO₂ emissions rather than just those at the tailpipe. As a result, it has introduced the MX-30 with a 35.5kWh battery, which doesn't offer huge range or power but does ensure that goal. Its study shows that the MX-30 will emit significantly fewer life-cycle emissions than a 95kWh EV (such as the Audi E-tron).

There will be a hybrid range-extender variant of the MX-30 powered by a rotary engine in the next couple of years. It means the revival of Mazda's famous rotary engine, last seen in the RX-8, which went out of production in 2012. It has been developed for use in a number of applications, including as a power generator in range extenders, hybrids and plug-in hybrids as well as working with hydrogen and LPG.

Beyond that, Mazda is in the early stages of looking at other powertrain options, such as recyclable liquid

fuels from microalgae. There is no clear time frame for its introduction. Hirose says: "We still have lots of problems we need to overcome with algae fuel. To achieve our targets [reducing CO₂ emissions by 50% in 2030 from 2010 levels], we have to start working on it now or we will be out of time."

"The biggest problem is productivity. This one alga produces oil, but the amount is too small to commercialise it as fuel. We are using genome editing to boost the oil production from the microalgae."

Mazda is hopeful its broad-brush approach will pay dividends in the industry's fast-changing landscape, believing electrification isn't the only option. Schultze says: "If we come into an age when sustainable fuels are economically similar, why not use them? We hope governments wake up and see that electrification is one way but there are others, too. Skyactiv-X is a step in the right direction." **RB**



MX-30 is Mazda's first EV and due in the UK in early 2021



Mazda sees a future for petrol and diesel



TOYOTA

DEPENDABLE, RELIABLE, trustworthy... all words traditionally associated with Toyota that risk damning it with faint praise and rather overlook the incredible transformation it has undergone in recent years. This is best illustrated by Toyota's shift from bland to shocking styling but underpinned by everything from its hybrid and fuel cell dominance to the dynamic ability of its TNGA platform and rumoured leadership in the breakthrough field of solid-cell battery technology. Then there is the heartfelt development of electrified, autonomous mobility solutions created with an emphasis on aiding the infirm, elderly and disabled.

Certainly anyone who witnessed company president Akio Toyoda's charismatic Tokyo motor show speech – made on a stand that didn't have a single traditional car on display, but rather a dizzying mix of autonomous pods, disability mobility aids and, erm, an electrically driven witch's broom – couldn't criticise either the scale of the firm's ambitions or the absolute integrity of its intent. Pronouncements emerging about the firm's future plans may frequently sit somewhere between being inscrutable and baffling, but cut through the chaff and a picture soon emerges of a world leader in action.

The driver behind this – beyond Toyoda's inspirational leadership – is the Toyota Group's trend-busting financial health. By most measures, it is not only the world's largest producer of cars – a goal it has notably never set itself, nor publicly set any store by – but also one of the

most profitable. Its margins have been averaging around 6%-8% over the past five years, a level that has, at times, rivalled that of much smaller, purely premium car makers, let alone ones in the mainstream where Toyota predominantly lives.

Data from analysts LMC Automotive suggests that while so-called light-vehicle (car) production in the Asia-Pacific region is on course to drop by 6% year on year in 2019, mainly as a result of output declines in China and India, Toyota's production volume is expected to grow by 5%. That will

mean it is one of only two of the top 10 makers in the region to grow. Likewise, and more significant for stability, Toyota's global output is expected to rise 3% against a market average drop of 5%.

Driving this volume growth are refreshed mainstream, global models such as the Corolla and RAV4 – both significantly sold with hybrid options, as are an increasing number of Toyotas like the revised CH-R and new Yaris. When car making is done well, large profits follow – and this cash-rich environment is the ideal one from which to be making the huge capital investments required at a time of change and instability.

This scale also gives Toyota opportunities that others are scrabbling to replicate, be it through acquisition, merger or partnership.

Not only can it spread its investment costs across more cars sold than rivals, but it has also been growing its influence by setting the standard around co-operatives for some time, both at home (it holds shares in Mazda, Subaru, Suzuki and Yamaha, among others) and internationally (most notably with BMW, on projects including everything from the Supra to fuel cell development).

Critics say Toyota has been slow to develop electric cars. Insiders say it remains unconvinced that battery-electric technology is the right environmental answer. But with the world's leaders having set a seemingly prescriptive course, Toyota is now using its hybrid know-how to respond, unleashing its scale and profit-driven R&D budgets to ensure it remains at the top of the industry. **JH**



Toyoda set out his firm's vision at the Tokyo motor show

MOTORSPORT IN JAPAN



THE NATIONAL MOTORSPORT scene in Japan has earned global cult status. Headlined by Formula 3, Super Formula (an equivalent to Indycars), Super GT and, more recently, its own sport of drifting, Japanese motorsport thrives within its own ecosystem, almost totally self-contained and for the past 30 years dancing to its own tune on rules and regulations. The cars are fast and spectacular, the home-grown heroes know the circuits intimately and, like everything in this fascinating country, it all feels exotic and a bit alien to Europeans.

The other attraction for foreign drivers is that you can get paid to race in Japan – and get paid well. That's what drew a generation away from Europe in the 1990s. Eddie Irvine was the best-known example to use All-Japan Formula 3000 (as Super Formula was then) as a springboard to Formula 1, but the list of those who joined and followed him is long. Nearly all

who experienced Japan returned with tall tales of great racing, lovely people and the odd bit of hedonism from nights out in Tokyo.

Today, Super Formula thrives, with a bespoke Dallara chassis, sticky Yokohama tyres and Honda and Toyota vying for engine superiority. Honda, Lexus and Nissan also do fierce battle in Super GT, a series last year won by avid Japanophile Jenson Button. He, like so many before him, found the whole scene and its unique racing culture a breath of fresh air, especially after so many years immersed in uptight F1.

Change could be on the near horizon, following a recent 'dream race' that mixed DTM and Super GT at Fuji after years of talks about such a collaboration. Opening that door is exciting – so long as it doesn't pollute one of the most colourful, diverse and healthy racing ecosystems found anywhere in the world. **DS**

JAPANESE MAKERS' FUTURE IN THE UK



Honda will close Swindon plant when Civic ends in 2021

THE LOVE STORY between Japan and the UK has soured recently, as the industry's trials and tribulations have hit car manufacturing. Honda's shock announcement last year that it will close its Swindon plant in 2021 when the current Civic generation ends means the loss of 3500 jobs. Honda attributed the move to "unprecedented changes in the global automotive industry", adding that "resources and production systems for electrified vehicles will be focused in regions with a high volume of customer demand".

Questions remain about Nissan's commitment to Sunderland, where it has already pulled planned production of the next X-Trail, blaming the diesel sales downturn and Brexit uncertainty. Recent reports that the factory, which builds the popular Qashqai, will close if the UK leaves the EU without a trade deal adds further fuel to the fire.

However, Toyota's future in the UK is looking brighter. In 2017, it announced a £240 million investment in its Burnaston plant to accommodate production of vehicles on its new global platform. Another Japanese maker is also helping to secure its future. As part of a tie-up between Toyota and Suzuki, hybrid Suzuki models will be built at the factory. **RB**

WHAT YOU NEED TO KNOW

HONDA

- New i-MMD petrol-hybrid engine promises class-leading fuel economy in cars such as the Civic and Jazz.
- Spending on a new plant and R&D is at a high level, which bodes well for the future.
- Delivery vans equipped with i-MMD – possibly based on Odyssey MPV – represent an untapped opening.
- Honda's European presence is under serious threat.

is only the fourth-biggest market for sales (104,000). ■ R&D spend in 2019 will be double that of 2014.



MAZDA

- Electric MX-30, arriving in early 2021, will also get rotary-engined range-extender variant.
- Mazda remains committed to petrol and diesel and is also researching biofuel.
- Tie-up with Toyota and Denso will help accelerate its electrification plans.

NISSAN

- Leadership crisis has affected its relationship with Renault and long-term plans.
- Readyng crucial IMX to grab a slice of the burgeoning electric SUV market.



MITSUBISHI

- Next-gen ASX, due in 2021 after next year's facelift, will be Mitsubishi's first EV since the 2009 i-Miev city car.
- Japan makes the most Mitsubishi (661,000) but

SUBARU

- Tightly run company with a single platform and all-wheel drive.
- Toyota's stake is a big help with electrification and quality processes.
- It needs to address its reliance on the US and its tiny presence in Europe.
- Plug-in hybrid drivetrains needed soon.

SUZUKI

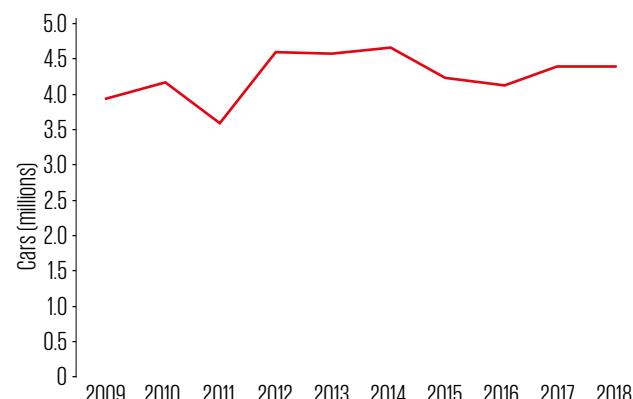
- European market share is above 1.5% for the first time in eight years.
- UK waiting list for the popular Jimny is 12 months.
- Its deal with Toyota will bring Suzuki-badged hybrid vehicles based on the RAV4 and Corolla.

TOYOTA

- Its global sales are growing despite the industry-wide downturn.
- Slow in battery-electric space but can use hybrid know-how to catch up.
- R&D spend, scale and partnerships give it near-unique level of resource.

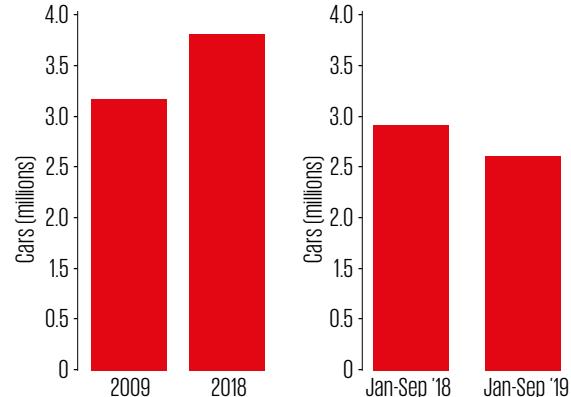
NUMBER OF CARS SOLD IN JAPAN SINCE 2009

Source: Jato Dynamics



MADE-IN-JAPAN EXPORTS

Source: Jato Dynamics



FIRST DRIVES

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VOLKSWAGEN GOLF

The new generation of Volkswagen's family hatch is more refined, efficient, responsive, high-tech, agile... In short: better than ever

The story of the Volkswagen Golf began in 1974. Back then, few would have imagined just what sort of a success the practical hatchback would become. Forty-five years later, the Golf has firmly established itself as the world's best-selling car, with more than 35 million sold globally.

Predictably, then, Volkswagen takes the development of each and every Golf generation very seriously indeed, carefully preserving what is cherished while diligently updating elements considered old or flawed.

As a result of this step-by-step approach, the Golf has managed to

remain relevant and competitive in Europe's hardest-fought market segment without resorting to any radical or contrived changes for seven complete model cycles – something that no hatchback rival can claim.

In its engineering, this new, eighth-generation model is more of a revision than a replacement. The Mk8 Golf retains the same front-wheel-drive MQB platform as its predecessor, albeit updated to offer greater structural rigidity. Its chassis draws heavily on the car it replaces, without any significant changes in geometry or hardware.

The exterior is more individual looking than the previous Golf. The flamboyant design of the LED headlights is particularly out of character for Volkswagen's family hatchback and the most controversial design element in a front end that is distinctly lower. There's also a more defined swage line running from the leading edge of the front doors through to the tail-lights.

In a development that helps to bring it into line with some rivals, buyers can specify Volkswagen's IQ light package as an option. This includes automatic main beam and

strobe-like indicators and it gives the tail-lights a distinctive LED graphic.

The new Golf is 29mm longer, 10mm wider and 4mm taller than before, with the same wheelbase. Yet Volkswagen has managed to improve aerodynamic efficiency: the standard model has a Cd of 0.27 compared with the 0.30 of the outgoing version.

The new Golf won't be available in three-door form so is five-door only, a production simplification that should benefit VW's bottom line. Talking of which, we did spot some cost-cutting measures. The new →







“
It’s now more direct in its reactions. For enthusiasts, that makes for a more compelling car
”

Minimalist dashboard is a bold departure for the Golf but the driving position feels very familiar

→ Golf eschews gas struts for the bonnet, relying on a simple manual strut. Volkswagen says this is because the new model adopts two bonnet latches instead of a single latch. The underside of the bonnet is also finished in black undercoat rather than body colour, a move claimed to streamline assembly.

The new Golf's engine line-up includes three new turbocharged petrol-based eTSI mild hybrids, which use a 48V electric drive system, and a revised petrol-electric plug-in hybrid drivetrain offered in two states of tune.

The mild-hybrid eTSI units are a 1.0-litre three-cylinder petrol engine developing 89bhp and a 1.5-litre four-cylinder petrol powerplant making 129bhp and 148bhp. All offer a claimed 10% improvement in fuel economy over the non-electrified powertrains they replace.

The plug-in hybrid drivetrains combine Volkswagen's 1.5-litre four-cylinder petrol engine with

a gearbox-mounted electric motor, offering 148bhp and, in a performance-focused GTE model, 242bhp – although only the higher-powered version will be offered in the UK when it goes on sale next year. Both use a 13kWh lithium battery, claimed to provide a 50% increase in electric range of more than 37 miles.

The launch range also has a 2.0-litre four-cylinder TDI diesel engine tuned for 113bhp and 148bhp.

Gearboxes include six-speed manual and seven-speed dual-clutch units, depending on the engine they are mated to. Alongside standard front-wheel drive, selected Golf models will also be available with optional 4Motion four-wheel drive.

Volkswagen will launch new GTI, GTD and R variants of the new Golf in 2020 (see p15). The new Golf R is expected to run an updated version of its predecessor's turbocharged 2.0-litre four-cylinder petrol engine developing up to 320bhp.

Over time, Volkswagen has

perfected the Golf and every new model faces a tough task to improve on the version it replaces. Does the new Golf succeed?

The answer comes the moment you step inside. It's the eminently practical interior where arguably the biggest changes have taken place and which will help to extend the appeal of Volkswagen's enduring hatchback. The so-called Innovision cockpit features a fully digital dashboard. Compared with the relatively conservative interiors of previous Golfs, it's a revolution and clearly aimed at younger buyers.

The area ahead of the driver is dominated by a 10.3in digital instrument cluster with either a 8.25in or optional 10.0in central touchscreen for the infotainment functions. Together with a new multi-function steering wheel, they form a vastly different driving environment than that of any previous Golf – one that is appealingly functional the moment you begin to poke around.

It's similar to Volkswagen's new electric ID 3, with the controls positioned higher and closer to the steering wheel than before, giving the dashboard a more top-heavy nature. The centre console is wider and, in models featuring a dual-clutch gearbox, houses a stubby shift-by-wire gear selector in combination with a starter button and the electric handbrake and hill holder.

There are very few physical buttons. All the major controls, including for the ventilation and driving modes, are housed within a touch-sensitive panel below the central display. A 'slider' is used to regulate various functions, including the volume. It's clearly meant to mimic the swipe of a smartphone but is a bit hit and miss. As an alternative, Volkswagen offers a voice control system.

Perceived quality, always one of the Golf's biggest strengths, has improved. Some might argue there is too much hard black plastic, but

**TESTER'S NOTE**

You can't fail to notice that it is more agile than the car it replaces: the balance is finely struck, making the new VW hugely satisfying to drive. **GK**

I suspect most prospective buyers will be taken with how well the dashboard is assembled and how expensive the materials used within the interior feel. The haptic feedback generated by the centre display and the response speed are further plus points.

Continuing the modern look are ambient lighting strips within the dashboard and door trims as well as a host of other new optional features, such as an excellent new head-up display, which is available on the Golf for the first time and a highly recommended addition.

The new Golf features the latest third-generation version of Volkswagen's MIB infotainment system. It is permanently connected to the internet via an embedded eSIM, thereby enabling online music streaming and real-time traffic information, among other online features.

Volkswagen has also upgraded the Golf's driver assistance systems, including optional Travel Assist, which combines adaptive cruise control and lane assist to enable "assisted hand-off driving" at speeds of up to 130mph.

The new Golf is the first Volkswagen model to feature Car2X (car-to-everything) technology, based on the harmonised EU standard. It uses information generated by other vehicles and the road infrastructure to warn of issues such as tailbacks.

Although the dashboard represents a major departure from that of past models, the driving position and overall interior packaging are familiar. The front seats provide a good amount of lateral support and the driver benefits from a wide range of steering wheel and seat adjustment.

The most powerful of the new Golf's mild-hybrid drivetrains, the 1.5 eTSI driven here, distinguishes itself with inherently effective →



Angles of the tail-lights aim to make the car's appearance more dynamic



Integrated touch-activated controls are part of a bid for a clean-lined look



New Golf's 8.25in or optional 10.0in touchscreen will be worked hard



Three-door model has been ditched from the line-up for this new-generation Golf, which is 29mm longer and 10mm wider than before

“
It has the dynamic ability
to firmly challenge the Ford
Focus, Seat Leon and Mazda 3
”



Cruising refinement is impressive, not least because of the hushed powertrain, high-speed stability and low wind noise

properties that should ensure it finds favour among traditional petrol-engine car buyers and diesel stalwarts.

With 148bhp at 5000rpm, the turbocharged 1.5-litre four-cylinder unit isn't exactly brimming with energy. However, it is remarkably smooth and revs freely to the 6400rpm cut-out, endowing the new Golf with a moderately sporting performance when you dial up the Sport mode. In everyday driving, though, there's no need to work it hard because there's good mid-range urge, with 184lb ft of torque available from 1500rpm.

The seven-speed dual-clutch gearbox has improved step-off qualities, and the latest petrol-

electric powerplant propels the new Golf from a standstill to 62mph in a claimed 8.5sec, with a top speed of 139mph. By comparison, the non-electrified 1.5 TSI model it replaces had figures of 8.7sec and 135mph. The 48V belt-driven starter motor brings additional functions, including brake energy recuperation, coasting and a more immediate stop/start system.

There's a persuasive maturity to the on-road characteristics of the latest Golf, whose handling is distinguished by its progressiveness, balance and accuracy. The new model is noticeably more direct in its reactions than before. This might surprise those coming from the comparatively relaxed confines of

the seventh-generation model, but for enthusiast drivers, it makes for a more compelling car – one with the dynamic ability to firmly challenge the likes of the Ford Focus, Seat Leon and Mazda 3 in the driving stakes.

We have yet to sample the standard fixed-ratio steering, but the progressive steering of our test car proved nicely weighted, wonderfully precise and quite predictable in its actions. The new Golf communicates with greater feel and has faster reactions than before, especially in the initial degrees of lock.

It might not deliver the overall feedback of some key competitors but it is meticulously accurate and always dependable, allowing you to confidently place it at the entry to

corners. Turn in on a trailing throttle and you discover excellent body control, with progressive movement as lateral forces build before the fast-acting steering allows you to feed off the lock at the exit. On the right road, it is never less than entertaining.

When fitted with the optional continuously variable dampers, the ride is brilliantly controlled. Quick reactions and excellent absorption help to moderate bump shock and quell vertical movement before it has a chance to build on more challenging road surfaces. There is genuine compliance and subtlety to the way the suspension soaks up bumps and maintains its ride height, leading to a relaxed and settled feel in Comfort mode.



Well-shaped boot has an adjustable floor. Folding rear seat backs split 60:40



Behind here lie MacPherson struts. Rear uses a torsion beam or multi-links



Lower-arched nose and more expressive LED headlights are two ways to tell a Mk8 from a Mk7

The springs and damping set-up is a touch firmer than that of its predecessor in Sport mode, giving the new car greater immediacy in its most sporting setting, although it is never abrupt under an unloaded wheel. Hit a sharp-edged rut mid-corner with the outside wheel loaded, though, and some inevitable thump does arise.

The new Golf also has excellent directional stability. As a result, it feels right at home at higher speeds on the motorway, with long gearing ensuring a hushed driveline and the car's improved aerodynamics bringing about a noticeable reduction in wind buffeting.

As for the Golf's superiority over its volume-market hatchback rivals,

this new model has managed to raise the game and distance itself from the competition.

It betters its predecessor in a number of key areas, delivering a familiar range of qualities bundled together with new-found dynamic attributes and new-age digital and connectivity functions.

The attention to detail in its engineering gives the new Volkswagen an immediate feeling of deep-seated integrity from the very first mile. The added performance and refinement from the electrified drivetrain and inherent maturity and resolved qualities of its chassis make it a highly gratifying car to drive on just about any road and in any environment.

If Volkswagen's claims are to be believed, it is also now significantly more efficient, with improved fuel economy and fewer emissions than ever before, no matter which model you choose.

And the interior? Although it is highly contemporary in appearance and a clear advance in ergonomics, I suspect it might prove a step too far down the digital road for many potential customers. It will no doubt appeal to younger buyers, but the execution and design run counter to the simple and straightforward traits that have traditionally made the Golf so popular. But that's something that can only be judged over time.

GREG KABLE

@gregkable

JUST HOW NEW IS IT BENEATH THE SKIN?

Volkswagen would have you believe the Mk8 Golf is all new underneath. However, the latest Golf is based around a carried-over platform and chassis. Lower-end models continue to receive a MacPherson strut (front) and torsion beam (rear) suspension, while upper-end models, including this 1.5 eTSI, run a more sophisticated combination of MacPherson struts (front) and multi-links (rear).

All models have passive dampers as standard, although, as with its predecessor, the new Golf works best with the optional continuously variable dampers, which come as part of the Dynamic Chassis Control (DCC). That also features a driver preference system with four modes: Eco, Comfort, Sport and Individual.



VOLKSWAGEN GOLF 1.5 eTSI

The bar has been raised again in the family hatchback segment



Price	£23,000 (est)
Engine	4 cyls, 1498cc, turbocharged, petrol
Power	148bhp at 5000rpm
Torque	184lb ft at 1500rpm
Gearbox	7-spd dual-clutch automatic
Kerb weight	1380kg
Top speed	139mph
0-62mph	8.5sec
Economy	WLTP figures tbc
CO₂, tax band	WLTP figures tbc
RIVALS	Ford Focus, Peugeot 308, Vauxhall Astra

TESTED 17.11.19, MALIBU, CALIFORNIA, US ON SALE JANUARY PRICE £92,750

AUDI RS6

Latest version of Audi Sport's large performance estate is more accomplished than ever as both an all-rounder and a driver's car



Get used to this: the launch of a new Audi Sport model. The performance arm of Audi is on a quest to double its sales over the next few years, with more models, many of them SUV shaped, and more markets in which to sell them.

Audi Sport is hardly small now. A couple of decades ago as Quattro GmbH, it was the maker of a very small number of interesting, all-weather, fast, four-wheel-drive performance cars for those in the know. Now, the range even before this expansion already runs into double figures, with the gravity moving away from fast estates and into super-SUVs.

Yet if there is a centre of the Audi

Sport brand, it is with this, the RS6. Bespoke R8 aside, it has always felt like the flagship as to what Audi Sport can do to Audis. The RS6's bonkers past most famously includes a V10 engine and has amusingly mixed supercar-baiting performance with practicality over four generations now. It's Audi Sport at its curious best.

You'll recognise plenty about this new RS6 from its RS7 sibling, which we recently tested in Germany. Audi Sport's move into new markets brings us to the US to test the new RS6, a big deal for Audi because, surprisingly, it's the first time the RS6 has been sold here.

Even by Californian stakes, the styling is no shrinking violet and

quite a change over the classy A6 Avant. Only the roof, front doors and tailgate are carried over to the RS6, with every part sculpted to look more aggressive, most notably the flared wheel arches housing the wider tracks and bigger alloys, new bonnet, rear spoiler, and front and rear bumpers. It looks more like a GT3 car than an estate with some of the addenda – and, to these eyes, brilliant.

The looks leave you in no doubt about what kind of engine powers the RS6: a big, powerful V8. Whereas the RS4 has switched from a V8 to a V6, a V8 is retained in the RS6 – and significantly upgraded with a larger turbocharger and increased →



boost pressure. The twin-turbo 4.0-litre unit produces a colossal 591bhp and 590lb ft and is hooked up to an eight-speed Tiptronic automatic gearbox and a proper Torsen differential-based permanent four-wheel drive. There's also a torque-vectoring diff at the rear.

The engine itself is now a mild-hybrid unit, mated to a 48V system to boost energy recuperation (see separate story, right). It works for efficiency reasons only rather than performance, not that the RS6 is wanting in the performance stakes: 0-62mph takes a claimed 3.6sec, traction off the line aided by a new launch control system, should you feel the need.

Chassis-wise, height-adjustable adaptive air suspension is standard, the car sitting 20mm lower than the A6 Avant and a further 10mm lower above 74mph. Steel coils with Dynamic Ride Control (DRC), which is an interconnected hydraulic damping system, is included on the range-topping Vorsprung version. (There are three RS6 trims in the UK: the standard £92,750 car with 21in alloys, the £100,650 Carbon Black with 22s and the £109,250 Vorsprung also with 22s.) The active all-wheel steering system from the RS7 features here, as does the option of ceramic brakes over the standard steel set-up that also raises the top speed to 190mph if the brakes are specced on the Vorsprung trim.

There are fewer changes inside

than outside, and less added aggression. The seats (very comfortable and supportive) are new, as is the steering wheel, which has larger shift paddles, but the capaciousness of the standard A6 Avant remains. Fido should be kept happy by the 565-litre boot, rising to 1680 litres with the 40/20/40 split rear seats folded flat.

Two customisable driving modes (RS1 and RS2) allow you to pick out the best bits of the standard Comfort, Auto, Dynamic and Efficiency modes that tweak all major dynamic components, including the engine and transmission management, suspension and steering. In the RS2

mode, you can also now turn off the electronic chassis control systems for the first time in an Audi RS model.

If that seems a rather extensive and complex specification, you'd be right: there are more than 40 ECUs in the RS6 talking to one another. So it comes as a surprise that the RS6 is so relaxing, comfortable and easy going as you roll down the road for the first time.

You're almost left wondering if you're driving the same aggressive-looking car you stepped into, such is its refined manner, which leans more towards comfort than sporty. On air suspension, the ride is reasonably quiet and cushioned, and even with

large 22in alloys, it manages all but the largest scars and abrasions on the road well, those firmer abrasions causing the body to rock. The sports exhaust, even in the Dynamic mode, is fairly quiet and certainly doesn't scream 600 horsepower.

Are you sure this is an RS version and not just a faster-looking A6, you find yourself asking? Ah – yes – you just haven't really squeezed the throttle yet. And when you do, the RS6's considerable straight-line pace is revealed. It's not sledgehammer in its delivery in the way that a Mercedes-AMG is, nor raucous in the way of an Italian or British V8, but it's supremely fast nonetheless. The refinement at low speeds isn't lost when you push on, either.

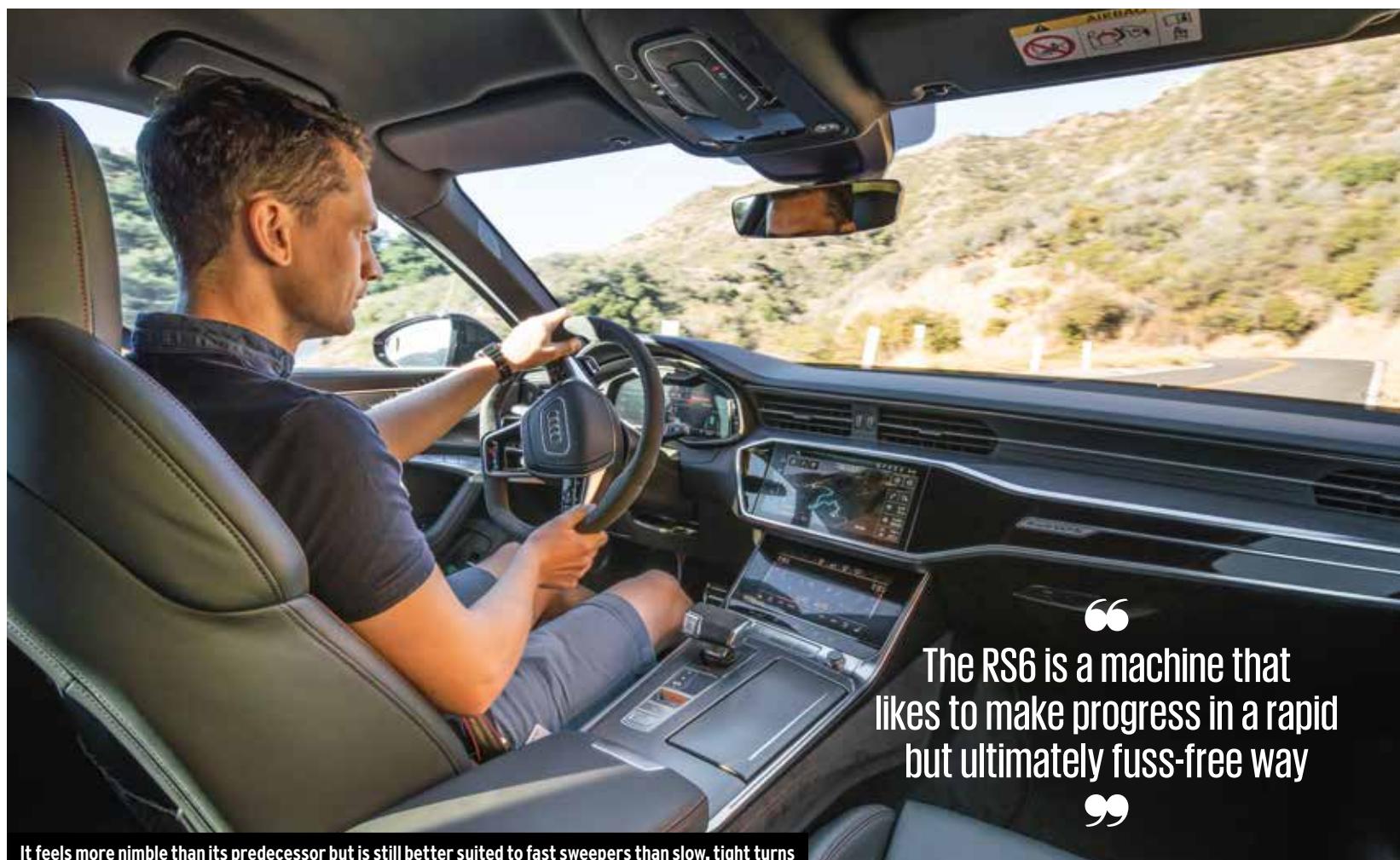
The engine is extremely flexible and is happy to be revved all the way to the redline and on a wide-open throttle does finally exhibit aural charm, albeit not at the levels of an AMG V8. It's your eyes rather than your ears that let you know how brisk your progress really is.

On tighter roads, you can happily use just second and third gear, such is the wide spread of torque and drivability. Gearshifts, whether manual or automatically controlled, aren't the event they could be, even in the crispest shift mode. The quiet, efficient shift is a good metaphor for the drivetrain as a whole: the RS6 is a machine that likes to make progress in a rapid but ultimately fuss-free way.

It's much the same for the chassis,



Many body panels are unique to the RS6 and lend it a keenly aggressive look



“
The RS6 is a machine that likes to make progress in a rapid but ultimately fuss-free way
”

It feels more nimble than its predecessor but is still better suited to fast sweepers than slow, tight turns

**TESTER'S NOTE**

The Virtual Cockpit digital instrument cluster is revised to include an RS-specific one based around a rather cool-looking 1980s-style hockey-stick rev counter. **MT**



Straight-line and point-to-point pace impress but it's also happy delivering comfort and refinement on a gentle run

which is improved over the previous RS6. It turns in more keenly and feels a good deal nimbler, the four-wheel steering at work here. Yet its sheer size and weight mean it never feels fully at home in slow corners and twisty roads in the way it does in faster, flowing ones. Nor does it ever really exhibit much feel through your hands on the wheel or your backside from the road below.

That sense of feel is improved in the steel-coils-with-DRC-equipped car we also tried, albeit that version lacked the air's suppleness and gains in the handling were offset by a drop in ride comfort. Whatever the version, this test does leave a

lingering doubt that the RS6 may prove to be too big and too complex to drive on UK roads to get anywhere near the limit of its abilities.

Still, the RS6 will definitely be suited to our weather. It is probably the most usable all-round performance car on the market, in that for more than half the year it's cold and wet and there aren't many things with almost 600bhp that you'd rather use in those conditions.

When you do floor the throttle midway through a corner towards the exit, the diff will always tuck the rear end in, which adds to the confidence and trust you feel to get on the power early and for the car to

find traction, albeit again without that involvement. You'd have to be really pushing it to see the RS6's playful side and even then it's not a car that eggs you on to do so or really involves you in the process. You feel it's showing you what it can do, rather than you controlling it that way.

But then, it's not really supposed to be. The RS6 is a car that impresses you rather than excites you and its key calling card is its sheer breadth of abilities, not just performance ones. Remember, this is a vast estate car that weighs more than two tonnes but has mighty yet undramatic straight-line and point-to-point pace, as well as space for all your stuff and

**EFFICIENCY GAINS:
ALL ABOUT THAT BAS**

The RS6 and RS7 are Audi Sport's first step towards electrified models, albeit a small step with a new 48V mild-hybrid system. The system combines a 48V belt alternator/starter (called BAS) and a small lithium ion battery in the boot to store recouped energy.

The BAS can recover up to 16bhp of power under braking or when a driver comes off the throttle and feed it into the battery. The system can allow for coasting at speeds of up to 99mph should the driving conditions allow and the stop/start system works from up to 13mph, with a predictive start element to ensure no loss of drive. It also links with the front stereo camera to decelerate the car should it close in on the vehicle in front.

Combined with the cylinder deactivation technology that cuts out four cylinders under low to medium loads, it can save 0.18 gallons every 62 miles, Audi claims.



brilliant, relaxed road manners for the 95% of drives when you just want to blend in and get where you're going.

Its direct rivals – the likes of the BMW M5, Mercedes-AMG E63 Estate and Porsche Panamera Turbo Sport Turismo – all feel more engaging and have greater driver appeal, yet the RS6 feels more usable for more of the time and, as such, arguably makes for the more compelling ownership proposition. Which, you can imagine, is a position Audi would probably take not only for the RS6 but also for all the new era of Audi Sport models to follow.

MARK TISSHAW

@mtisshaw



Roomy rear bench folds 40/20/40 to swell the 565-litre boot to 1680 litres

AUDI RS6 AVANT

Impressive rather than immersive, it's a fine all-weather performance car and more involving than before

★★★★★

Price	£92,750
Engine	V8, 3993cc, twin-turbocharged, petrol
Power	591bhp at 6000-6250rpm
Torque	590lb ft at 2050-4500rpm
Gearbox	8-spd automatic
Kerb weight	2150kg
Top speed	155mph (governed)
0-62mph	3.6sec
Economy, CO₂	22.1-22.6mpg, tbc
RIVALS	Mercedes-AMG E63 S Estate, Porsche Panamera Turbo Sport Turismo



TESTED 29.11.19, TYROL, AUSTRIA ON SALE NOW PRICE £65,000 (EST)

MERCEDES-BENZ GLE 350de 4MATIC COUPE

Diesel-electric plug-in driveline gives the new GLE Coupé a class-leading electric range, but is there anything else about it to lure buyers in? In a word, yes. Read on...

Mercedes-Benz, by its own admission, was late in joining the SUV coupé ranks. Instead, it preferred to sit back and take a wait-and-see approach as its more progressive premium-brand rivals led the way into what has, for better or worse, become an indispensable part of any large-scale luxury car maker's line-up.

But after tasting initial sales success at the more profitable end of its line-up with the first-generation GLE Coupé, it has wasted little time in launching this new, second-generation model, which has both more resolved exterior styling and greater interior luxury than its predecessor, launched in 2015.

The new GLE Coupé is aimed directly at the likes of the Audi Q8, BMW X6 and Porsche Cayenne Coupé. Unlike the model it replaces, though, it is not merely a rebodied version of the 'regular' GLE SUV.

To help provide the coupé with a more individual appearance,

Mercedes has rung the changes, giving it a 62mm-shorter wheelbase than its more upright US-produced sibling, at 2935mm, among other measures. Compared with the old GLE Coupé, though, it has grown: its length is up by 39mm to 4939mm, the width has increased by 7mm to 2010mm and its height is a scant 1mm lower than before, at 1730mm.

As with the bullish-looking exterior, the cabin has been thoroughly redesigned, in line with moves made with the GLE SUV. Key elements include a pair of 12.3in digital displays for the instruments and infotainment functions. As in other recent new Mercedes models, they are housed within a single panel atop a new multi-layered dashboard and are controlled by the German car maker's new MBUX operating system, with touchscreen, conversational speech and gesture control functions complementing small touchpad controllers within the horizontal spokes of a new →





TESTER'S NOTE

The GLE Coupé's boot is actually 25 litres bigger than that of the more upright GLE. Its loading lip is now also 59mm lower than on the previous GLE Coupé. So rakish doesn't have to mean less practical. **GK**

“
You're scarcely aware of which of the two power sources is doing the driving in urban use
”



All GLE Coupés are four-wheel drive and this 350de plug-in hybrid mounts its electric motor within the automatic gearbox

◀ multi-function steering wheel and a larger touchpad within the centre console.

It's an agreeable driving environment. The high seating position affords a commanding view out front and higher-grade materials throughout the cabin create a genuinely upmarket feel. One of the more notable new features is an optional large, high-quality head-up display. Active Stop and Go assist – an optional function that permits semi-autonomous driving in traffic jams – is also among a wide range of driver assistant programmes adopted by the new model.

Despite the increase in external dimensions, accommodation remains much the same as before. Front shoulder room has risen by 21mm but other measurements go largely unchanged, according to Mercedes. That said, the new GLE Coupé is eminently practical in spite of its swoopy roofline and liftback-style tailgate. It offers more than adequate space for five adults and, with a boot whose through-loading width has been expanded by 24mm, there is a slight, five-litre increase in luggage space, at 655 litres.

The basis for the new model is Mercedes' MHA platform, as used

by the latest GLE SUV. It is claimed to offer an impressive 33% increase in rigidity over the structure used by the first-generation GLE Coupé, thanks in part to the adoption of cast aluminium nodes for the front and rear suspension mountings.

The new GLE Coupé will be sold in the UK with a choice of petrol, diesel and diesel-electric plug-in hybrid drivelines. As standard, all come mated to a nine-speed torque-converter automatic gearbox and Mercedes' 4Matic four-wheel-drive system, which, in its latest form, offers fully variable apportioning of drive between the front and rear axles.

We cover the sole petrol unit – a turbocharged 3.0-litre inline six-cylinder motor with 429bhp and 382lb ft used by the Mercedes-AMG GLE 53 4Matic Coupé – in the review opposite. The two diesel models use a turbocharged 2.9-litre inline six-cylinder engine, which develops 268bhp and 442lb ft in the GLE 350d 4Matic Coupé and 325bhp and 516lb ft in the GLE 400d 4Matic Coupé.

But it's the plug-in hybrid unit in the GLE 350de 4Matic Coupé, driven here, that represents the biggest advance. It runs a turbocharged 2.0-litre four-cylinder diesel engine in combination with a gearbox-mounted electric motor for an overall system output of 316bhp and, equalling the GLE 400d Coupé's torque output, a substantial 516lb ft. That's sufficient, Mercedes claims, for a 0-62mph time of 6.9sec and governed top speed of 130mph.

The dual power sources are terrifically well integrated in hybrid mode, to the point where you're scarcely aware of which one is doing the driving in urban use. With those deep reserves of torque, the delivery is engagingly flexible, giving the GLE 350de Coupé outstanding cruising qualities. That said, there are times when the diesel engine has to work quite hard to deliver the performance requested and it is quite vocal.

With a 31.2kWh lithium ion battery housed within the floor of



Upmarket ambience is helped by, but not limited to, the digital displays



TESTED 29.11.19, TYROL, AUSTRIA ON SALE SPRING 2020

MERCEDES-AMG GLE 53 COUPE

AMG-honed dynamics and 429bhp punch match sporty looks



the boot, the GLE 350de Coupé delivers a class-leading WLTP electric range of between 51 and 62 miles at speeds of up to 100mph. As a result, its combined cycle fuel consumption is rated at between 217.3mpg and 256.8mpg – figures that you'll never replicate in real-world driving but endow the most economical of all the new GLE Coupé models with true tax-busting CO₂ credentials that should make it attractive to company car drivers.

The amount of electric energy regenerated under braking and coasting is very impressive. It is achieved via all four wheels, rather than just two as on earlier plug-in drivetrains offered by Mercedes. Full recharging of the battery, meanwhile, can be completed in 30 minutes at a rate of up to 60kW, making it faster to 'refill' than any rival in this respect.

Dynamically, the 2690kg GLE 350de Coupé can't match the heightened agility offered by other new GLE Coupé models. However, its roll and pitch movements are nicely contained, even over challenging alpine roads. The added weight brought on by its diesel-electric driveline and large battery also robs its standard steel suspension of some of its otherwise fine compliance. However, with Mercedes' E-Active Airmatic chassis technology as an option, it still manages to deliver the cossetting qualities that suit the upmarket ambience created by its cabin.

The GLE 350de 4Matic Coupé will not be to everyone's taste, particularly those without easy access to a charging point. But if you're looking for genuine zero-emission capability over extended distances, truly luxurious qualities and an ability to stick out from the SUV crowd, it might just be for you.

GREG KABLE

@gregkable

MERCEDES-BENZ GLE 350DE 4MATIC COUPE

Tax-busting, distinctive-looking SUV delivers feel-good luxury travel with an impressive electric-only range



Price	£65,000 (est)
Engine	4 cyls, 1950cc, turbocharged, petrol, plus synchronous electric motor
Power	191bhp at 3800rpm (diesel), 134bhp (electric), 316bhp (combined)
Torque	295lb ft at 1600rpm (diesel), 324lb ft (electric), 516lb ft (combined)
Gearbox	9-spd automatic
Kerb weight	2690kg
Top speed	130mph (governed)
0-62mph	6.9sec
Economy	217.3-256.8mpg
CO ₂	30-34g/km
RIVALS	Audi Q8, BMW X6, Porsche Cayenne Coupé

Mercedes-Benz's AMG performance car division is not holding back in launching a go-faster version of the second-generation GLE Coupé. From the outset of UK sales next spring, this new sporting GLE 53 Coupé model will sit alongside the standard 350d and 400d diesels and diesel-electric 350de in a four-strong initial line-up.

The successor to the earlier GLE 43 Coupé has been conceived to rival the likes of the Audi SQ8, BMW X6 M50i and Porsche Cayenne S Coupé, providing a stepping stone to the range-topping GLE 63 Coupé that was revealed at the recent Los Angeles motor show.

The GLE 53 is the latest model to receive AMG's mild-hybrid drivetrain, which was initially launched in the CLS 53 back in 2018. It employs a turbocharged 3.0-litre inline six-cylinder petrol engine that develops 429bhp and 384lb ft, in combination with an integrated starter motor that's capable of providing an additional 21bhp and 184lb ft for brief periods of loaded acceleration.

By comparison, the older turbocharged 3.0-litre V6 used by the GLE 43 delivered 362bhp and 384lb ft through a less highly developed seven-speed transmission and 4Matic four-wheel-drive system.

Predictably, performance is defined by the strong reserves of torque delivered by both the combustion engine and the electric motor. Despite tipping the scales at 2250kg, the GLE 53 Coupé offers robust step-off and brawny in-gear

acceleration, as evidenced by its official 0-62mph time of 5.3sec.

Equally as impressive as its sheer performance is its effortless cruising ability. The flexible nature of the drivetrain and the terrifically smooth operation of its transmission endow the GLE 53 Coupé with outstanding long-distance qualities. With substantial 275/50-profile tyres as standard front and rear, it does suffer from some annoying high-speed tyre roar on less than smooth road surfaces, but for the most part, refinement is exceptional for a large SUV with such a sporting brief.

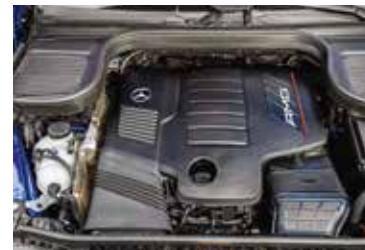
It's the heightened dynamic ability that really makes its mark, though. There's greater engagement in the steering and handling than you'll experience in standard GLE Coupé models. When hustled along

challenging roads, the GLE 53 Coupé displays the sort of agility and direction-change adroitness that can challenge the best of its high-riding rivals. With strong grip and its new four-wheel-drive system constantly altering the amount of drive to the front and rear wheels, it can be made to carry quite high speeds through corners without any tyre-squealing drama. Traction in all conditions is exceptional.

The AMG Ride Control suspension provides outstanding body control and a noticeable improvement in ride over the older GLE 43. Indeed, there's a far more settled feel to its ride, especially at urban speeds, where there is a new-found level of compliance.

GREG KABLE

@gregkable



MERCEDES-AMG GLE 53 COUPE

Impressive performance and rolling refinement but expensive. Lacks the practicality of the upright GLE 53, too



Price	£75,000 (est)
Engine	6 cyls, 2995cc, turbocharged, petrol
Power	429bhp at 6100rpm
Torque	384lb ft at 1800-5800rpm
Gearbox	9-spd automatic
Kerb weight	2250kg
0-62mph	5.3sec
Top speed	155mph (governed)
Economy	30.4mpg
CO ₂ , tax band	212g/km, 37%
RIVALS	Audi SQ8, BMW X6 M50i, Porsche Cayenne S Coupé



TESTER'S NOTE
Engage 'B' using the gear selector and you get enough regenerative braking for Nissan Leaf-style one-pedal driving. **JD**



TESTED 21.11.19, FLORENCE, ITALY ON SALE NOW

POLESTAR 1

Volvo sub-brand's coupé is a technical knockout but can it win on an emotional level?

At a glance, and a cursory one at that, it would be easy to dismiss the Polestar 1 as simply a two-door Volvo S90. But there's more to it than that. Much more. In fact, as my colleague Mr Matt Prior discovered when he drove one a few months back, it's arguably one of the most interesting cars of the year. Yet that example was a prototype, quirks and all, whereas the one you see here is the finished article – one of the 1500 that will be hand-built over the next three years. So what's it like?

Well, before we get to that, it's probably worth a little recap, because there's quite a lot to talk about with the plug-in hybrid Polestar 1, which blazes the trail for Volvo's fledgling premium electric car brand. It's based on the Concept Coupé, hence its strong S90 cues both inside and out, but apart from elements of its Scalable Platform Architecture (SPA), it has little in common with the more mundane models. For starters, the eye-catching (this car really does look good) bodywork is made up of hand-layered carbonfibre-reinforced

polymer (CFRP). Even so, the kerb weight is still 2350kg, which makes sense when you realise what's under those lightweight panels.

Driving the front wheels is a turbocharged and supercharged 2.0-litre four-cylinder petrol engine, while at the rear are a pair of torque-vectoring electric motors, one for each wheel. There's another motor

between the internal-combustion engine and gearbox that acts as starter/generator. Powering these are two large batteries, one in the transmission tunnel and another over the rear axle. So you can see why it's a bit lardy.

Still, there should be enough power to overcome this, because with all the various motive forces working

together, there's a not inconsiderable 601bhp and a thumping 738lb ft of torque. Yet before you unleash all that energy, you'll want to drive it in pure-electric mode, using just those motors in the rear. Delivering 229bhp and capable of travelling in near silence for about 80 miles on a charge (it's this figure that delivers the impressive economy and emissions figures, although our hard-driven test route saw the claimed fuel economy figure divided by at least 10) and at speeds of up to 100mph, these motors give the Polestar genuine everyday EV ability. Acceleration is instant, and up to about 60mph, it feels T5 quick, which is more than enough for the daily cut and thrust.

Engage 'Power' and you find that the Polestar is perhaps not quite as rapid as you'd expect a 600bhp car to be (that's nearly two-and-a-half tonnes for you) but the combination of immediate torque and that twin-charged engine mean the Polestar has the measure of, say, a Mercedes-AMG A45 in a straight line. Traction is leach-like, too, with



Drawing on the Concept Coupé, its looks and road manners mix GT and sports car



Volvo-sourced cabin appointments and specific Polestar details make the cabin feel special



Torque-vectoring rear motors ensure crisp, tidy handling



“

The Polestar 1 has the measure of, say, a Mercedes-AMG 45 in a straight line

”

only an occasional squirm of torque steer reminding you that there's no physical connection between the front and rear axles.

Yet it's the noise that gets your attention, the combination of supercharger and turbocharger chatter, gravelly induction (the intake plenum is carbonfibre) and the whine from the electric motors creating an aural backdrop that's appealingly different.

However, the Polestar's real party trick is the way it deals with corners. The clever torque-vectoring motors do their bit here, rotating the car into and out of the bends, but so does the suspension. There are double wishbones at the front and a multi-link axle at the rear, but in place of Volvo's adaptive dampers are eye-wateringly expensive Ohlins

dual-flow manually adjustable dampers, which, as an engineering choice, is both strange (who wants to get grubby adding a few clicks of bump and rebound to their luxurious sports GT?) and brilliant (because they work so well).

There's not much feel through the steering, but it's meatily weighted and has a cracking rate of response, which, in tandem with those torque-vectoring motors, helps the Polestar scythe towards the apex with real agility. Then, on the exit, you sense the outside rear wheel being subtly oversped, killing understeer to deliver a deliciously neutral stance. Rapid direction changes reveal a deft dexterity, the ultra-stiff structure (there's a special carbonfibre cross brace, known as 'the dragonfly', glued to the floor)

and special dampers delivering cast-iron control as the Polestar dives this way and that. The brakes are up to the challenge, too, the low-speed snatchiness giving way to both prodigious power and a progressive pedal that has you second guessing where regenerative retardation ends and friction braking begins.

Take it easier and the Polestar does the whole GT thing well, too. The ride is perhaps a little on the firm side, but only on really rough sections, and even then it manages to just round off the sharp edges where an S90 would get a bit brittle. Plus, with a little effort, you can always soften the dampers a touch.

It also feels special inside, the use of bespoke leathers, premium-trim inserts and details such as the translucent gear selector helping to both enhance the already stylish Volvo-sourced interior and justify the Polestar's price.

Ah, yes, the price. At £139,990, this thing isn't cheap, but then Polestar is making only 1500 examples (all left-hand drive) and each one is essentially hand assembled. More important, for such a high-tech

machine, it has genuine charm and character, and although it has some quirks (firm ride, tiny rear seats), it also combines the digital and analogue to beguiling effect.

JAMES DISDALE
@jamesdisdale

POLESTAR 1

Despite its fiendishly complex underpinnings, this quick, composed coupé has genuine personality

★★★★★

Price	£139,990
Engine	4 cyls, 1969cc, turbocharged, supercharged, petrol, plus three electric motors
Power	601bhp at 6000rpm (combined system output)
Torque	738lb ft
Gearbox	8-spd automatic
Kerb weight	2350kg
0-62mph	4.2sec
Top speed	155mph (governed)
Economy	403.5mpg
CO ₂ , tax band	15g/km, 16%
RIVALS	Aston Martin DB11 V8, Porsche Panamera Turbo S E-Hybrid



TESTER'S NOTE

The '3D' bit of the i-Cockpit means dials are projected from below via mirrors onto separate sheets. Like a head-up display, it means less refocusing from the road. I didn't notice that, but I did notice it looks very cool. MP



TESTED 27.11.19, FRANCE ON SALE JANUARY

PEUGEOT 2008

Peugeot's new compact SUV gives its many rivals something to think about

Another week, another story that opens with the line 'another week, another compact crossover'. A further opportunity will come in January. This week, it's the Peugeot 2008, the taller small Peugeot that is not quite as small as the last one. At 4.3m long, it's 15cm longer than the 2008 it replaces and about the same length as a new Volkswagen Golf.

It sits on the PSA Group's CMP (Common Modular Platform) small car architecture, which means it comes internally combusted or as a battery electric vehicle, with plug-in hybridisation saved for bigger Peugeots, Citroëns and DSs now and Vauxhalls later.

The idea is that, instead of Peugeot making a stand-alone EV, you choose a regular Peugeot and then select a powertrain – 'thermal' or electric – to suit you. Which seems a pragmatic long-term approach.

In the UK, most 2008s will have a 1.2-litre turbocharged three-cylinder

petrol engine in 99bhp (manual only), 129bhp (manual or automatic) and 153bhp (auto only) flavours. The 134bhp EV will make up a double-digit percentage of sales, considerably more than the 99bhp manual-only diesel, which, thanks to VW, will be just one in every 20

2008s. You can try to make the case for a clean modern diesel, Peugeot CEO Jean-Philippe Imparato tells me, but "nobody's listening".

Prices for combusted 2008s are from £20,000 to £31,000, with the EV £28,000 to £34,000 after the government grant, although

lower servicing and refuelling costs should keep overall ownership costs equivalent to a 129bhp petrol's.

The 129bhp model we tried was in GT Line trim, three-quarters of the way up the 2008 ladder and classy inside, with some faux leather, funky contrast stitching and silvered plastics used sparingly enough that you can almost be convinced they're metal.

Adults can get seated behind adults easily – you'd hope so, too, in a car 4.3m long – and behind there's a 360-litre boot, a very strong load space for the class, depending on which class you pop the car in.

At this trim grade, the 2008 gets a large central touchscreen that's nice to look at but sometimes fiddly to use. The temperature control, at least, ought to be separated from it. And there's a new, fancier 3D take on Peugeot's i-Cockpit, which, as usual, features a small steering wheel that'll probably still obscure part of the instrument pack, which is a shame because it looks great.



Peugeot's new compact SUV is 15cm longer than its predecessor, at 4.3m

TESTED 27.11.19, FRANCE ON SALE APRIL

PEUGEOT e-2008



Balance between ride comfort and handling control is judged pretty well



GT Line, an upper-level trim, provides a classy ambience and large touchscreen

The engine is quiet (I drove the 153bhp auto briefly, too), making only a muted thrum when you work it hard. Both transmissions are easy-going, the manual much more so than is usual in Peugeots. The eight-speed auto, meanwhile, is smooth and fuss-free.

The rest of the driving experience is mostly as easy. The steering is light, but adding cornering force or speed adds weight convincingly naturally. And the ride quality on 17in wheels (215/60 R17 Michelin Primacy tyres) is pliant enough. Inevitably, given the 2008 is taller than regular hatchbacks, there's a ride quality/body control trade-off, but Peugeot has pitched the 2008 pretty well on 17s. On 18in rims, it's more brittle.

Either way, there's roll and pitch, but that's preferable to tying it down and making it rock hard. If you want dynamism, a 2008 isn't for you, but if you cared that much, you probably wouldn't be looking at a compact SUV.

Hence I still prefer regular hatchbacks because, with a lower centre of gravity, they tend to be

nicer to drive and more efficient, but the 2008 does leap above the abilities of most of the compact SUV competition. A true bar raiser? Still waiting for that one.

MATT PRIOR

@matty_prior

PEUGEOT 2008 1.2 PURETECH 130 GT LINE

The 2008 compact crossover has most rivals licked but the class is still waiting for a true game changer

★★★★★

Price £26,100

Engine 3 cyls, 1199cc, turbocharged, petrol

Power 129bhp at 5500rpm

Torque 170lb ft at 1750rpm

Gearbox 6-spd manual

Kerb weight 1192kg

0-62mph 9.1sec

Top speed 123mph

Economy 43.7-50.6mpg

CO₂, tax band 102-109g/km, 24-25%

RIVALS Nissan Juke, VW Golf

The e-2008 is meant to be as straightforward a proposition as any combusted model. The motor is in the front, a 50kWh battery (less than a Kia e-Niro's or Hyundai Kona Electric's 64kWh unit) sits where the gearbox would otherwise be, down the centre line, and in an H-shape beneath the seats, so it doesn't impinge on passenger space. It gives a WLTP range of 193 miles.

You can charge it at 100kW from a DC fast charger, with up to 7.4kW from a single-phase AC wallbox, which you can have fitted as part of the deal. Via a DC fast charge, you can put 80% into the battery in half an hour. On a wallbox, a full charge is an overnight job.

The battery is warrantied for eight years and at resale Peugeot will give you a battery capacity certificate, which will eventually be just another element of buying a used car: 'Does it have service history, is there any outstanding finance, has it been

nicked, and how much life is left in the battery?'

The 134bhp motor gives torque immediately and seamlessly, but on the downside, the whole caboodle weighs 300kg more than an auto petrol, so body control is looser.

Because the centre of gravity is, presumably, lower than in an internally combusted 2008, Peugeot hasn't tried to tie it down to contain body movements, so the ride is reasonable, which is not always a given on EVs.

This is one of the best compact crossovers there is (not a high bar, granted) and the e-2008 therefore distils things to a simple proposition: if you want a 2008, does a zero-emission variant suit the way that you'll use it? As Guillaume Clerc, the chief engineer on the 208 and 2008 projects, says: "If we can't sell electric 208s or 2008s, the world isn't ready for EVs." My guess is that it'll do just fine.

MATT PRIOR

PEUGEOT E-2008 GT LINE

An EV option that is deliberately un-weird. Indeed, electric propulsion has never felt more conventional

★★★★★

Price £32,000 (after gov't grant)

Engine Permanent magnet synchronous motor

Power 136bhp at 3673-10,000rpm

Torque 192-221lb ft at 0-3673rpm

Gearbox Single speed, automatic

Kerb weight 1500kg

0-62mph tbc

Top speed 93mph

Range 193-217 miles

CO₂, tax band 0g/km, 16%

RIVALS Nissan Leaf, other Peugeot 2008s





TESTER'S NOTE
A five-seat layout is available, but only on the 220d AMG Line Premium. Mercedes' 4Matic all-wheel drive is an option on 200d and standard on the 220d. **JD**



TESTED 13.11.19, MALAGA, SPAIN ON SALE NOW

MERCEDES-BENZ GLB 200

Seven-seat SUV is a refined family runaround that doesn't mind getting its tyres dirty

The premium SUV market is an increasingly crowded one, but that hasn't stopped Mercedes-Benz from adding yet another high-riding, off-road-flavoured model to its line-up (its eighth, to be precise) in the form of the GLB.

As the 'B' part of its name suggests, this can be considered a rough-and-tumble version of the B-Class, meaning there's more than a touch of MPV to this SUV. How much? Well, like the recently refreshed Land Rover Discovery Sport, the GLB seats seven. And unlike its GLC and GLE big brothers, but like the smaller GLA, this latest addition is available in both two and four-wheel-drive guises.

Okay, so what have we got? Externally, the GLB looks a little like a shrunken GLS, which means it's an upright and boxy presence on the road. You'll have to make your own mind up about the looks, but from some angles it's slightly ungainly, while from others there's more than a hint of Citroën C5 Aircross.

Matters improve markedly inside, the GLB benefiting from the slick wall-to-wall TFT infotainment and

instrument cluster that made its debut in the A-Class last year. Some of the plastics used lower down in the cabin look and feel a little scratchy, but otherwise it's a high-quality affair that rivals anything on offer from BMW and Audi. In fact, with its neat trio of eyeball air vents, metal-finished air-con controls and three-spoke multi-function steering wheel, you could be inside an A-Class – raised driving position aside.

It's fairly spacious, too, although the third row of seats are for young children or occasional adult use only because, with the sliding second row in its rearmost setting, there's virtually no leg room behind. Speaking of space, boot capacity shrinks from a handy 570 litres with the third row stowed (it folds into the floor in one easy movement) to virtually nothing with the chairs raised – a Discovery Sport offers more space with seats up and down.

Underpinning the GLB is essentially the same MFA2 platform as the A-Class, although it's been stretched and pulled to accommodate those extra seats.

The familiar architecture means a similar line-up of four-cylinder petrol and diesel engines, up to and including the 302bhp 2.0-litre from the A35. However, it's the entry-level, front-wheel-drive GLB 200 petrol we sample here, its 161bhp 1.3-litre turbocharged four-pot developed jointly with Nissan and Renault.

Given the unit's small size and the car's not inconsiderable 1555kg kerb weight, performance is actually fairly brisk. Peak torque of 184lb ft is available at just 1620rpm, plus the nicely insulated engine will happily rev to 6000rpm. Response is further boosted by the seven-speed dual-clutch transmission that slots home its ratios quickly and smoothly.

In many ways, it's this unit that's best suited to the GLB – its level of performance is well matched to the car's easy-going dynamics, which are geared towards everyday comfort rather than cornering crispness.

All GLBs get strut front suspension and a multi-link rear axle, while our car further benefited from optional adaptive dampers that, on our smoothly surfaced Spanish test route

at least, served up welcome plushness over bumps – this is a quiet and comfortable way to get about. And while it's not exactly a thrill a minute in the twisty bits, there's enough composure and grip to allow you to maintain a decent lick.

The steering is mute but precise and body control rather good despite the lean when pushing on. With some load going through the suspension, you can feel both axles sharing the cornering forces, helping to minimise a natural tendency to understeer.

At £34,200, this 200 Sport is the entry point to GLB ownership, undercutting the cheapest Disco Sport by about £5k. Factor in its lower emissions and smoother drivetrain than the pricier GLB diesels, plus its likely use as a laid-back and versatile family runaround, and it's arguably the pick of the bunch.

JAMES DISDALE

MERCEDES-BENZ GLB 200 SPORT

Not as crisp to steer as a Disco Sport but classy interior and seven-seat versatility mean it's easy to live with



Price	£34,200
Engine	4 cyls, 1332cc, turbo, petrol
Power	161bhp at 5500rpm
Torque	184lb ft at 1620-4000rpm
Gearbox	7-spd dual-clutch automatic
Kerb weight	1555kg
0-62mph	9.1sec
Top speed	129mph
Economy	36.2-40.4mpg
CO₂, tax band	134g/km, 30%
RIVALS	Land Rover Discovery Sport, Audi Q3, BMW X1



GLB offers a loftier view of the A-Class's sophisticated fascia, and retains refinement on the road, too

TESTED 3.12.19, WARWICKSHIRE ON SALE NOW

AUDI RS Q3 SPORTBACK

Audi's first compact SUV coupé gets the full-blown RS treatment



The latest addition to Audi Sport's growing stable of RS models is part of a dual-pronged attack on the market for small performance SUVs. While the RS Q3 should appease those wanting a little extra head room for rear passengers, the Sportback earns extra style points with its sloping rear end and 45mm-lower roofline.

Looks aside, the two are mechanically identical, with the same firecracker turbo five-pot as the first-generation RS Q3. Power and torque have been boosted to a healthy 395bhp and 354lb ft, enough to hit 62mph from a standing start in 4.5sec with help from quattro permanent all-wheel drive.

It makes for the kind of explosively potent performance that we expect of any car with an RS badge, with power delivery more nuanced than

the single large turbocharger would suggest. The engine responds quickly at the lower end of the rev range and confidently on to a 7000rpm redline, although the indecisive gearbox doesn't gel well with the amount of power on tap. It can take a little too long to drop a cog when prompted, and although things tighten up in Sport mode, it's best to take charge yourself using the wheel-mounted shift paddles.

Handling is assured and always predictable, allowing for confident point-to-point progress, if lacking in true driver engagement. The progressive steering rack doesn't give much sense of what the front tyres are doing through corners, and although the stiff suspension keeps body roll in check, it's only ever truly relaxed on the smoothest of roads. With the optional adaptive dampers

set to Dynamic, the cabin jostles on even slightly rough surfaces.

A tech-laden interior puts the Sportback on a par with the class best, with a fully digital instrument cluster and 10.1in infotainment display equipped with the same software as Audi's more premium models. You don't have to look far to spot cheaper plastics, though.

If looks and straight-line speed are your main deciders in choosing a fast compact SUV, the Sportback makes more of a statement than the vanilla RS Q3 and delivers performance on a par with that of more expensive rivals. Still, those seeking an entertaining steer as well as rapid pace may be better served elsewhere.

TOM MORGAN

@tommorgan3

AUDI RS Q3 SPORTBACK SPORT EDITION

It earns its RS badge with rapid pace and confidence-inspiring handling but rivals offer more interior refinement

★★★★★

Price £57,950

Engine 5 cyls, 2480cc, turbocharged, petrol

Power 395bhp at 5850-7000rpm

Torque 354lb ft at 1950-5850rpm

Gearbox 7-spd dual-clutch automatic

Kerb weight 1700kg

0-62mph 4.5sec

Top speed 155mph (governed)

Economy 27.7mpg

CO₂, tax band 204g/km, 37%

RIVALS BMW X2 M35i, Mercedes-AMG GLC 43 Coupé, Porsche Macan



You'll not want for technology interest in the RS Q3 Sportback



FORD SHELBY MUSTANG GT500

Price from \$73,995 (£56,735) On sale Not in UK

What's new? The most powerful Ford in history: 749bhp from a supercharged 5.2-litre V8

THIS CAR IS proof that petrolheads still run Ford, even as they put a Mustang badge on an electric SUV.

The immense power runs to the rear wheels through a seven-speed dual-clutch transmission. No manual is available, that being reserved for the 519bhp GT350 and GT350 R. It allows Ford to claim a 3.3sec 0-60mph run, an absolutely eye-popping time for a front-engine rear-drive car.

To drive, it is better than a blunt weapon but far from a precision instrument. The good news is that if that's what you want, a GT350 will provide it for a lot less money. The bad news is that if you want either, you'll need to move to the US because the cost of homologation in the UK would far outstrip any profits that might otherwise result. **AF**

★★★★★



PORSCHE TAYCAN 4S

Price £83,367 On sale Now

What's new? A new entry-level Taycan and one that is at least as good as the Turbo version

IF YOU'RE INTERESTED in getting a Porsche Taycan, this is the one you should buy. And do so with the optional Performance Plus battery, at £4613. That buys you a 93.4kWh battery compared with a 79.2kWh unit, for additional range, faster charging and better performance.

This entry-level Taycan will still hit 62mph in 4.0sec but, to me, the chassis is its greatest achievement. When we drove the Turbo S, we marvelled at how well Porsche had been able to manage such enormous mass and the lighter 4S is better still. No four-door car of this weight blends handling and ride so skilfully. It is engaging and rewarding to drive, and compared with most electric cars right now, that is a triumph. **AF**

★★★★★

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TESTED 15.11.19, NORTHAMPTONSHIRE ON SALE NOW

VOLVO V60

Plug-in hybrid estate gets a performance-enhancing injection



You might wonder what 'Polestar' actually stands for these days. Admittedly, it's not obvious. On one hand, Polestar is a stand-alone subsidiary performance brand of Volvo – one currently readying itself to release the 600bhp Polestar 1 plug-in hybrid (see p32), with its three electric motors and an exterior design that combines art deco and Bauhaus, only remixed from the future.

Here, you can ignore that Polestar because on the other hand, there's Polestar Engineered. This trim level represents an even more serious take on the range-topping T8 Twin Engine versions of the S60 saloon and V60 estate, though that terminology is somewhat understating matters. Software tweaks might liberate only 20bhp or so from the 380bhp T8 plug-in hybrid powertrain (transverse 2.0-litre four-cylinder turbo for the front axle, with

an independent electric motor for the rear), but there are more appreciable changes elsewhere.

The brakes, recognisable by their deep-gold calipers, are from Brembo, and there's also an aluminium strut brace in the engine bay to stiffen the nose and hone the steering response.

However, the headline additions are adjustable dual-flow-valve dampers supplied by Swedish suspension superstars Öhlins. And it's important to make the distinction between 'adaptive' and 'adjustable'. The characteristics of the former are usually altered at the touch of a button handily positioned on the transmission tunnel. But on the Polestar Engineered V60 tested here, altering the damping characteristics involves opening the bonnet and twisting a pair of stylised gold dials sprouting from the strut towers. And that's the easy bit: to get at those for the rear axle, you'll need to jack the

car up and remove the protective rubber covers.

Ultimately, despite moments of unambiguously brilliant vertical body control and palpable improvements in the accuracy and feel of the steering, the V60 Polestar Engineered rides too firmly to be considered viable daily transport on British roads – something guaranteed to hole the appeal of any £60,000 estate below the waterline. Its speed, 25-mile electric range, sense of security and general air of desirability will secure its esoteric appeal but, as a traditional high-performance estate, it lacks the capability of the AMG's C-Class alternative or the deadpan accuracy of an Audi RS4.

RICHARD LANE

@_rlane_

VOLVO V60 T8 TWIN ENGINE POLESTAR ENGINEERED

Stellar suspension can't convert this likeable but ultimately misconceived estate into a bona fide AMG rival

★★★★★

Engine 4 cyls, 1969cc, turbocharged, supercharged, petrol, plus electric motor

Power 314bhp at 6000rpm (petrol), 86bhp (electric), 405bhp (combined)

Torque 494lb ft (combined)

Gearbox 8-spd automatic

Kerb weight 2079kg

0-62mph 4.6sec

Top speed 155mph

Economy 113-166mpg

CO₂, tax band 48g/km

RIVALS Audi RS4, Mercedes-AMG C63 Estate



Polestar Engineered trim has Brembo brakes, Öhlins dampers... and gold seatbelts



ALFA ROMEO STELVIO TI 210

Price £48,000 (est) On sale January

What's new? Simplified trim levels, cabin upgrades and a greater focus on technology

AS ALFA ROMEO can already claim the Stelvio to be one of the more dynamic SUVs on sale, the focus for this facelift is wisely on perceived quality improvements.

The redesigned centre console feels much more premium to the touch than before, while the overhauled infotainment system is now fully customisable and recognises touch inputs for the first time. It also gains a full driver-assistance suite, including adaptive cruise control and lane keeping assist, to bring it on a par with the rest of the class.

The Stelvio remains an entertaining steer, and this top-end diesel delivers strong pace, but rivals still best it for interior presence. **TM**

★★★★★



VOLKSWAGEN E-UP STYLE

Price £24,000 (est) On sale January

What's new? As part of a refreshed Up range, the e-Up gets a battery almost twice the size of that in the original electric version

SIZE DOESN'T MATTER, we're told, but it certainly helps when it comes to the number of kilowatt hours in your battery pack. The original Volkswagen e-Up made do with a modest 18.7kWh stack and a 99-mile range, but the 2019 version now has a 36.8kWh battery pushing the claimed range up to 161 miles.

The rest of the experience is the same – brisk, torquey acceleration, a comfortable ride in most conditions and willing handling – but the significantly extended range makes it a more viable prospect more of the time. It's still not cheap, but it is classy, fun and usable – especially in the city. **MJ**

★★★★★

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JCB Fastrac

The World's Fastest Tractor has 150mph potential. Yes, really. We drive it

MODEL TESTED FASTRAC TWO WORLD'S FASTEST TRACTOR

Power 1016bhp • Torque 1770lb ft • Weight 4876kg • 0-60mph 9.9sec • 30-70mph 7.4sec • Fuel consumption 5mpg

Six months ago, this tractor did not exist. JCB had just set a new land speed record in a Fastrac tractor, an impressive 103mph. But, as you may have seen on Channel 4 recently, the JCB team and their nominated driver, Guy Martin, didn't think that was fast enough.

So JCB went away and didn't just set about upgrading the tractor that has set the July record but built an entirely one, from the ground up. So now there are two very quick JCBs.

In late October, this, the Fastrac Two, set a new world record for a modified tractor, at 135.191mph over a two-way average, with a peak speed at the end of Elvington's runway of 153.771mph. Directly from there, it was taken to London and put on static display, and from there, it was trailered to Autocar's preferred test base for this kind of thing, in Rutland. There, we became the only other people to date to drive the JCB Fastrac Two World's Fastest Tractor. This year's Christmas road test is the world's fastest tractor.

DESIGN AND ENGINEERING



Tractors, by definition, are not designed to travel at fast speeds. 'Traction' units are designed to haul – using lots of torque – large, heavy objects. So making a tractor go fast is anathema to the agriculture/construction business.

The regular Fastrac has an innate advantage over most tractors in that it has a separate chassis, whereas most agricultural examples do not. They often don't have rear suspension but instead suspend the cab on the drivetrain at the rear, with front suspension only. The Fastrac, meanwhile, has full suspension front and rear, which gives it better road manners than most tractors. And although the Fastrac has a slightly lower top speed than a Mercedes Unimog four-wheel-drive truck, it has a high top speed for a tractor. So as farms grow in size and fields may be miles apart, this means farmers can use a tractor rather than a truck.

You'll note that its top speed of 43mph, though, is still some way short of 155mph. So to make the WFT that fast while trying to keep it true to its tractorish roots required some extraordinary measures and it's only when you see the two machines side by side that you really see the lengths JCB's team has gone to.

The Fastrac looks fairly dynamic for a normal tractor, but with a cab high above your head and tyres that come up to your eyeballs, it's still a tractor. Next to it, the record-breaking Fastrac Two looks like a computer rendering of a concept.

For one, it's lower. The Fastrac has two deep chassis rails running from front to rear and the weight of those has been halved. It's in kind of three sections: there's a rear section around the suspension, a front section around the engine and a centre section near the cabin. The →

We like

- Strong straight-line performance
- Impressive stability
- Built so well that mammoth performance feels entirely effortless

We don't like

- Narrow operating temperature window
- Rubbish at ploughing



- Underbody aerodynamics features a largely flat floor, although the exhaust pokes through it, too. At the back, there's a wide diffuser, made from aluminium, to reduce and balance lift front to rear. Plus a parachute.



- Front bodywork directs air around the front wheels and along the edge of the engine cowling to aid cooling but also houses the cooling tank, into which 25kg of ice is placed before each record run to cool air passing through the intercooler.



- Vast water-to-air intercooler is located between a huge turbocharger and the air intake plenum. Inlet air that has been through the turbo might reach temperatures of 280deg C. After it has been through the intercooler, that can be down to 10deg C.



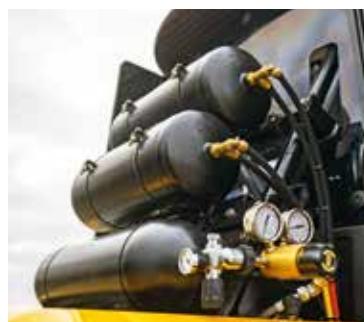
- GKN makes tractor wheels for JCB but a regular Fastrac usually uses bigger ones than this. These are machined and welded to far tighter tolerance than normal tractor wheels and the tyres need balance weights, too. Imagine the steering wheel shake otherwise.



- Of the four intake ducts, the big one is the main engine air intake and to its right one for an electric supercharger. The bottom two provide air cooling for an engine torsion damper and the exhaust respectively.



- To improve aerodynamics, the Fastrac Two sits lower and is narrower than a regular production model. Although plenty has been modified, this bonnet is a standard size and shape – just pressed from aluminium to make it lighter.



- Most tractors have a compressor but not this one. So the remote-charged scuba tank (bottom one) pushes high-energy air into the exhaust between gearshifts and keeps the turbo spinning. The top two provide air to the brakes.



- Under the bonnet, things look way more motorsport than agriculture. You can see the huge 5.0-bar turbo here, plus an exhaust partly 3D printed from Inconel to cope with near-four-figure gas temperatures leaving the engine.



● The main instrument pack is widely configurable but this is the go-to working layout: speedo, gear position, rev counter, a few temperatures and a big red flashing light if anything is going wrong.



● Multi-function controller is configured to monitor myriad on-board sensors, with the rest of the switches - clearly marked or a bright red push button - fairly self-explanatory. It starts on a rotating toggle.



● Gearlever gate like a classic Ferrari's, only beefier. Magnetic sensors at the end of each gate detect gear position because the Fastrac adjusts torque delivery in each gear. The wire is for a push-to-talk radio button.

whole thing has been dropped, with the engine significantly lower and the front drivetrain, which makes the usual Fastrac four-wheel drive, removed. The conventional Fastrac uses a two-ratio CVT transmission, but the WFT doesn't. Instead, JCB has brought in an old-school ZF six-speed H-pattern manual truck gearbox. Behind the 'box runs a beefier propshaft (albeit one from a tractor), running through to a rear axle that features a tractor crown wheel and pinion, with a spool differential that locks the rear wheel rotation together. In some ways, if you want to go fast in a straight line, you couldn't ask for a

more perfect set-up: a front-mounted, longitudinally positioned, perfectly smooth six-cylinder engine driving through a manual gearbox to a locked rear diff, with four big wheels aligned to point in the same direction.

Those wheels, incidentally, which come up to your shoulders rather than your head, are standard tractor affairs and built by GKN, the usual supplier, although they're the smallest fitted to a JCB tractor and constructed to a tolerance of less than 1mm, rather than the usual 3mm. They also carry wheel weights, up to 1kg, to balance the tyres, which tractors don't usually bother with because they don't go fast enough.



The tyres themselves still carry the 'A8' speed rating markings from the mould they're made in – which is a 25mph-rated standard tractor tyre. However, they carry two internal bands to limit exterior expansion to no more than 2mm at 150mph, they have more natural rubber in the compound and they have had their tread pattern buffed down to 10mm from the standard 27mm. We suppose they could have gone further but this is, after all, still meant to be a tractor.

Aerodynamic body addenda diverts air around a standard-shaped bonnet (it's aluminium rather than steel) and around a cabin that looks standard at a glance but is anything

but. It has been reduced in width by 300mm and height by a further 200mm, so in all, its roof is 400mm lower than a normal Fastrac's.

Finally, then, to the details of probably the most important bit: the engine. In July, when JCB originally set the record, it had an engine that produced approximately 500bhp. It's a JCB 672 engine, an inline six-cylinder pushrod four-valve diesel, and its power was good enough for three figures. But to go half as fast again, they wanted twice as much power. Which meant things got very, very serious, very quickly.

The new engine has the biggest turbocharger you'll find fitted to a



● FIA-approved Cobra motorsport seat is straight racing-car specification and fitted with a five-point racing harness. Even with a helmet on, though, there's ample head room beneath the roll-cage.

Production one also world's fastest

JCB offers two base ranges of Fastrac tractor, the 4000 and 8000. Perhaps unsurprisingly, the Fastrac Two record tractor is based on the higher-spec 8000 unit.

The 8000 is the world's fastest production tractor, with a top speed of 43mph. Chief among the differences is that the WFT uses JCB's own engine, the 672 unit, which it puts in its own vehicles and sells to others (and is used in the 328mph Dieselmax land speed record car). The standard Fastrac 8000, though, uses an 8.4-litre engine from Finnish engine maker AGCO Power and it develops up to 349bhp and 1062lb ft.

On a regular Fastrac, that torque goes to all four wheels via a two-range continuously variable transmission - low speed up to 25mph when pulling, the higher speed from rest to 43mph in lower-stress operation. The wheels have reduction hubs, too, so the wheels are spinning more slowly than the transmission - not something the WFT gets. The production tractor has electrohydraulic four-wheel-drive engagement and locking front and rear differentials, and vast options for electric and hydraulic power take-off front and rear.



tractor. It produces 5.0 bar of boost and, as big turbos do, doesn't boost big until it has a lot of air going into it. So there is an electrically powered supercharger to keep the turbo spinning at low revs, while during gearshifts on what is a leisurely H-pattern 'box, there is a scuba-dive tank at the rear, which fires air at 100 bar into the exhaust and keeps the turbo spinning while the clutch is in.

So the big turbo is spinning all the time, which is ace. But a 141bhp-per-litre diesel generates lots of heat, which radiates into the intake air, which ideally you want cool. So there is a huge ice-cold water-to-air intercooler between the turbo and

the intake manifold. JCB's engineers load that with 25kg of ice prior to each run, and by the end of a runway, it's all gone. But in the meantime, it's taking air from the turbo at 280deg C and cooling it to 10deg C before it comes out of the intercooler.

The air goes into the engine via standard inlet valves, into a cylinder whose compression ratio has been reduced from 18:1 to 11:1, via machining the tops of the standard pistons. They push on forged con-rods but do drive a standard crankshaft. The exhaust valves are the same size as usual, but because of the extreme combustion temperatures, they're made from a

different material, after which gases reach an exhaust manifold that is 3D printed from Inconel because it reaches nearly 1000deg C. It glows red not just when the engine is on a test bed, but even when it's running at speed in cool air.

So all of that combined gives this machine performance that we'll come to in a moment but it also means it's incredibly fragile at those power outputs. After the record runs, JCB discovered some microscopic cracks and saw torque peaks of up to 3300lb ft acting on the propshaft. So the wick was, sadly but inevitably, slightly turned down for our test, leaving us a little over 500bhp to get

on with. That's why the performance figures quoted here are from the record-setting runs, at which point in-gear the Fastrac Two will give a Ford Focus RS a run for its money at higher speeds. In the 500bhp form we ran it, and on a shortened runway, it still did 112mph and left a Ford Ranger Raptor in its wake.

INTERIOR



If the outside looks like a tractor that could have rolled in from the set of a science fiction film, it is pure race car inside. There's a single Cobra race bucket seat with head bolsters and a five-point harness and, around you →



◀ in this fairly spartan cabin, there is polycarbonate instead of glass for the surfaces, with two escape hatches, a fire extinguisher and the biggest FIA-approved roll-cage we've seen bolted directly to the chassis. Fixed to that are a few screens: a Racelogic speedo hooked up to a GPS data logger, a tyre pressure and temperature sensor, and a big central screen, showing some temperatures and a rev counter.

To your right is the six-speed 'box, with magnetic sensors at the end of each gate because different gears get a different throttle and torque map so as not to destroy the diff or spin up the wheels (a very real possibility, terrifyingly). Behind that is a flat panel with light switches, display switchgear and the most important thing of all: the start switch.

PERFORMANCE



To start a conventional tractor, you turn a key, there's some whirring and, after a while, away it goes, because these machines have big batteries and compressors and an alternator on board. The whole thing is self-contained.

The WFT is not so simple because it has gone from being a machine

you'd run all day for days on end to one you run briefly not very often. In taking it from nine tonnes to less than five tonnes, JCB opted to delete some equipment, in addition to giving it a lower and lighter chassis and making it slightly smaller. So there is no power take-off, for example, because there is no

on-board compressor for hydraulics, or air. And, in fact, no alternator.

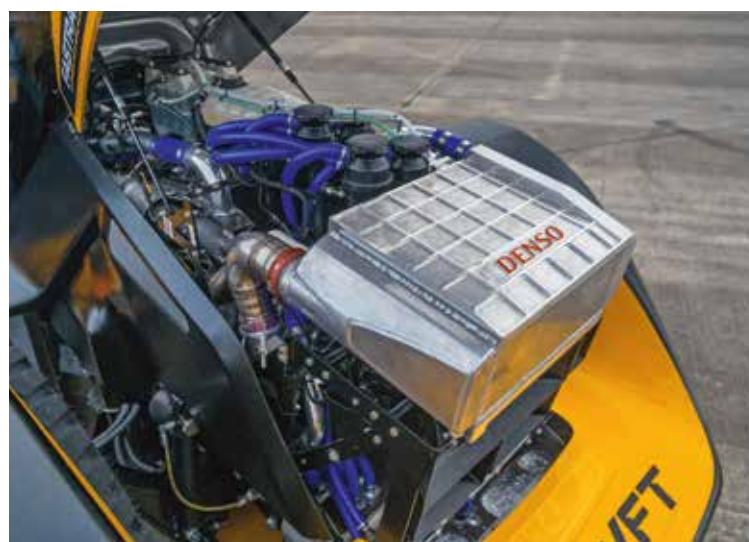
So to start the WFT, you have to hook it up to a generator or battery on a truck, which then follows it around in case you stall. Not that there's as much chance of that as is usual in valuable, rare cars, where a nervous owner will say: please, don't slip the

clutch because it costs a fortune, wears out quickly and nobody makes them any more. It's different here. JCB designed an eight-plate clutch that runs in a huge bath of oil and is so robust that the way it is tested is to fit it to a tractor, running it at top speed while towing 20 tonnes, selecting reverse gear and slipping the clutch until the set-up is driving backwards.

So it can easily handle the WFT's five tonnes setting off from rest. JCB's engineers suggest you select second gear, wind on 2500rpm (max revs are at a 3400rpm hard limiter and 3000rpm is a good change-up point) and slip the clutch almost all the way through second gear while keeping those revs high. This is slightly easier said than done when the clutch pedal is so light and there is no discernible feel through it but, once rolling, it's that much easier.

Even with less than maximum power, this is still a powertrain with a very narrow operating window. Guy Martin has said you could drive off into a field and plough with the WFT, which sounds great but is not even close to accurate. Running this is like an agricultural-sized F1 car.

Because of the low compression ratio, combustion doesn't come easily



“
Even on a much shorter runway than the record run, we saw 112mph
”



● WFT uses more than 50% of standard Fastrac parts but the detailed motorsport-grade engineering, including streamlining and lightening, are more eye-catching.



● Williams Advanced Engineering was involved in the analysis and development of the WFT's aerodynamics, which includes a front splitter, belly plate and rear diffuser.

if temperatures are too low so there is a grid heater to pre-warm air at low speeds (yes, that's reheating air that has just passed through a massive intercooler), but this heater switches out as speeds and revs rise because the thinking is that there's sufficient heat to keep combustion going nicely. In between those two states, though – once the grid heaters are off but before the tractor is going flat out – it doesn't run happily. Unfortunately, that's exactly the sort of low, constant speed that we like to drive at for photos and video. Here, the Fastrac Two is such a smoking, banging, recalcitrant mess that at one point we thought it had exploded. If you want to run at tractory speeds, then, you can't: it likes to be at idle, or flat out.

And flat out, it's amazing. A support car like a Ford Ranger Raptor struggles to keep pace with it, even in its 500bhp tune. The performance figures on full power show it reaches 60mph from rest in 9.86sec, but the way this huge, five-tonne machine keeps on pulling is what's so impressive.

Even on a far shorter runway and with much less power than during the record run at Elvington, we saw 112mph, which would have made us

land speed record holders earlier this year and still leaves us the second-fastest tractor drivers in the world (if you don't count JCB's in-house testers). Which is quite pleasing.

Once rolling, it's surprisingly easy to keep the WFT going fast. After gearchanges, the clutch and engine take-up is no more difficult than in a regular car, you'll never miss a gear on the big-gated manual gearbox and the in-gear flexibility comes without holes or torque gap. It's a smooth and responsive if noisy engine.

But then there's the stopping. There are air brakes, massively over-served, and the standard discs are just as up to the job of stopping five tonnes from 150mph a few times on a runway as they are nine tonnes plus whatever it's towing countless times on the road. But you'll remember we said there is no on-board compressor: instead, two air canisters on the back must be filled before each outing, because they provide air to the system, and once they're empty, they're empty, and you'll have no braking apart from an ineffectual parachute. The engineers think there are 40 stops in the tanks and they usually recharge well before 20. But still, worth remembering.

HANDLING AND STABILITY

★★★★★

The Fastrac Two runs nitrogen dampers on its three-link suspension, with live axles front and rear, and although the cabin is not suspended, ride comfort is pliant. Granted, we're only running it on a runway, not in a field.

The steering is hydraulic, with three turns between locks, and there is no direct mechanical link to the front wheels, so you can end up in a situation where the standard JCB steering wheel isn't showing straight even though the wheels are pointed straight. But the only truly weird thing about the driving experience is remembering that the rear wheels are locked, so the turning circle is a runway's width. It'll do tighter turns but I don't imagine the rear axle will thank you for it.

But whatever crosswinds or headwinds, despite the blocky shape of the machine, this is a straight-line monster. It's completely stable, with absolutely no drama whatsoever as you run it through the gears. Starting in second and getting through to fifth, it's huge testament to its engineering that it doesn't want to

do anything other than track totally straight, despite all controls bar the throttle pedal being light. There's no great brake feel and it's a bit like a Dallara Stradale in that there's a lot of movement in the pedal. And you don't heel and toe: you just knock the stick into neutral and, when going slowly enough, slide it back into gear. It's an undramatic but deeply, deeply impressive driving experience.

BUYING AND OWNING

★★★★★

JCB is disinclined to say just how much it has spent on not just one but two tractors, but it clearly thinks it's worth it, not only as a marketing exercise but also, given it's an engineering-led company, as a technical exercise. There has been some help from Williams (aerodynamics) and Ricardo (engine), an existing JCB partner already, but there's no question this is an expensive machine to make and a complicated one to run. We started setting up the WFT at 8am and it wasn't ready until midday, having been in a hangar with heaters blowing at its important bits for several hours because the gearbox oil is uninterested below 70deg C. →

Data log

JCB FASTRAC TWO WORLD'S FASTEST TRACTOR

LED headlights	■
Digital instruments	■
GPS and data logger	■
Tyre pressure monitor	■
Tyre temperature monitor	■
Machine vibration monitor	■
5-point harness	■
FIA-approved seat	■
FIA-approved roll-cage	■
FIA-approved fuel tank	■
Aluminium bonnet	■
GRP body panels	■
Underbody pan	■
Rear diffuser	■
Adjustable dampers	na
Automatic gearbox	na
Air conditioning	na
Cruise control	na
ABS	na
Brake assist	na
Traction control	na
Power take-off	na

Options in **bold** fitted to test car
■ = Standard na = not available

TRANSMISSION

Type 6-spd manual, electronically controlled multi-plate wet clutch, rear-wheel drive, locked differential (no hub reduction gears and standard rear axle case)

Ratios

1st 6.345 2nd 3.769 3rd 2.259

4th 1.444 5th 0.805 6th 0.805

Final drive ratio 3.08:1

BRAKES

Front 470mm discs, twin calipers (60mm, 75mm)
 Rear 470mm discs, single caliper (60mm)

Air over hydraulic, single charge
 (no compressor, air tanks needed)

Anti-lock

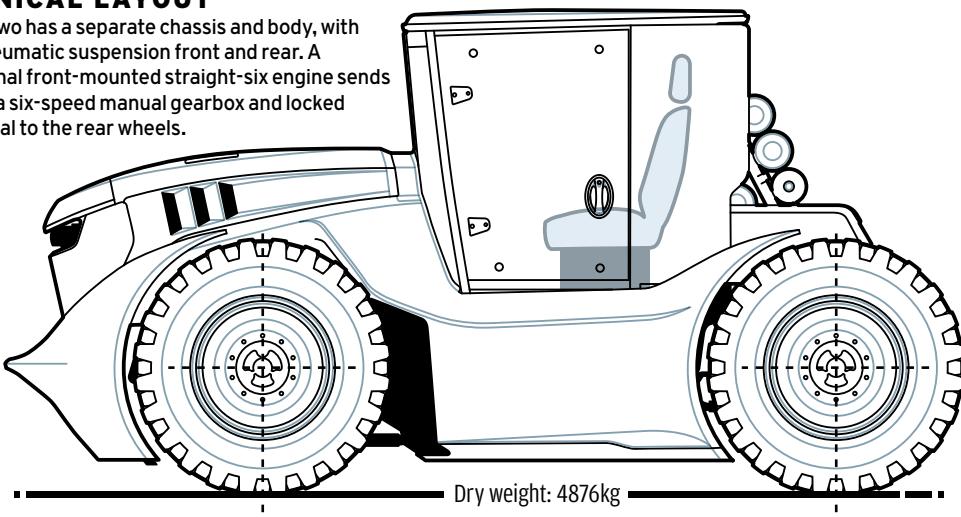
None

Handbrake type None

Parachute Standard

TECHNICAL LAYOUT

Fastrac Two has a separate chassis and body, with hydropneumatic suspension front and rear. A longitudinal front-mounted straight-six engine sends drive via a six-speed manual gearbox and locked differential to the rear wheels.



ACCELERATION

JCB Fastrac Two World's Fastest Tractor

Standing quarter mile 18.7sec at 95.1mph, standing km 29.2sec at 121.3mph, 30-70mph 7.4sec, 30-70mph in fourth na



Ford Ranger Raptor

Standing quarter mile 17.9sec at 77.8mph, standing km 32.9sec at 97.1mph, 30-70mph 10.5sec, 30-70mph in fourth na



STEERING

Type Hydraulic

Turns lock to lock 3.0

Turning circle 40m

ECONOMY

TEST MPG Track

5mpg

Tank size 20 litres

Test range 22 miles

COOLING

50-litre ice tank

Side pod radiators for engine cooling

Ram air cooling

Twin electric water pumps

SAFETY

5-point harness

FIA race seat

FIA roll-cage

ENGINE

Installation Front, longitudinal
 Type JCB 672, 6 cyl in line, 7.2 litres, turbocharged, electrically supercharged, charge-cooled, diesel

Made of Cast-iron block and head
 Compression ratio 11.0:1

Valve gear 4 per cyl, pushrod

Power 1016bhp at 3100rpm

Torque 1770lb ft at 2500-2900rpm

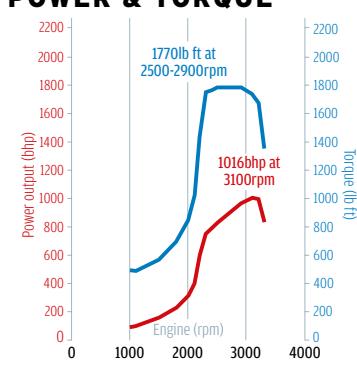
Redline 3300rpm

Power to weight 203bhp per tonne

Torque to weight 356lb ft per tonne

Specific output 141bhp per litre

POWER & TORQUE



ACCELERATION

MPH TIME (sec)

0-10	0.7
0-20	2.1
0-30	3.8
0-40	5.3
0-50	8.7
0-60	9.9
0-70	11.2
0-80	15.2
0-90	17.4
0-100	19.7

Standing quarter mile 18.7sec at 95.1mph

Standing kilometre 29.2sec at 121.3mph

CHASSIS & BODY

Construction Steel chassis, GRP body, aluminium bonnet, polycarbonate windows

Weight 4876kg (dry), 4975kg (wet)

Drag coefficient 0.48

Frontal area 4.5m²

Wheels GKN 28in, welded steel

Tyres BKT 400/80 R28

Spare None

SUSPENSION

Front and rear Adjustable hydropneumatic, front anti-roll bar

THE SMALL PRINT Power-to-weight and torque-to-weight figures are calculated using manufacturer's claimed kerb weight. © 2019, Haymarket Media Group Ltd. Test results may not be reproduced without editor's written permission. For information on the Fastrac Two WFT and less esoteric Fastracs such as the 4000-series and 8000-series, contact JCB Information Centre, PO Box 45, Uttoxeter, ST14 7GZ (0800 083 8015, jcb.com). Cost-per-mile figures calculated over one day/several lengths of a runway and include a team of highly talented engineers, the hire of a runway and a hangar, the use of a support vehicle and plenty of 25kg bags of ice but do not include the cost of a film crew - or the tea and biscuits consumed by an Autocar road test team, which can bankrupt the economy of a small country. Insurance quote covers anyone brave enough to drive a tractor at 150mph, irrespective of profession, driving licence record, no-claims bonus status and sanity or lack thereof. Please remember: do not try this at home, unless you happen to be Lord Bamford. Happy Christmas.

AUTOCAR ROAD TEST

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VERDICT
★★★★★

The best way to do 150mph in five tonnes of British engineering

What's so refreshing and exciting about spending time with Fastrac Two is not just the machine itself, but also meeting the engineers who arrive with it, who designed it, who put it together and who run it. JCB has put a small, talented and young team in charge of the project in a similar fashion to the way Lamborghini put brilliant young engineers, designers and test drivers in charge of developing the Miura. And beyond the headlines and the JCBWFT hashtags and the TV programme and even the record itself, their experience matters most. Because although JCB knows that creating the world's fastest tractor has benefit to it as a marketing tool, it also has massive merit as a technical exercise, and in the world of agricultural and construction equipment, engineering counts for more than styling, marketing or advertising.

So here's to a five-star speed record, a five-star machine and its five-star engineers. If you want to do 150mph in a tractor, there's nobody we'd trust more.

Testers' notes



It's just about possible to climb up the rear tyre and swing into the cabin without stepping on the fragile body but easier to use a small set of steps.



Although glass has been swapped for Plexiglass, standard door catches remain. Plus taped-in escape hatches.

Jobs for the facelift

- Fit some steps
- Broaden the operating window
- Refit a big hitch to go for a towing record. Your correspondents are available to drive

ROAD TEST RIVALS

Verdicts on every new car, p154



1 JCB FASTRAC TWO WFT
Based on the 8000-series Fastrac, it's the best and, in fact, only way to do 150mph in a tractor at the moment. Exquisitely built, and hard to run. It's like an F1 team and car, only made much, much bigger.



2 ALLIS CHALMERS D19
Ohio father and daughter tractor pull race veterans hit 108mph in their vintage Allis. They told farms.com "they'll be waiting" if anybody else comes along and goes faster.



3 LEBLANC TRACK-TOR
Some motoring programme's 'tractor', with a 500-horsepower 5.7-litre Chevrolet engine. Not entirely clear how much tractor there is beneath the orange paint. Currently SORNed.



4 JCB FASTRAC 8330
The world's fastest production tractor can pull 10 tonnes across a field and yet is still fully suspended, comfortable and as capable as some trucks on the road. A great British machine.



5 BIGTRAK
Programmable six-wheeled electric toy that could trailer an apple to your dad, according to the adverts. Harder than it looked to achieve top speed without running into a sideboard.

Engine	6 cyls, 7.2 litres, turbo, diesel	4.3 litres, "modded quite a bit"	V8, 5.7 litres	6 cyls, 8.4 litres, turbo, diesel	Electric motors
Top speed	135.19mph	108.5mph	87.2mph	43mph	0-the 1980s: immediately

ROLLING THUNDER

The oldest engine in production, the Mulsanne's majestic 6.75-litre twin-turbo V8, turns 60 this year. Andrew Frankel drives the first and last Bentleys to carry it

PHOTOGRAPHY LUC LACEY



At some as-yet-unannounced time in the not too distant future, a period of time best measured in months rather than years, Bentley will announce that the Mulsanne is finally being put out to pasture. By then it will have been around for 10 years and what Bentley plans to do for a flagship model next is not something to which I am privy.

And I'll miss the Mulsanne. When it came out, I wasn't so sure about it. To me it looked slightly odd, an

uncertain step after the majesty of all those Arnages and Turbo Rs. As the first top-of-the-range Bentley titan to be paid for entirely by Volkswagen money, I guess I was expecting something a little more bold.

Yet I know no other car that has settled so well in its own skin over the years. To these eyes, it has aged astonishingly well and if it does indeed turn out to be the last Bentley to top the price list powered by an internal combustion engine, its future status will be assured.

But, while we're on the subject of

engines, there's something else I'll miss even more when it goes: that massive lump of British bent eight aluminium under its gently sloping bonnet.

It is the longest-lived engine in the world today, so far as engines still put into cars by their manufacturers are concerned. GM continues to make its small block and Ford its Windsor motor, both of which are older still, but only in 'crate' form for those wishing to replace worn-out examples, built hot rods and so →

VW spent more money redesigning the Arnage for its 2002 facelift than was originally spent by Vickers developing the entire car.



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S2 counted air-con and power steering among its innovations in 1959



Mulsanne's more relaxed take on high luxury

on. They are not used in new cars.

The story of Bentley's (or, more properly, Rolls-Royce's) V8 actually starts in the early 1950s when it was recognised that the straight six in use at the time and which itself dated back to the early 1920s had reached the end of the road. What was required was a new motor that offered more power,

more torque, more refinement and more reliability. More of everything indeed apart from this: they didn't want any more weight. Tricky, that. A V12 was considered but dismissed on the grounds of complexity and weight, so the V8 configuration was chosen. Which I guess

is why to this day so many people think it was a copy of an American engine, or a straight buy-in, like the Buick-sourced V8 used by Rover for decades. But it wasn't, it was a pure Rolls design from the outset that hit its performance and refinement marks by displacing first 6.25 litres and then 6.75 litres, but did indeed

weigh no more than the old 4.9-litre straight six by being cast not from iron but aluminium.

Its survival over the years is all the more remarkable for the fact that its owners actually tried to kill it. Just as in the late 1970s Porsche intended the 928 to replace the already ageing 911, so Vickers – which owned Rolls-Royce in the 1990s – decided its new Arnage and Seraph saloons would be powered by modern BMW engines. But when VW bought Bentley in 1998, its first public act was to recommission the by now much missed old V8 and, at considerable expense, completely

re-engineer the front end of the Arnage to take it. In time it would completely redesign the V8 too, mainly to allow it to meet emissions legislation, but also to improve its power and reliability. It's been a few years since a single component on a modern twin-turbo 6.75-litre V8 was interchangeable with one from a 1959 6.25-litre motor, but no one would ever claim one was not a direct development of the other.

Today, it is more than just a fabulous engine. It is unique. I know of no other motor that generates its power this way. These days it produces 530bhp, which is at least →

HOW DOES THE ORIGINAL BENTLEY V8 COMPARE?

Read books about the history of Rolls-Royce and Bentley and you might escape with the idea that the new V8 wasn't such a big deal. The product didn't change much other than what was required to accommodate the new engine: the S1 just became the S2, its 4.9-litre, six-cylinder motor replaced by a 6.25-litre V8.

No one talked about power or torque, either, for the publicly stated reason that that wouldn't have been very gallant. Perhaps more likely and in private it was because the company didn't feel like owning up to the fact

that, with only around 200bhp, its brand-new engine had no more power than did those fitted to the last true Bentleys almost 30 years earlier.

I wasn't bothered by that. I just wanted to know if two engines built 60 years apart could feel related in any meaningful way. And the rather lovely truth is that they do, at least up to a point.

Of course, I expected the S2 scarcely to be able to get out of its own way, but in fact it felt quite sprightly, despite its engine's age, smaller capacity and absence of

turbochargers. By 1959 standards, it would have moved right along. It still has that delicious laziness, and while the thunder is more of a rumble, it feels as appropriate to its 60-year-old surroundings as does the Mulsanne's motor today. It actually feels a lot younger than the car it's in, largely because it is. While the engine may have been brand new in 1959, the S2's design philosophy dates back almost to the war and, frankly, it shows. It would be the mid-1960s before Rolls-Royce and Bentley embraced the modern era with the monocoque

Shadow and T-series. The S2 remains an interesting curio, but the engine is better than the car to which it is fitted. In the Mulsanne, they are perfectly matched. Both will be missed.



Perhaps the most extraordinary car to use this engine was the Bentley Buccaneer. Six were built for the Sultan of Brunei in 1996.



← 250% more than it did 60 years ago, but the truth is that now Bentley has ditched diesel, the Mulsanne is the least powerful of all eight and 12-cylinder Bentleys on sale. But when it comes to torque, it bows to no one. It has 811lb ft of the stuff at 1750rpm, and the only reason it doesn't have more even than that is that it would melt its ZF gearbox if it did.

But such is the way it delivers that torque, at times it makes you wonder whether it needs a gearbox at all. Such is the age of this engine, its valves (just two per cylinder) are operated via long pushrods from a single camshaft buried deep in the vee, so the motor couldn't rev even if Bentley wanted it to, which

it absolutely does not. Peak power comes at, wait for it, 4200rpm, but the real joy of this engine is that it will still make you giggle at its magnificence if you never use more than 2400rpm. No one does effortless like this.

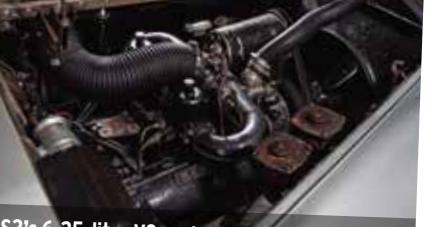
And it makes an occasion out of every journey. Actually, you don't even have to go anywhere: just sit in it, fire it up, give it a blip and you will be instantly aware you are in the presence of rather venerable greatness.

Nor could there be a more appropriate car in which to fit it. The character of the Mulsanne and that of its motor are as indivisible as that of the 911 and its flat six. You climb up into that hand-stitched cabin,

wonder briefly just how large a herd of cattle went into its creation, settle back into the best chair in the business – made in-house by Bentley – and when you think of the way you'd like that car to deliver its performance, that is what it does.

Other cars such as V12 Mercedes-AMGs do tip of the toe response too, but they roar when extended. The old Bentley motor never roars, not least because it never allows itself to be extended. It thunders. Its manners are more akin to a pre-war steam locomotive than a current production car. You find yourself locking the car in gears because you don't want your progress to be interrupted by anything so inelegant as a downshift. You let the torque talk.

This engine and car combination is such a hard act to follow because by objective judgment neither is particularly good these days, so you can't just make it objectively better because of the enormous risk of simultaneously making it



S2's 6.25-litre V8 replaced S1's straight six

subjectively worse. And there's no doubt which measure counts for more here. And I have no idea when or even if the Mulsanne will be replaced. My guess is that it will because Bentley won't want to relinquish the territory to Rolls-Royce and, lest we forget, Lagonda. But I expect there will be a hiatus of a number of years and when the new car comes it will be a pure-electric vehicle.

So this is not just the end for the Mulsanne and its amazing old engine, it is in some sense the end of an era for Bentley too. Still 60 years – almost half the time that cars have been in existence – is not a bad innings. And I, for one, am glad I was around to see it. **A**

“
The Mulsanne's manners are more akin to a pre-war steam locomotive
”

GREAT EIGHTS: THE MANY LIVES OF THE BENTLEY V8

**MULSANNE TURBO 1982**

It is no exaggeration to say this engine saved Bentley. Strapping a turbo to the Mulsanne (raising power by 50%) turned Bentley from a moribund marque of rebadged Rolls-Royces into a brand that would turn the tables on its Rolls-Royce stablemate. Before the Mulsanne Turbo, Bentleys accounted for 5% of Rolls-Royce production. Within a year, that figure was 30%. In 10 years, Bentleys outsold Rolls-Royces by two to one.

**CONTINENTAL R 1991**

The first Bentley not to have an equivalent Rolls-Royce since the 1950s. Based on the strong-selling Turbo R saloon, the Continental R evoked the memory of the superb R-type Continental coupé of 1951. With flowing coupé lines, but retaining genuine four-seat accommodation, the Turbo R was a Bentley of opulence, character and individuality. It showed a confidence returning to the name that could not have been dreamed of 10 years earlier.

**CONTINENTAL T 1996**

Turning the Continental R into the T required not just raising engine power until it was the most powerful Bentley there had been, but also stiffening the suspension and, crucially, carving a chunk out of the wheelbase. The result was an uncompromising Bentley sports car with a cockpit like a WW1 biplane, an implausible turn of speed and simply terrible ride quality. Did we care? We did not: we were too busy having fun even to notice.

**ARNAGE RED LABEL 1999**

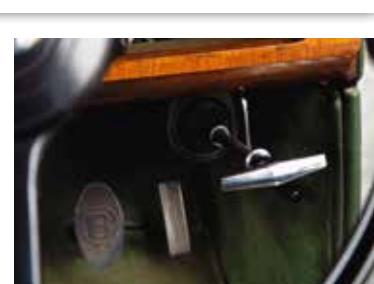
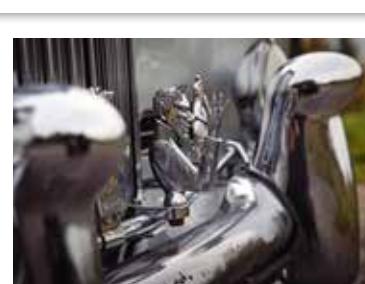
The colour of the Bentley label once denoted the model you were buying. And when it wanted to tell the world the 6.75-litre turbo V8 was not dead, but had just been temporarily missing in action, Bentley employed the same method. So the Red Label denoted an Arnage with the homegrown engine, the Green Label one still fitted with BMW's Cosworth-modified twin-turbo V8. Customers voted with their feet, ensuring another 20 years of production for the old engine.

**STATE LIMOUSINE 2002**

On the 50th anniversary of the Queen's accession to the throne, Bentley presented Her Majesty with a new State Limousine. It may have seemed like a rather lovely present but was actually the PR coup of the decade, stealing the business of transporting the Monarch to state occasions from right under Rolls-Royce's nose.

**BROOKLANDS 2006**

Not to be confused with the Brooklands saloon of 1992, this was the Brooklands coupé and, to my way of thinking, the closest the firm has come in recent years to capturing the spirit of the Bentley boys. Fast, sleek and surprisingly easy to drift, it was a car to be driven by cads, bounders and gentlemen jewel thieves. Or at least that's always how I looked at it. A shame, then, that the company never got around to building a coupé version of the current Mulsanne.



“Within a couple of laps, I’m confident it’s not trying to kill me”



MAD MACS

After a set of flying laps in the savage and spectacular McLaren Senna, Andrew Frankel does it all again in the even more savage and spectacular Senna GTR

These are the terrible twins, the baddest of McLaren's bad boys. The big brother we know already: the 789bhp Senna has already earned itself a stellar reputation as just about the most thrilling street machine to wear a numberplate – and a five-star Autocar road test in the process. It is as savage as it is spectacular, a car given over to the provision of unfettered performance and very little else.

Except that the requirement for it to be road legal places certain constraints on it. It has to have ground clearance, catalytic converters, airbags and an aerodynamic profile that keeps its body within legal

boundaries. It has to have suspension that provides at least some ride quality and tyres that will shift some water should you be caught out in the rain. So like every other road car, it is in some sense compromised.

So here's another that isn't. The Senna GTR is what you get when you relieve a Senna of the need to comply – not just with the rules of the road, but those of any race series too. For although it looks like a racing car, there is no championship in which it can compete. Like its P1 GTR predecessor, the hot Senna is a pure track-day car, which will be seen largely in company with others from the limited

run of 75 of these £1.2 million cars, at McLaren-hosted events held at race tracks around the world.

Its headline figures are 814bhp from its engine (over 200bhp per litre of displacement) and, far more significantly, an entire tonne of downforce at 150mph, some 200kg

more than that offered by the Senna and 400kg more than the P1. Given it weighs 1180kg dry, we're not far off it being able to drive upside down.

The reason it's only 20kg or so lighter than the Senna is, for all that it's lost by way of seats, airbags and so on, some weight has to be added

for its larger front diffuser and enormous rear wing, a fire-extinguishing system, on-board communications and air jacks. Interestingly, it doesn't need a roll-cage because its carbonfibre tub already far exceeds FIA roll-over requirements.

I take the road car first, just to warm myself up. We're not anywhere exotic today like



Apprehension soon turns to exhilaration



Giant wing endows the Senna GTR with 1000kg of downforce



GTR gave confidence to attack Snetterton in the wind and rain



Road-legal Senna and track-day GTR between them pack 1603bhp

Monza or Spa, but at a typically cold and windy Snetterton in Norfolk. Or, I should say today, cold, windy and wet. But McLaren have thoughtfully removed the Pirelli Trofeo R track-day tyres it usually wears and fitted a set of conventional Zeros with deep treads, so I'm not too concerned.

At least until I reach the first corner, which requires instant full left lock despite the fact I'm sure it turns right. It happens again at the next corner after which even I realise the way the Senna grips in the wet is in inverse proportion to how it grips in the dry. You have to be incredibly careful as you turn into a corner and even more as you reapply the power. And even when you're travelling in a straight line, if you're not millimetrically precise with the throttle, the back will still bite harder and faster than its safety systems can follow. Only under braking does the car feel in any way reassuring.

Even so, that's fairly scant comfort for what's to come – namely a Senna with even more power and yet sharper responses. The interior is pure race car with a flickering screen and a couple of handles for a steering wheel. There are buttons everywhere, all of which I can thankfully ignore. But it's still a faintly terrifying prospect.

At least at first. If you can get your heart out of your mouth and let your brain pick it over, a few comforting thoughts occur. First, this is a car that has to be safe to be driven by all customers in all conditions. Just because you're rich enough to afford a GTR doesn't mean you're good



Air jacks prop up just 1180kg of carbonfibre

enough to handle a car that's not on your side. And McLaren is not in the business of scaring the hell out of its best clients, or even making them feel foolish. Second, that extra downforce is going to help hugely in the quick corners. Finally, it comes on racing wet-weather tyres, which compared with street rubber have a compound comparable to warm chocolate.

And for by no means the first time in my career, I discover a track car that's far easier and better to drive in difficult conditions than its road-going equivalent. It's far easier to get some heat in the tyres, which then provide more grip, which provides more heat, which provides more grip. The GTR benefits from this circle of virtue in a way the Senna never can.

Then, it is absolutely bloody brilliant. I'm not saying you can ever forget the weather but, within a couple of laps, I'm confident it's not trying to kill me and, with a couple more, I can push it hard. The downforce in corners like the Bombhole and Coram provides apex speeds you'd be proud to achieve in the dry in most very fast cars, and so long as you're smart enough to back off the brakes as you slow and the downforce bleeds away, you can really attack the slower corners.

And here's the thing: it, too, will oversteer everywhere under power in this weather, but it doesn't snap sideways, it just slides – quickly, for sure, but not alarmingly. Most of the time, you don't even need to lift: you just correct with the steering. Soon it starts to gel and you stop thinking about braking areas, turning, apex and exit points and just get on with the simple business of enjoying the entirely explosive performance and mesmerising feel.

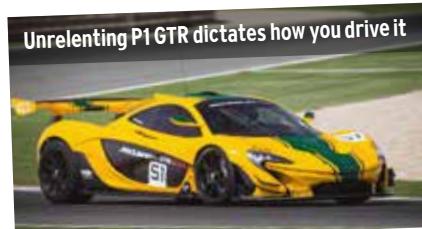
Only when I was told on the radio my time was up and I slowed down did I feel the sweat soaking into my balaclava and the thumping in my chest. I was utterly exhilarated but somehow not scared. Which is exactly how it should be. **A**

SENNA GTR vs P1 GTR

A hard comparison to make, because I drove one at Snetterton in the wet a few weeks back and the other in the baking heat of Qatar a few years back. But I can tell you the less powerful Senna GTR with hundreds of kilos less weight and hundreds of kilos more downforce felt far less like a converted road car, far more like a bespoke racer.

The P1 GTR was a sledgehammer, the Senna GTR is a stiletto, which doesn't in itself make one better than the other, just very different devices

indeed. No question the Senna would be far quicker on any circuit, but I'll never forget the way the P1 would go on relentlessly gathering speed on the straight.



Unrelenting P1 GTR dictates how you drive it

But the P1 gave you fewer options and required greater precision when driving. You had to drive it the way it wanted to be driven, while even

in the wet you can drive the Senna accurately and quickly, or flamboyantly and more slowly. It gives you that choice.

Had I the option to drive either again, I'd take the Senna in a heartbeat. Not only is it a better, quicker car, but I suspect that in the dry it would provide one of the most remarkable driving experiences of my life.

Like a Battista out of hell

Pininfarina's £2m Battista promises eye-watering acceleration even by electric hypercar standards but, as **Richard Lane** reports, its maker is also aiming for top-class GT dynamics



When was the last time you failed to wrap your head around an unbelievable performance statistic? Or have you become so accustomed to reading silly numbers that it's now rare for anything to make you stop and think? Personally, not since discovering the McLaren F1 could hit 60mph in 3.2sec – a surreal time recorded by this magazine in 1994 – have I struggled for words.

That was, at least, until 37-year-old German engineer Réne Wollmann explained that the Battista – yet another eye-wateringly expensive entry on the rapidly lengthening 'hypercar' roster, with deliveries

due in 2020 – will almost halve the legendary McLaren's sprint time courtesy of 1900bhp and 1700lb ft from four electric motors. Admittedly, an FIA World Rallycross Championship Audi A1 will do the same, but this is where the truly mind-bending stat comes in. Here it is: stamp on the accelerator pedal at 80mph and the Battista will accumulate speed at the same rate as a Tesla Model S P100D launched from standstill. The American car, remember, reaches 60mph in 2.5sec. In fact, it's so pulverisingly quick in Ludicrous mode that footage of passengers attempting to suppress laughter, tears and possibly bodily fluids has become a YouTube

phenomenon. The Battista will presumably demolish it for straight-line pace, despite weighing more than two tonnes.

It's hard to imagine how that sort of paradigm-shifting acceleration will feel. Multimillionaire collectors who nowadays don't open their wallets for less than 700bhp won't have experienced anything like it, either, which is why, so the official line goes, Pininfarina is running pre-delivery workshops like the one Autocar is attending at the Circuit de Calafat.

It is a tight, technical track that sits on the Spanish coast an hour's drive south of Barcelona, and one that Mahindra Racing uses to develop its

Formula E cars – Mahindra being the Indian car-making giant that bought a controlling stake in the world's most famous coachbuilder in 2015. It set up Automobili Pininfarina as a maker of the luxurious electric cars whose calling card is extraordinary speed. The product pipeline includes more practical vehicles but, similar to the strategy Tesla initiated with the original Roadster in 2008, the brand is starting in the headline-grabbing, uppermost echelon of the sports car market. The Battista, which is to be constructed almost entirely of carbonfibre, and with cabin opulence comparable to a Bugatti, will cost around £2 million. And frankly a Formula E car, or anything else the



Wollmann's last job was head of Merc-AMG's Project One



DOES A FORMULA E CAR GIVE A TASTER?



Formula E single-seater has a purity to how it drives

It's doubtful Ferrari would consider allowing deposit holders for even the SF90 Stradale to drive an actual Scuderia F1 car, but Mahindra ownership means Pininfarina can offer something to similar effect. Admittedly, a first-generation Formula E car with the wick turned down to hot-hatch power levels poses somewhat less of a health and safety headache for event planners than a 900bhp hybrid F1 missile, but it's still a rare chance to drive an FIA single-seater at the top of its particular tree.

So how does it feel? Surprisingly pure, in short. There's no power steering, traction control or anti-lock brakes, and with so little steering lock and road-spec tyres easily overwhelmed by the torque, the cars are primed to spin. It's a characteristic exacerbated by the lack of powertrain noise. When

the rear axle starts to slide in a combustion-engined car, there's an immediate flare of revs as the tyres over-rotate. As an audible signal, this can be just as useful as the synapses in your backside in communicating what's happening beneath you, but it's missing in this 2018-spec Mahindra M4 Electro and every other Formula E car.

For our short stint at the Calafat circuit, and as is the custom at any event in the series, there's also not a single tyre warmer to be found in the pit garage, so extra care is required.

As for the link between Formula E and the Battista, beyond the marketing opportunities, it's tenuous, with battery management and aerodynamics the principal areas of crossover. Ultimately, the road car will be a far quicker, more complex and more capable device.

Battista should leave a Formula E racer in its wake



sensible side of a top fuel dragster, wouldn't see which way it went.

So far, roughly 50 six-figure deposits have been taken, securing one-third of the total production run. Given this car is something of a step into the unknown, for both manufacturer and buyers, that's an encouraging figure. At Calafat, owners-to-be and others who are still sitting on the fence get to meet the engineers and designers, have a closer look at a rolling chassis (due to get full 1900bhp running gear in March) and drive the Formula E car.

It's also a chance for us to catch up with a project that is a bellwether for the future of performance cars. So far, electric supercars have done little

to dispel the notion that they exist as one-trick ponies obsessed with lung-crushing acceleration. The Battista would appear no different, but if such a storied brand and engineers of the calibre Automobili Pininfarina now has on its books can't make driving this thing simple fun – and engaging on a level removed from the thrill of naked speed – perhaps it really is time for us to start worrying.

In the past year, Pininfarina's new technical headquarters in Munich has swelled from just six to more than 100 personnel. The original premises in Cambiano, Turin, are still operational and the cars will be assembled in Italy, but Munich has been crucial for recruitment. How →

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THE INFLUENCERS



Mercedes SLS AMG Electric Drive
In 2013, this was the quickest-ever electric production car, although the 0-62mph time of 3.9sec looks pedestrian today. One motor per wheel made it a dynamic showcase, demonstrating the potential of instantaneous torque splitting.



Rimac Concept Two
Croatian pioneer Rimac supplies the basis for the Battista, which uses the same carbonfibre monocoque with integrated, structural battery packs. It's a sizeable structure and stretches out to the extent that there's no need for suspension subframes.



Pininfarina Sergio
Based on the Ferrari 458 Italia – itself styled by Pininfarina – the Sergio laid down the brand's modern aesthetic back in 2013. The same sardonic grin can clearly be seen on the new Battista, even if the naturally aspirated 4.5-litre V8 is dead and buried.



Revised bodywork has taken WLTP-mimicking range simulations from 280 to 310 miles. Flat out at 217mph, it should do 60 miles: in theory, enough to go from Oxford to Oxford Circus in about 15 minutes.

“There should be something aristocratic about this car”

This, along with the four-wheel-drive powertrain, is supplied by the part-Porsche-owned Croatian start-up Rimac, whose Concept Two will bear a strong technical resemblance to its Pininfarina cousin, only with a more track-oriented set-up. The Italian car is intended as a much more fluid-riding grand tourer, with softer spring rates and, according to the latest simulations, a default torque split of 35:65 front to rear. Despite the mid-engined shape and the frightening pace, there should be something aristocratic about the Battista, and on the subject of Nordschleife simulation laps, Wollmann admits there have been some, “but only for performance

reasons and cooling predictions. We don't want to go into that game.”

“We're not going for a track weapon. This is clear,” says Nick Heidfeld, echoing Wollmann. The former F1 driver will advise on the dynamic development for the Battista and a brief chat with him at Calafat yields encouraging snippets. “The best steering I've ever experienced was in a McLaren 570S,” he says, although he admits aiming for such rich tactility and actually achieving it are two different things. Still, it's an admirable goal.

A dedicated rear-wheel-drive mode taking the smaller electric motors on the front axle offline would add another dimension to the driving experience and still leave the car with 1200bhp. It's a feature Heidfeld is extremely keen to implement, although Wollmann says he cannot understand why, if you are not at full steering lock and there is traction left in the tyres, you wouldn't use the additional power for even more acceleration and agility.

It's an intriguing insight, and with the complexities of torque vectoring, regenerative braking and the overarching need to safely contain unprecedented road car performance, there will be further ideological predicaments during the car's development. We'll find out first hand next year whether the Battista is a mould-breaking electric driver's car or merely a statistical marvel. ☐

Battista's visual allure is backed by a top dynamics team



BLOCK PARTY

To mark the 10-millionth Mini, Simon Davis drives the great Brit to a great Dane of even longer standing built on a similar ethos of ingenious, simple design and a sense of fun

PHOTOGRAPHY LUC LACEY





S

o here we are, then. Some 60 years after visionary car designer and all-round Autocar hero Sir Alec Issigonis decided it would be a smart idea to mount a four-cylinder engine transversely at the nose of his new compact, fuel-efficient city car, photographer Luc Lacey and I find ourselves looking – somewhat apprehensively, I might add – at a verdant green example of that original car's modern-day descendant.

The car in question is a Mini. Of course, it is. How could it be anything else? And this particular Mini isn't just any old Mini, either: it's the 10-millionth Mini built since the now defunct British Motor Corporation launched the genre-defining original in 1959. Specifically, it's a limited-run 189bhp Cooper S 60 Years Edition, which seems rather convenient considering that it also happens to be the 10-millionth Mini. Did I mention it's the 10-millionth Mini? It's the 10-millionth Mini. Can you see the stickers on the car? Tough to miss, right?

Anyway, back in 1959, the Mini brand didn't officially exist in its own right, BMC marketing Issigonis's breakthrough model under its Austin and Morris brands as the Seven and Mini-Minor respectively. It has been known by a few different names since then, too, while the Mini brand itself has been passed from keeper to keeper before finally finding its current home at BMW in the late 1990s.

But the Mini story is one that's been told 10 million times before. And Lacey and I haven't arrived at Autocar's south-west London road test base on what could be described, politely, as a 'very cold' November morning for a history lesson. No, our task is a different one. An epic

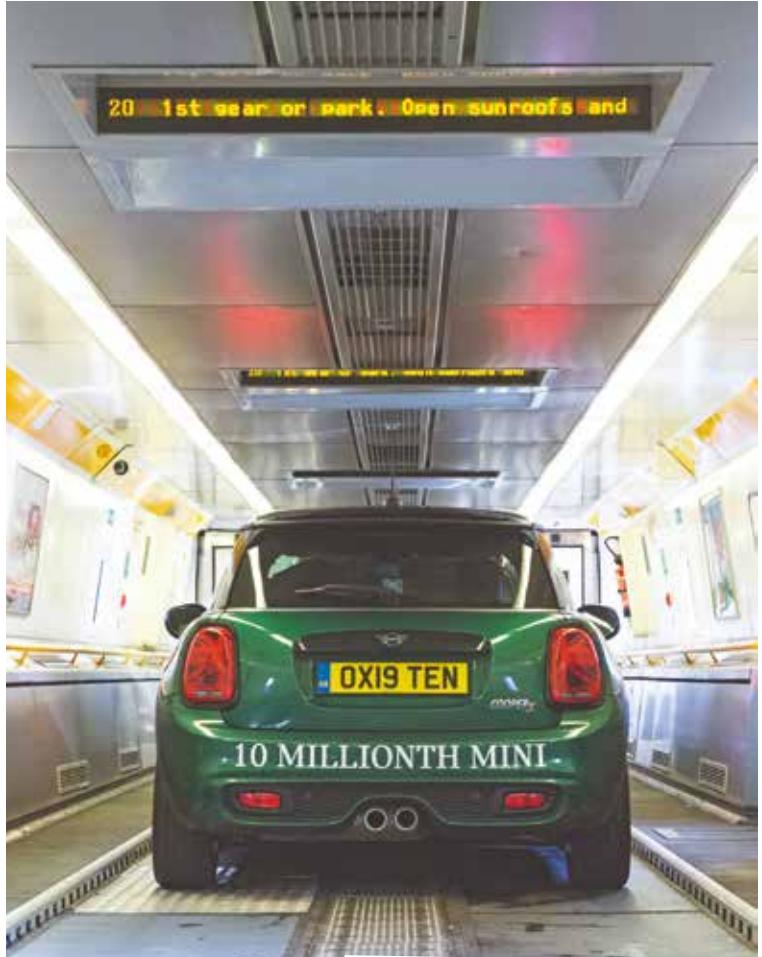
European road trip. One that should – everything going to plan – provide a fitting tribute to what is a landmark car, from a landmark brand in a landmark year.

The plan is simple: take the Mini to Monaco and retrace the route of the 1964 Rallye Monte-Carlo. Actually, no, it isn't. I'm only kidding. As good a trip as that would undoubtedly be, it's also a bit, well, predictable, and for this road trip, we wanted to do something a little different. A little off the wall. So instead of crossing the Channel and immediately making a desperate dash south for the invitingly warmer climes of the French Riviera, we'll continue east, before hooking a bit of a left and travelling north. Quite a long way north.

Our destination is the small town of Billund in Denmark, the home of another company whose focus on compact, ingenious design and unshakeable sense of fun and character have seen it become a much loved household name in its own right – just like Mini. That company is Lego, the famous maker of brick-based build-it-yourself toys whose forms are ultimately limited by only the breadth of your imagination. Considering that it has been around since 1932, I'd wager you've probably heard of it.

The plan is to get from London to Lego House in Billund for a look at its wares and a photoshoot before turning around and heading all the way back to London again – all in the space of three days. Taking two overnight halts in the German city of Bremen into account, Google Maps puts our trip at just over 1500 miles in total. That's a hell of a distance to travel in any vehicle, let alone a Mini – a car that hasn't always won praise for a soothing, comforting ride. Perhaps you can see where that →

“Our trip is 1500 miles. That's a hell of a distance in any car, let alone a Mini”

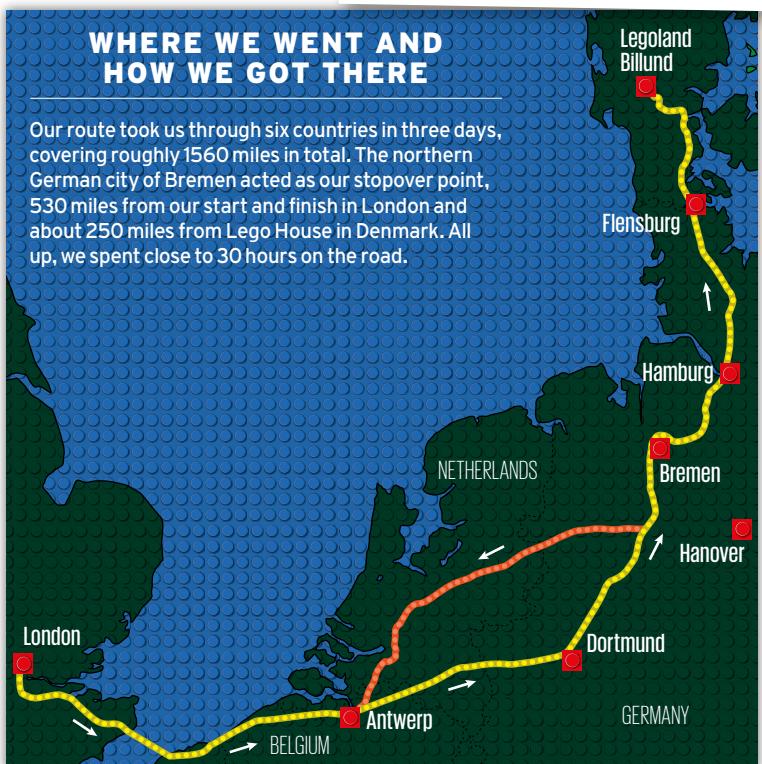


Ten million in 60 years. Can you tell?

Packaging of the original was a masterpiece

WHERE WE WENT AND HOW WE GOT THERE

Our route took us through six countries in three days, covering roughly 1560 miles in total. The northern German city of Bremen acted as our stopover point, 530 miles from our start and finish in London and about 250 miles from Lego House in Denmark. All up, we spent close to 30 hours on the road.



DARREN JONES

← aforementioned apprehension might be coming from.

But with a Eurotunnel train to catch, press on we must; which is exactly what we do once the diminutive rear seats have been collapsed to make way for Lacey's expansive collection of camera equipment. Amusingly, this process provides a rather poignant reminder that while the Mini has grown over the years, its fundamental design has stayed largely the same. Its transverse engine still allows for the wheels to be positioned towards its extremities, which in turn frees up cabin space for its occupants – provided the boot remains fairly small.

Today, the end result might not be quite as groundbreaking effective as it was in 1959. Increasingly stringent safety requirements and greater customer appetites for as many bells and whistles as possible have done their respective bits to inflate proportions and take up space (you didn't even get seatbelts on the original) – but the overall blueprint remains unmistakably Mini. Such is the price of progress, I guess.



This wee fella is too small to be a Great Dane

Nevertheless, the hop down to Folkestone and across to Calais via the Eurotunnel is pleasingly painless. The Mini's impressively supportive seats – upholstered here in attractive special-edition brown leather – do well to ward off any aches, while the seat heaters quickly neutralise the winter's chill.

Gripes at this point are fairly limited, too. The firm-edged ride hasn't proved problematic just yet, although I haven't completely warmed to the seven-speed dual-clutch 'box. It can be a bit too slow on the uptake, hesitating when I'd prefer a snappy downshift for a swift passing manoeuvre. Given the choice, I'd have gone for the standard six-speed manual without thinking about it. But with practically all of the trip still ahead of us – and most of that being on potentially congested motorways and autobahns – I'm nonetheless grateful for the dual-clutch gearbox's ease of use. As is my left leg.

Eventually, we clear the expansive, relatively dull farming plains of northern France and Belgium and

are soon bearing down on the German border from the Netherlands. A quick driver change just before we cross into Germany puts Lacey at the wheel and gives me some much-needed rest, right in time for the skies to open and unleash one of the heaviest deluges I think I've ever seen. Thankfully,

Lego has collaborated with a number of car manufacturers over the years to launch brick-based renditions of some of their best-known models and Mini is no exception.

Under its Creator Expert series, Lego launched its take on the Mini Cooper Mk7 – the car that, when production ceased in 2000, represented the end of the line for the original Mini. This model was made up of 1077 pieces and was finished in British Racing Green. Its bonnet lifted to reveal a detailed engine and the seats were made to look as though they were finished in a patchwork-style upholstery.

It even came with a picnic basket – not unlike the original car.

Today, under its Speed Champions series, Lego has recreated the Monte Carlo Rally-winning 1967 Mini Cooper S, as well as a 2018 Mini John Cooper Works rally buggy. Both come as part of the same 481-piece set.



Two Minis are part of a 481-piece Lego set

the Mini remains staunchly unflummoxed all the way to our hotel in Bremen, but the rain scuppers any attempt to make the most of the derestricted autobahns.

By the time we wake up to the cold, grey dawn of the second day of our trip, the rain has lifted. Save for a brief run-in with the Autobahnpolizei, this allows for swift progress to be made into Denmark. The Mini's 2.0-litre four-pot proves powerful enough so as not to be grossly shown up on the autobahn and it doesn't become too much of an earache when cruising

at speeds of between 100mph and 130mph, either.

After roughly four hours on the road, we roll into Billund and arrive at Lego House. Despite turning up somewhat unannounced, the ever-charming Lacey manages to sweet-talk his way into parking the Mini on the pavement for a few snaps in front of the building and a chance encounter with Trine Nissen – the head of communications for Lego House – leads to a fascinating, and very entertaining, impromptu tour →

Our Mini arrives outside Lego House in Billund, Denmark





of this Mecca for all things small. In addition to an impressive array of Lego-based constructions (the 'Tree of Creativity' is a highlight, being made of more than six million pieces and standing 15 metres tall), Nissen sheds light on how Lego came to be the global success it is today.

Unsurprisingly, the decision of founder Ole Kirk Christiansen to introduce interlocking plastic building bricks alongside the company's existing line-up of wooden toys plays a key role. However, these original bricks were hollow, which limited their structural integrity and versatility. A solution was soon found, though, and as with all great designs that fix, it was a delightfully simple one: a series of reinforcing cylindrical tubes was added to the interior of every new brick. Lego patented the concept and the rest – as they say – is history. And with the photographs in the bag, so, too, is our time in Billund.

Back in Bremen, we wake on the third and final day of our trip to find a thick, soupy fog has swept across the

Both companies have form in coming up with clever solutions

city like a ghostly stage curtain. The weather once again seems to be doing its best to work against us. Out on the autobahn, visibility is all but non-existent and we're limited to a more conservative pace. Nonetheless, the Mini takes it all in its stride.

As we push on through the murk and cross into the surprisingly sunny Netherlands, before meandering back towards Calais and on to Britain, I can't help but be amused by the commonalities between Issigonis and Christiansen. Both men were pioneers in their own right and led teams of clever people whose respective creations went on to inspire leagues of copycats. Whether they would have got on in real life

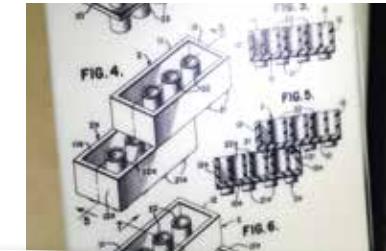
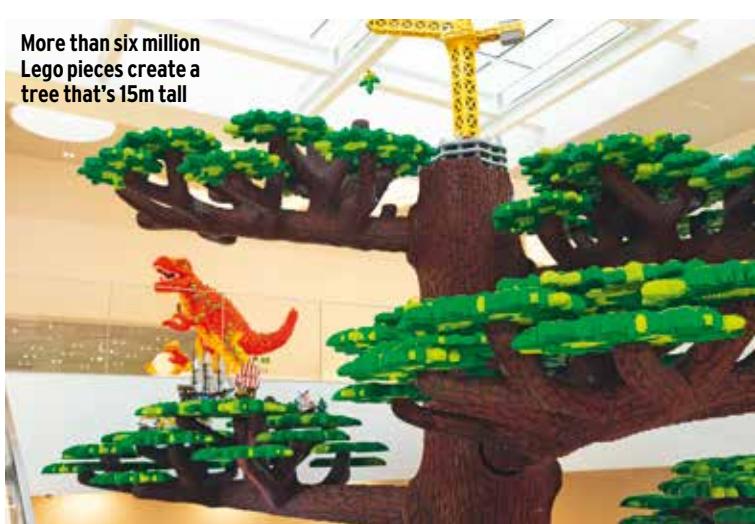
I've no idea; but surely there'd be some degree of mutual respect for the simple engineering solutions and clever design that helped catalyse the success of the other's brainchild.

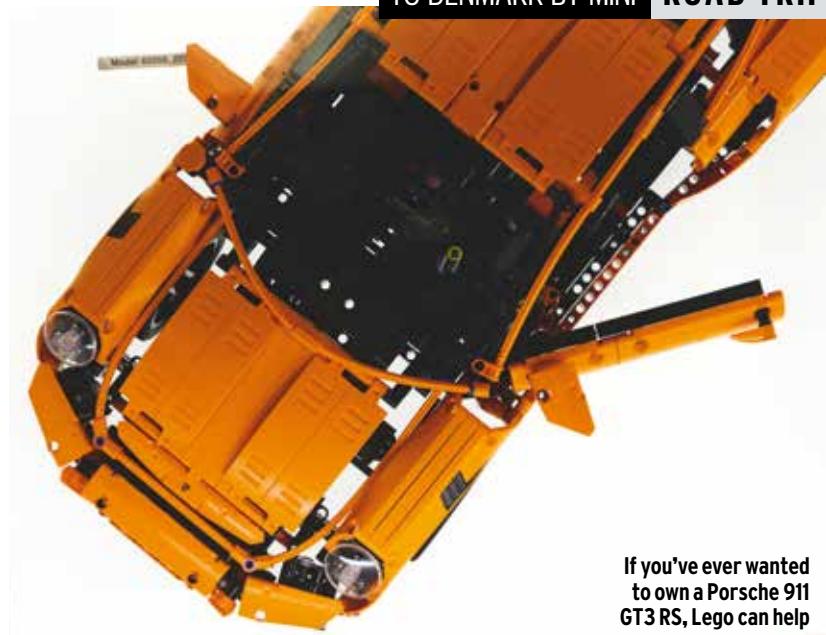
During our time in Billund, Nissen mentioned that six identical 2x4 Lego bricks could be combined to create 915,103,765 different permutations. Obviously, a Mini can't take quite that many forms, but that's not to say it hasn't sprouted permutations of its own over the course of its 60-year life. In 2019 alone, we have the Mini Clubman, Countryman and Cabriolet models, as well as the likes of the Coupé and Paceman in recent years. We've had a fair few quick Minis, too, as well as Minis that have gone on to become motorsport icons (Rallye Monte-Carlo, anyone?).

As time progresses, however, both companies will face even greater change, driven in no small part by shifting environmental concerns. The long-awaited Mini Electric will arrive early next year as one response and Lego will have to come to grips with the possibility that the non-biodegradable plastics on which a lot of its products are based could well fall out of fashion.

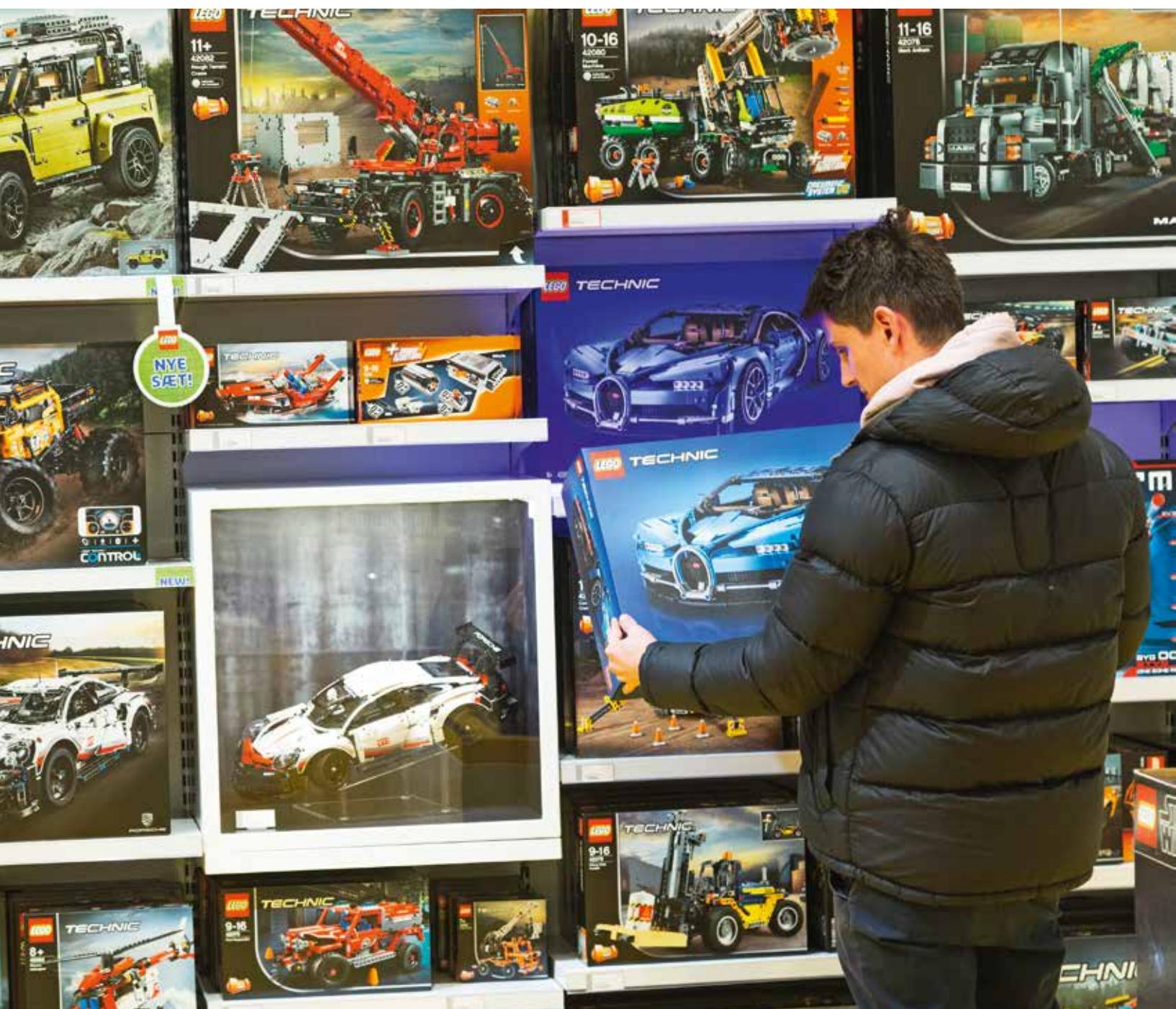
That said, it's not like both companies don't have form in coming up with clever, often beautifully simple solutions to complex challenges. Given the inherent creativity that has driven their respective success, I'm confident both will be around for some time yet. **A**

More than six million
Lego pieces create a
tree that's 15m tall





If you've ever wanted to own a Porsche 911 GT3 RS, Lego can help



THE ORIGINAL MINI ADVENTURE

The ad line for the first BMW-era Mini implied lifestyle fun awaited, but the first real Mini adventure took place inside its Cowley factory. **Richard Bremner** relates the story

PHOTOGRAPHY WILL WILLIAMS

Imagine ordering an extensive and rather elaborate new kitchen, and then discovering after it has been part-installed that you must move house and transfer your shiny new units and white goods to a room of a different design and layout. Now

imagine the scale of that challenge multiplied by several hundred. And there you have the task facing the team kitting out BMW's Mini factory in Cowley, Oxford, 19 years ago.

The new Mini developed by Rover and BMW in the late 1990s was originally intended to be built at Longbridge, Birmingham, where

most original Minis were produced during its 41-year life. All that changed when then chancellor Gordon Brown refused to grant BMW a relatively modest amount of aid to assist with the modernisation of Longbridge. This was the last straw for a BMW board riven by the difficulties faced by its "English Patient".

In March 2000, BMW announced that it was disposing of Rover, keeping Mini and selling Land Rover to Ford. The Phoenix Consortium that bought Rover for a nominal £10 was gifted the Longbridge plant, the MG F, Rover 25, 45 and 75 – the last of these assembled in the Cowley factory that, suddenly, was going to



produce the new Mini. Not that the staff of Cowley knew that straight away. "There was a one-hour gap between hearing that Rover was to be sold and that Mini would be coming to Cowley," says Andy Brook, then in pipeline logistics for the 75, now a materials planning manager.

There are still plenty of people at Mini's Oxford plant today who were involved in this transfer. Mick Fisher, who joined Austin as an apprentice in 1965, drolly describes it as "stripping the Rover 75 out and putting the Mini in", which rather underestimates the Herculean task involved.

"The challenge was that all the equipment was designed for Longbridge and we now had to fit it into a much smaller building," he says. "The glazing stations and the rolling roads were all going into a much smaller building."

The method of attaching parts to the underside of Minis changed, too. "We had rotary slings for the



For the contrast-colour roof, bodies had to go around the paint shop twice. "It's still a bottleneck today," says Fisher.

Food and sleep were for wimps. They were long days

Some of the original team recall 'challenges'



Mini," Fisher says. These turned the body through 90deg to make it easier to attach parts, whereas the 75's underbelly was attended to from a pit beneath.

"We wanted to prove the kit," he says. "We built the first cars on the run. The normal shop-floor build [for a new model] is three years. We had nine months.

There was only one body-in-white build phase before the start of production instead of three or four. The first Mini made was carried down the line, because the skillet lines [the body conveyors] were not driven." Fisher adds that "there was a bouquet of roses on the bonnet" of that car in December 2000. It wasn't quite the first R50-generation Mini, Longbridge having built a few pre-series cars, but it was a very significant one.

The factory was clearly teeming with activity. "There were a lot of BMW staff. There were four teams: the Mini project team kept their jobs," says Jason Field, a senior IT specialist. "Cowley was paired with BMW's Regensburg plant and there was a charter flight there to train from Monday to Friday." The person tasked with overseeing the project is now boss of the Volkswagen Group.

"Herbert Diess was a turnaround manager," says Fisher. "He was nice to the workforce but hard to work for." Field jokes: "Sleep and food were for wimps. They were long days."

The effort was worth it, though, the buzz building around the car a novelty for a Cowley staff unused to having a big hit on their hands. "After the press event, we kept a lot of early cars," says Dom Nolan, now a manager in materials supply. "We used them at the weekend and they would be swarmed."

Yet some had doubts. "With the Rover 75, we believed we had built a really good car and it didn't sell. This could be a repeat," says Brook.

It wasn't. "As orders started coming back, there were more shifts," says John Cowan, ex-Rover and now on the electric Mini production integration team. "The weekend shift came on and it was seven days a week."

Not just building cars but "keeping the kit going", says Fisher. "It was not designed for here. It was almost thrown together. It was a real challenge. The line went up, down and around," he says of the snake-like path it took. "The start of production was in April, as planned, but there weren't masses built," says Fisher. The Mini was launched to the public on 7 July 2001. "It was one launch date we couldn't miss," says Cowan.

Despite growing demand, Brook says: "There was still talk two years later that the plant might shut." But as production grew, worries faded. "In 2001, it was less than 50,000 cars," says Fisher, "but by 2005, it was over 200,000." A year later, Fisher and his colleagues were finding ways to extend the production line within the old Rover buildings. "It was pretty innovative," he says of solutions that made plentiful use of roof space. Ingenuity of the kind that made the original Mini famous is clearly flourishing at the factory that BMW calls 'The Home of the Mini', its next targets the launch of the Mini Electric and surviving Brexit. 

WHAT'S IT FEEL LIKE TO DRIVE TODAY?

The youngest of the first R50 generation of hatchback Minis is now 13 years old, yet there are still plenty about, partly because it was a big success and partly because it's a very well-made car. And still desirable. Examine one today and you're struck by its perfect proportions - sadly absent from the current, long-nosed Mini hatch - the jolly interior and the fact that this first new Mini, criticised for its size at launch, now seems quite small.

And it definitely feels Mini-like: the flat cornering, quick steering and eager engine are an enjoyable surprise even today. That enthusiasts are collecting the very earliest - of which this is one - should be no surprise.





Britain's next top model

Nostalgia fuels model cars, which can fetch big money. Toy story by John Evans

PHOTOGRAPHY MAX EDLESTON

Simon gets it. Greg gets it. I get it, but I'm not sure Max, the photographer, gets it. Too young, I reckon. I'm talking about that feeling of nostalgia triggered by the sight of old die-cast model cars by Corgi, Dinky and Matchbox.

I'm surrounded by them here in the Collectors Old Toy Shop in Halifax, owned by Simon Haley, 54. He's joined by Greg Brooke, 62, a customer and collector who has been coming to the shop for 27 years.

"I had one of those and one of those – and one of those!" I, a 59-year-old, can't help exclaiming as I peer at the shelves and glass cabinets filled with row upon row of the exquisite diecast cars, many of the most valuable ones still in their boxes.

Every visitor of a certain age says it, apparently. Some turn up just to ogle the models and be transported back

to a time when their idea of fun was pushing their own along the carpet. And then overnight they outgrew their Minis, Zephyr Zodiacs and fire engines, and up to the loft or, more likely, to the jumble sale the little cars went, never to be played with again.

Haley stocks a few hundred of these battered old relics from childhood. Priced from £1 each, they spill out of baskets at the back of the shop, where they're popular not only with young visitors but also with collectors harvesting spare parts.

At the other end of the shop's price spectrum is Haley's Corgi No.267 Batmobile. It appears to be in mint condition and together with its original box is priced at £500. However, there are Batmobiles and there are Batmobiles... Haley's is the so-called Black First Issue of 1966. His price is competitive considering that Collect-a-Toy, which publishes a price guide for popular collectors'

models, suggests that one in A+ condition with its box is worth £538.

The guide also lists six other Batmobiles, the most expensive being what it describes as 'Red Wheels in early box' of 1973 with a guide price of £948, and the cheapest Batmobile Black of 1974 at £245.

Incidentally, the first Batmobile wasn't actually the Black First Issue but the Satin Black First Issue. It was quickly withdrawn because Corgi thought its finish too dull and changed it for a gloss one. Haley says a good one, if you can find it, is worth £1000.

Collect-a-Toy's price guide also provides a neat little graphic showing how each Batmobile's price has moved in recent years. Taking that Black First Issue as an example, the guide price for one in A+ condition started from a low of around £450 in 2008 before rising to £1000 in 2013 and falling to its present value of £538 in 2019.

In between Haley's cheapest motors and his most expensive is an example of that icon of childhood, the Corgi No.261 James Bond Aston Martin DB5. Launched in 1965 to coincide with the release of Goldfinger, the third Bond film, and fitted with machine guns, a bulletproof shield and, most exciting of all, a pop-up roof that allowed the ejector seat to fire its occupant skywards, the model was a smash hit with children. Today, boxed examples in good condition are highly prized.

Haley wants £250 for his almost mint example complete with box, instruction leaflet, two figures and, crucially, the unused 007 transfer. This compares favourably with a guide price of £502. The model has never scaled the heights of the Batmobile, peaking at around £575, but this may be due to its massive sales success, which means good examples are always coming to

TOP 5 SHOP FINDS

SIMON HALEY

- Corgi Batmobile (£500)
- Corgi James Bond DB5 (£250)
- Corgi Jaguar E-Type (£100)
- Dinky Ford Mustang Fastback 2+2 (£70)
- Pilen VW Scirocco Mk1 (£38)

GREG BROOKE

- Corgi Batmobile (£500)
- Corgi James Bond DB5 (£250)
- Corgi Monte Carlo Rover 2000, 1966 (£150)
- Corgi Monte Carlo Mini, 1966 (£120)
- Corgi Chevrolet Camaro, 1969 (£50)

JOHN EVANS

- Corgi James Bond DB5 (£250)
- Corgi Ecurie Ecosse Transporter, 1962 (£180)
- Dinky Fordson tractor, 1934 (£85)
- Corgi Lamborghini Miura with 'diamond' headlights (£6)
- Corgi Cooper Maserati (£4)



Brooke has more than 1000 cars in his collection, but says that while many have increased in value, collecting them has never been about making money. "It's all about nostalgia – my memories of childhood and my own cars," he says. "The first model I bought was a Matchbox No.5 red bus. It cost 10 pence in a flea market. My most prized is a Dinky Rolls-Royce Silver Wraith of 1959."

Where do all these collectable models, many still with their boxes, come from and, more important, what sort of child would keep their cars this way?

"I buy my stock from people who visit the shop, from markets and from auctions," says Haley. "Private sellers who occasionally offer me their old cars boxed and in

unplayed condition are often retired professionals who were careful with their things from day one." Occasionally, he says, a load of unsold stock covered in dust is discovered. It could be anywhere in the world. Haley has his eye on Iran as a future source of top-quality models. The problem is that when big finds come to market, they upset prices, which is why Haley is loath to talk about model cars as investments.

"Just collect what you like and not with an eye on future values," he says. "Cars still with their boxes command the highest prices, although the car itself must be in top condition."

Something else that can affect prices is collectors' advancing years. Richard Beale, valuer at Warwick & Warwick, an auction house that holds regular sales of model cars, says that the prices of cars that pre-date

the 1950s are softening because the number of collectors who remember that period is declining. "On the other hand," he says, "the market for 1960s cars and later is still buoyant."

I like the look of Haley's DB5, released when I was five and one of which I had before it got too damaged to be played with any longer. Haley shows me how its roof sits properly.

"Most have damaged roofs caused when the child pushed it down to relocate the ejector seat," he says. "To avoid damaging the mechanism, they should have pushed the seat down first, then pressed down the roof. A collector will look for this."

Maybe so but I'm more interested in seeing how far it fires the baddie in the passenger seat. Not very, it turns out, and worse, right in the path of the speeding Aston. I don't remember that happening in the film. □

1959 Silver Wraith is grown-up Brooke's most prized model



market. "The 1960s was the golden age of model cars," says Haley. "The real cars they were based on were more exciting, film and TV tie-ups boosted their appeal and people had more money to spend."

Competition was intense between Matchbox, Dinky and Corgi. Today, each brand has its followers but I'm attracted to the Corgi models by their superior finish and detailing. Collector Brooke agrees.

"It's my favourite brand," he says. "The cars are better proportioned and their colours are brighter. They were the first to have windows, too. In fact, Corgi's slogan was 'The ones with windows!'"







Let's talk turkey

It's the road testers' Christmas lunch. Time to talk candidly about 2019's top cars. **Steve Cropley** is at the head of the table

PHOTOGRAPHY MAX EDELESTON

Just make sure you're at the Beckford Arms by 9am, said Saunders, our organiser, not sounding excessively Christmassy. Truth be told, 9am did seem a touch early for something billed as a convivial pub lunch where a group of road-testing mates would embrace the Christmas spirit, especially as said Georgian public house is a good two hours from the office in wildest Wiltshire.

Of course, we knew the real reason for the early start. The one thing about gatherings of drivers and cars – from which words and photographs will be extracted – is that they begin in an early, time-eating frenzy of car arranging and cleaning, followed by an extended bout of camera action and then some more arranging and shooting after that, just to be sure.

Then will come action shots, during which (especially at this time of the year) the cars get covered with road gunge in their first 100 yards, so you'll have to clean them again. Sure, there will be a nice lunch in the middle of it all, but the surrounding activities will ensure the day doesn't end until daylight runs out around 4.30pm – and I've seen many a photographer (to a person, they're obsessives) extend winter shoots by illuminating one car with the headlights of another.

Not that I want to sound less than profoundly enthusiastic about our Christmas junket: this was, after all, a gathering of the finest road-testing talent this side of the equator; a team of enthusiasts driving and gassing as usual about their favourite cars and little else. For a whole day.

Besides road test editor

Order, order. "Prior, you paying?" Prior forces a thumbs up

Matt Saunders, who chose to appear in a vast red and black Jeep Wrangler Rubicon, there was Matt Prior in a svelte 600bhp Polestar 1 plug-in hybrid coupé, Andrew Frankel in a magisterial Porsche 911 and James Disdale in a BMW 320d Touring, his version of 2019's perfect family car. Simon Davis's choice was a Toyota Supra, almost scary in its extreme yellowness, and Ricky Lane's McLaren 600LT was the major eye-grabber of the group despite a calm grey-green paint job. Finally, there was me in a white Tesla Model 3 Long Range, a car that has profoundly surprised and impressed me during the year. I looked forward to justifying my choice to the blokes.

This event has become an Autocar Christmas fixture: we each choose a recently launched car that we especially like, ideally to illustrate a personal preference in cars per se, and we take it to a photogenic location, with lunch attached. We drive, eat, talk, snap and finally head homeward, realising as the year ends how greatly we love this job and want to keep doing it next year. Also just how different from one another a clutch of great cars always are. "There are no really bad cars any more" goes the pub litany, and that's just about true. But this year-end exercise always shows how diversified cars continue to be and how healthy that is for

“
This car begins the rest of Tesla's life. Its price, performance, space and range put it back on top
“

STEVE CROPLEY
TESLA MODEL 3



buyers, drivers and the industry that makes them.

Last year, we chose a far-flung location atop coastal cliffs in Devon, not far from the northern edge of Exmoor. This year's destination, the Beckford Arms near Tisbury, is a pub in which I've dined a dozen times with friends who live nearby, never failing to have a good time. When we approached them with our Christmas plans, the proprietors were friendly and obliging, giving us the run of a large apron in front of their imposing building. (There was a large car park at the side for patrons whose routine was likely to be disrupted by our seven-car set-up.) I already knew the cuisine was great and the building had a beautiful bay window enveloping a large luncheon

LOVE THY NEIGHBOUR

Photographer Max Edleston spent a fair bit of the day on top of this ladder, or running up and down it, to shoot cars and people in various set-ups. He'd scoped out the location a couple of days earlier and befriended the neighbours so as to position his ladder in their front garden. The results (we think) speak for themselves.

How's it going
Edleston? Up and
down, up and down



table through which – later – photographer Max Edleston would be able to frame food, people and cars in one image.

If all that wasn't enough, the Beckford Arms stands at the top of a picturesque avenue running through the beautiful Fonthill estate, flanked at this time of the year by the exotic colours of late autumn trees in echelon. The pub is at one end and a magnificent stone arch stands a mile away at the other. This was our almost-private drive for the day...

Saunders was late, protesting about the traffic as is traditional for people who don't get up on time. We had the other six cars in their camera positions by the time he arrived around 10, so no time lost. It was



'Tis the season to be jolly, fa la la la la la la

the sunniest, bluest, crispest, most perfect day (after a week of unending darkness) so Max was practically in orbit. That's another thing about photographers: when the weather's decent, they get excited and start giggling and running about with the excitement of it all. While Max ran, we talked cars... →

Wrangler and 600LT prove that quality comes in many guises



POLESTAR 1

Price	£139,990
Engine	4 cyls, 1969cc, turbocharged, supercharged, petrol, plus three electric motors
Power	601bhp at 6000rpm (combined)
Torque	738lb ft (combined)
Gearbox	8-spd automatic
Kerb weight	2350kg
Top speed	155mph (governed)
0-62mph	4.2sec
Economy	403.5mpg
CO ₂ , tax band	15g/km, 16%

I love the way this car addresses the world we're moving into, not the one we're leaving behind

“

MATT PRIOR
POLESTAR 1



Now's not the time to fiddle with damper settings, Saunders



POLESTAR 1 MATT PRIOR

Our silver-tongued editor-at-large showed up in the coupé flagship for an all-new Swedish-Chinese electric marque, despite the fact that all Polestar 1s were supposed to be in Italy doing their stuff on the European launch. At the outset of our talk, he quoted from his first drive story a few months ago: he has been charmed by the car but also called it “nerdy, weird and expensive”.

A vital point of enjoyment for Prior is that the Polestar 1's ultra-rigid carbonfibre structure has a passive suspension beneath, featuring highly sophisticated 22-stage Ohlins dampers. “I just like it,” said Prior. “They could have given it air

springs and adaptive dampers like everything else in the price range, but instead they thought: let's tune this to be sporty and have a bit of fun.”

The fact that it's got 600bhp plus a sophisticated PHEV powertrain featuring advanced torque vectoring – most noticeable when you're playing in high-speed corners – means it never feels like a Volvo, something that might have been a concern.

“I love the bodystyling,” said Prior. “It's impressive, but it's also the kind of car you can take anywhere. The Volvo-inspired cabin shows it can be comfortably stretched to £140,000 and I especially like the wit of the transparent panel over the electrical gubbins in the boot that makes it look like a flux capacitor. It's great and, above all, it's cool.”


**PORSCHE 911
ANDREW FRANKEL**

We should have known Frankel would appear in a Porsche 911. He's a lifelong devotee, a former owner, and has punted more rear-engined Porkers than most of us have driven Vauxhalls. What's more, he'd freshly witnessed the stellar performance of this very car at our recent Britain's Best Driver's Car contest, based on the Anglesey circuit.

But there's far more to his regard for this car than that. Frankel sees a palpable gap between the capabilities of this 992-series 911 and last year's

991: "It's a quiet car, a comfortable car, and everything works so well now. It has a total, leave it outside, get it dirty, use it and abuse it capability, but when you need it to perform, it's absolutely magical. I just don't buy what people say about the latest 911 being too big. Sure, it's bigger than older 911s, but if you relate it to rivals like the Audi R8, it feels compact."

"Originally, I felt slightly affronted by the idea of a turbo for every 911, but the way this car's engine uses the torque to challenge the chassis, and makes good sense of the gear ratios, means it's a better car than any predecessor."

“

It's the bandwidth that astonishes. It's lovely to drive slowly, but it also does other things 911s do, even better

”



Frankel preaches to the converted on his 911



Today, German cars outnumber all but the American ones

PORSCHE 911 CARRERA S

Price	£93,110
Engine	6 cyls, 2981cc, twin-turbocharged, petrol
Power	444bhp at 6500rpm
Torque	391lb ft at 2300rpm
Gearbox	7-spd dual-clutch auto
Kerb weight	1590kg
0-62mph	3.7sec
Top speed	191mph
Economy	27.2-28.5mpg
CO₂, tax band	205g/km, 37%


MY MOST EAGERLY AWAITED CAR IN 2020


VOLKSWAGEN ID.3
A rear-engined VW designed to mobilise the masses as efficiently as possible? We've been here before. But there's every reason to believe this innovative electric hatch could prove just as significant as the Beetle turned out to be. **JD**



AUDI RS6 AVANT
Early reports suggest this new RS6 has been injected with some of the much-needed panache and engagement recent Audi Sport models have lacked. That it also looks the bee's knees, and retains a V8 engine, is encouraging, too. **SD**



PORSCHE TAYCAN
The electric car is set to take a huge leap next year. I haven't driven a Taycan, which should be a pretty memorable occasion - but I wonder if introducing the VW ID 3 to its rivals might be even more important. Watch this space. **MS**



BMW M2 CS
Come on, this is obvious. The M2 was very good and the M2 Competition sensational, with its muscle-car character and dynamic precision. The lighter CS should be better still, and you'll even be able to have a manual 'box. Heaven. **RL**



FIAT 500
Loads to anticipate in 2020 from a professional and technical standpoint. And where the city car goes next (if anywhere) will be fascinating. And I love small, light, cheap cars. So sign me as excited for the next Fiat 500. **MP**



LAND ROVER DEFENDER
Phew! There are so many. But the serious choice has to be between Aston DBX and Land Rover Defender, two cars whose fortunes are crucial to their makers. Do I really have to choose? Oh, all right, Defender... **SC**

JEEP WRANGLER 2.2 MJET II RUBICON

Price	£48,420
Engine	4 cyls, 2143cc, turbocharged, diesel
Power	197bhp at 3500rpm
Torque	332lb ft at 2000rpm
Gearbox	8-spd automatic
Kerb weight	2122kg
0-62mph	9.6sec
Top speed	112mph
Economy	36.2mpg
CO ₂ , tax band	206g/km, 37%

“It's a car that makes you want to change what you'd planned for the weekend”

MATT SAUNDERS
JEEP WRANGLER

Steady, Saunders,
or you'll spend all
afternoon cleaning it



After downing tools, it's time to down drinks



JEEP WRANGLER MATT SAUNDERS

For Saunders, the new Wrangler's story is mostly about toughness and versatility – he loves cars like that – but it's also about Jeep's classy new iteration of a classic model: “The previous edition didn't move the dial. It didn't look or feel special, although it did the big thing, which was to keep Wrangler traditions alive.

“This one's much better executed. You'd never mistake what it is – it's like the Porsche 911 in that way – but it's clearly better designed and built.

You soon form a decent mind picture of the customer it'll attract, someone who understands it and may have owned other Wranglers. It's all about lifestyle: you can imagine towing a caravan to the Lakes with the kids aboard, then ditching the

doors and folding the screen, sticking a barbecue in the back and heading to the water. Jeep has been consistent with this model, and now that the Land Rover Defender has moved away from having a frame chassis and ‘proper’ axles, there's nothing like it.”

The Wrangler isn't exactly refined, said Saunders, especially with the hardcore Rubicon's knobbly tyres fitted. “The refinement doesn't match regular SUV standards,” he said, “but if you have a normal family car and only this for ordinary driving now and again, it's absolutely fine.”



TOYOTA SUPRA SIMON DAVIS

Very few cars are quite as yellow as the new Toyota Supra that Simon Davis brought to our lunch venue, but it certainly wasn't the paint job that encouraged him to choose it. It was something more cerebral. “It's not that I'm a massive fan of the way the Supra drives,” he said, “although it's pretty good. Mainly, I like what it says about Toyota and the future.

“At a time when performance car projects are being shelved – especially by companies well into hybrids and electrification – this →

THE CAR THAT DISAPPOINTED ME MOST IN 2019



LAMBORGHINI HURACAN EVO

After the sublime Performante, hopes were high for the Evo. Yet what we got was half-baked. The engine is a masterpiece but the chassis feels like the front and rear axles have been developed by different teams who never spoke to each other. **JD**



TOYOTA YARIS GR SPORT

What an entirely ill-conceived car: a 98bhp hybrid supermini with effectively the chassis from the excellent Yaris GRMN. So not only does it barely have enough power to get out of its own way, but it's also a city car with a fiendishly sharp-edged ride. **SD**



BMW Z4

I didn't really dislike it but was sad at its lack of ambition. To be honest, a new 3 Series is a better driver's car than this two-seat convertible and that is absolutely not how it should be. I've been waiting for years for stock Z-cars to raise their games. The wait continues. **MS**



LAMBORGHINI URUS

There's just no hiding the clear sense of loathing of the wider world around you when driving one of these. I was shocked by how fast it was, and how capable on track, but I ended up feeling all the worse about myself for how much less I cared about my impact on those around me. **AF**



MINI JOHN COOPER WORKS

Not the worst car I've driven but the one that makes the least of its constituent parts. It has all the right ingredients. So why is it hyperactive on turn-in and so unsettled all the time? So uncomfortable yet unfocused? A missed goal. **MP**



BMW 7 SERIES

BMW has raised the 7 Series' game in terms of rolling refinement, cabin opulence and, most of all, the freakish way in which this luxo-arge will take apart roads better suited to hot hatches. But that grille is still unforgivable. Moreover, it's likely a bellwether for BMW's design future. **RL**

← represents a heartening commitment to pure performance cars by Toyota. A rear-drive straight six is a brave model to launch today. More than that, the Supra introduces a new design language, has been deliberately configured to encourage aftermarket tuners and runs alongside a renewed GT86 programme. Toyota clearly means what it says."

Sure, the Supra looks like a BMW inside, Davis admitted, which has encouraged some critics to label the Supra a BMW in different clothes. But if this is how you sustain great sports cars, said Davis, then we enthusiasts should be happy. It gets agreed around the lunch table that this Toyota is a bit sharper to drive than its BMW Z4 relative – quite a result for the Japanese.

TOYOTA GR SUPRA

Price	£54,000
Engine	6 cyls, 2998cc, turbocharged, petrol
Power	335bhp at 5000-6500rpm
Torque	368lb ft at 1600-4500rpm
Gearbox	8-spd automatic
Kerb weight	1500kg
0-62mph	4.3sec
Top speed	155mph
Economy	34.5mpg
CO₂, tax band	170g/km, 37%



If this is how you sustain sports cars, through joint-venture programmes, that's fine with me

“
SIMON DAVIS
TOYOTA SUPRA



Cheapest car here is an everyday champ for true enthusiasts



BMW 320D XDRIVE TOURING

JAMES DISDALE

Soon after arrival at Beckford in a neat-looking BMW estate, Disdale began to take criticism for being “the guy who’d brought the pool car”. Of our seven choices, his was the cheapest and most common. But that, he robustly argued, didn’t prevent his choice from being both apt and impressive.

“It’s one of those rare cars that strikes you as being all the car you’ll ever need,” he said, citing his own situation as a married man with a young family. “They used to call the



The best car in the world? Disdale thinks so

Merc S-Class the best car in the world, but given the progress of technology and quality, and taking into account its more sensible size, I’d say that accolade now belongs to the BMW 3 Series.”

Why a 320d? Because it’s →

THE CAR THAT SURPRISED ME MOST IN 2019



BMW 1 SERIES

A front-drive 1 Series? Surely, BMW had blown it this time? Yet it works, and brilliantly at that. It’s brimming with driver-centric entertainment, yet with the packaging that finally makes it work as a properly practical family hatchback. **JD**

ASTON MARTIN VANTAGE MANUAL

Never entirely warmed to the Vantage when I first drove it, but I’m a big fan of the manual. The meaty dog-leg ‘box really helps extract an extra level of charm and character from Aston’s baby sports car. **SD**

TOYOTA COROLLA TOURING SPORTS

Two surprises here: first, that Toyota’s Focus rival could take such a dynamic leap forward, and second, that it could be offered with a four-pot hybrid powerplant with clear sporting appeal. **MS**

FERRARI PORTOFINO

This is a Ferrari for people only interested in the image they project, not the car they drive. Right? Wrong, it turns out. I was amazed at how improved it is over the California. Bodes well for the new Roma. **AF**

ALFAHOLICS GTA-R 290

I’d read good things about what Alfaholics did to 105-series Alfa coupés but didn’t expect this to be one of the best 10 cars I’ve ever driven. Magical handling and an engine and transmission that are old-school involving. **MP**

TESLA MODEL 3

Sorry to be one-speed about this. I’d thought of Teslas as rather crude, cumbersome and poorly finished, but the Model 3 – even with basic single engine – has a well-packaged interior, looks great, is sized to suit UK roads and always fun. **SC**

← torquey, decently quick and sensationally economical. The top-end performance of the pricier 330d that Disdale could have chosen would rarely be utilised. Why an estate? Because it's as good as a similar-sized SUV without the economy-sapping frontal area. Why an xDrive? Because it often rains in Blighty, and sometimes snows.

In the end, it was Disdale's sheer enthusiasm for this very available model that sold it to the rest of us. "We all love cars," he declared, "but mostly we can't have McLarens. In a 320d, you'll still want to take the long way home."

BMW 320d xDRIVE M SPORT TOURING

Price	£41,325
Engine	4 cyls, 1995cc, turbocharged, diesel
Power	187bhp at 4000rpm
Torque	295lb ft at 1750-2500rpm
Gearbox	8-spd automatic
Kerb weight	1640kg
0-62mph	7.4sec
Top speed	140mph
Economy	57.6mpg
CO₂, tax band	124g/km, 32%

“It’s one of those rare cars that, when you boil things down, seems to be all the car you’ll ever need”

JAMES DISDALE
BMW 320d xDRIVE TOURING



TESLA MODEL 3 STEVE CROPLEY

On a first drive earlier this year, I was deeply impressed with the Tesla Model 3, and not just because of the usual electric car stuff – refinement and acceleration. It was a major shock

to see how well the company had kicked on from its bigger, less advanced, much more expensive Models S and X to produce a car whose entry level (after £3500 of UK government aid) started at only £38,500 – not far above well-praised Japanese and Korean battery-electric vehicles with less performance and shorter ranges.

Throw in the existence of Long Range (350 miles) and Performance (0-60mph in 3.2 sec) models and you had a simple but comprehensive model line-up. My own mini comparison of a single-motor Model 3 Standard against a



Cropley quizzes Lane on Model 3 and 600LT

TESLA MODEL 3 LONG RANGE

Price	£47,000 (after gov't grant)
Engine	Two synchronous electric motors (one front, one rear)
Power	360bhp (est)
Torque	390lb ft (est)
Gearbox	Single speed, direct drive
Kerb weight	1850kg
Top speed	145mph
0-62mph	4.4sec
Range	349 miles
CO₂, tax band	0g/km, 16%



Model 3 passes the screen test – and many others, too



Jaguar XE earlier this year showed that the quality and finish of materials were now acceptable. I yearned to drive one of the twin-motor four-wheel-drive Model 3s – and this came to pass on the Beckford run. My 280-mile three-legged trip to Wiltshire from London via Coventry was easy. The Long Range proved that it will do a reliable 300 miles, even in winter.

But there was more to my appreciation of this car than dynamics. I love Tesla's screen-based info-switchgear layout. The seats are brilliant, the ride is firm but decent and there's not much intrusion of road noise into the cabin, given the near silence of the powertrain. Six months ago, I'd have been profoundly surprised. Not now.



“

The 600LT Spider is one McLaren that has learned how to sing at high revs, although still not quite as the Italians do

”

RICHARD LANE
McLAREN 600LT SPIDER



McLaren 600LT RICHARD LANE

Lane is solidly addicted to supercars and rates the 600LT as one of McLaren's best, especially on engine note grounds. Which is an achievement: "Ferrari and Lamborghini have had many decades of tuning exhausts – they've shown it's an art form – but the 600LT is McLaren's best yet and the Spider body, with that little roll-down rear window, lets you appreciate it best."

Engine "music", said Lane, is starting to match McLaren's other, more generally agreed areas of excellence: the driving position, visibility, steering and layout of major controls. Other somewhat crustier members of Autocar's road test fraternity were a shade sceptical



Hear here: the 600LT Spider does it for Lane

of Lane's emphasis on noise, but everyone concurred the 600LT takes McLaren to a place, dynamically, above more mainstream relatives.

Our table agreed there's more 'daylight' between a 600LT and a 570S (about £40,000 cheaper) than a Ferrari 488 and a rarer, pricier Pista. This, stated Frankel – possessor, arguably, of the loudest voice – is the real argument in favour of the 600LT. If you want a wonderful noise, buy a Lamborghini Huracán, he said. That car emits a noise "so fabulous, you want it played at your funeral"! A

MCLAREN 600LT SPIDER

Price	£201,500
Engine	V8, 3799cc, twin-turbocharged, petrol
Power	592bhp at 7500rpm
Torque	457lb ft at 5500-6500rpm
Gearbox	7-spd dual-clutch automatic
Kerb weight	1404kg
Top speed	201mph
0-62mph	2.8sec
Economy	23.2mpg
CO ₂ , tax band	276g/km, 37%



Frankel and Disdale parked intelligently for a quick getaway

HIGHLIGHTS OF OUR MOTORING YEAR

Autocar's writers pick their most memorable moments from another busy 12 months of driving, admiring, talking and writing about cars

Kia e-Niro: no going back to petrol or diesel for Mr Holder



MARK TISSHAW

A whirlwind 48 hours in Detroit in mid-summer saw Steve Copley and I meet every single top Ford executive to hear about their plans for the future of the Blue Oval. It was insight and access Steve shared in his comprehensive eight-page feature, which I hope you enjoyed. Yet there was one character we didn't include in the piece: Bill.

Bill, a former narcotics cop, was not only our driver but also our armed guard. "I couldn't forgive myself if anything happened to you," said Bill, surprised at why we thought it was newsworthy to even ask why he was carrying a gun. Bill kept a close eye, with sightlines at all times – presumably just in case we asked the wrong question and a Ford exec took it the wrong way...



JIM HOLDER

It was less a moment of jubilation or excitement, more one of the penny dropping and life changing. It came just days after I'd handed back my Kia e-Niro long-termer and climbed aboard the hugely capable seven-seat SUV that replaced it. And there I was, standing on a garage forecourt, dirty diesel pump in hand, £75 bill for 500 miles of fuel racking up before my eyes, when I realised that driving



Aston's Laura Schwab spoke engagingly



Trip to the US came with extra – and unexpected – security measures

anything other than an electric car that I could charge cheaply and easily and at home, while I slept, just didn't suit me any more.

STEVE CROPLEY

Years ago cars were simple and uncomplicated objects of pleasure. Then about 20 years ago, with the emergence of events like Goodwood's festivals, they changed to become passports to good times at special destinations. The snag was you needed something special: the size of the enjoyment was geared to how rare and expensive your car was.

Now the world is different – and better. Today we have the Festival of the Unexceptional (aka Concours d'Ordinaire) which celebrates mass-market cars of the 1970s and 1980s that – despite their large role in our lives – used to run until they were worn out and die unmourned. Now we realise how much they contributed to our day-to-day existence and that we miss them. This year's FotU was my first (there have been previous diary clashes) and it was my most enjoyable motoring festival in living memory. Wandering a field of Allegros and Metros, Horizons and Volvo 340s with a posse of like-minded car-nuts is something I never want to miss again. Fast-rising attendances this year show how many people feel the same.



MATT SAUNDERS

It's all too easy to get very matter-of-fact about some of the amazing cars you get access to in this job, and the amazing places that just driving them can take you to. Perhaps I have, because my highlight of 2019 was sitting in a Silverstone pit garage rather than any particular car, with three blokes who I've long wanted to properly interview – but never imagined that I'd be able to interview *together*.

Sitting down with three of the most celebrated and influential vehicle dynamicists in the car business – Porsche's Andreas Preuninger, Aston Martin's Matt Becker and Jaguar Land Rover's Mike Cross – and getting them to simply compare notes on their favourite cars, the cultures of the companies by which they're employed and their thoughts for the future of car enthusiasm was an enormous privilege. I came away from it filled with hope for what's to come – not to mention walking about ten feet tall.



MATT PRIOR

One minute we thought insurance complications would leave us unable to drive a McLaren F1 at more than 20mph, if at all. The next minute, it was sorted. (Long story. Another time.) Five hours later we handed it back

having driven it long and hard enough to melt the rear numberplate.



JAMES ATTWOOD

Snapper Luc Lacey's brief was simple: 'Rally cars. Sand dunes. Blue sky. Camels.' Since we were in Morocco, watching the Future Terrain team of ex-armed forces personnel tackle the Carta Rallye in a Dacia Duster, that seemed easy. Except it was raining, the skies were leaden and the scenery featureless scrubland. Camels? Nowhere to be found.

But after hours of chasing rally cars the skies cleared, the scenery improved and then, at last, we spotted the camels. Gaunt, bedraggled camels, admittedly, but still... camels.

As the Dusters neared, Luc quickly set up his kit. But the camels weren't quite angled where the Dusters were heading. A videographer travelling with us tried to help, running at the camels, arms flailing, aiming to scare them into Luc's shot. They bolted – in the other direction. Luc eventually filed numerous amazing photos – but none with camels.



RACHEL BURGESS

An unusual one, away from the inevitable joys of driving brilliant cars. Laura Schwab, Aston Martin boss in the US, →



Puddles? In the desert?
And not a camel to be seen. Almost a disaster



From left: Becker, Preuninger and Cross talk driving dynamics



We had to jump through hoops but we got to thrash this F1 properly



Festival of the Unexceptional is a highlight of the year



was the keynote speaker at Autocar's Great British Women in the Car Industry event in June. Such was her story of rising to the top, told with humour, grace and brilliance, that the audience – both men and women – were totally enraptured. Her speech, available to watch on Autocar's YouTube channel, left me buzzing for days and served as an inspiring reminder of how hard work and kindness pays off.

TOM MORGAN

Choosing Britain's best driver's car and best affordable driver's car are two of the biggest dates in the Autocar calendar. Joining the road testers to experience one for myself was pretty epic, especially as it meant borrowing the keys to some of the best hot hatchbacks on sale today – and a few that had yet to hit dealer forecourts. The ever-reliable Welsh weather tried to put a dampener on things, but that just meant timed laps went out the window in favour of sideways action in a Mazda MX-5.

JAMES RUPPERT

Not sure if you've noticed, but the Mini is 60 years old in 2019. Despite owning a few I've not been to any of the special events around the country. What I did do, though,

was drive to the Autocar Awards at Silverstone in my Mini Cooper and show it off.

The editor thought it was a jolly good idea to turn up in it, and anyway they had used it for a film, which would be shown on the night. The sun was shining and the A-Series was deafening. Wonderful. I took it upon myself to slot it in at the head of the awards entrance line-up that included an Aston Martin and a McLaren. The high point was a six-year-old who was dropping his dad off at Silverstone (mum was driving, I think) and insisted on a selfie, not with a supercar but with my Mini Cooper.



MIKE DUFF

Absolutely no question on this one: driving the Continuation Aston DB4 GT Zagato at Silverstone in September. I had the Stowe circuit to myself for 40 minutes and a perfect replica of one of the most beautiful sports cars in the world to play with. Proper pinch-yourself stuff.

The DBZ is a hoot to drive, too, with lowly grip making it not only fun and predictable but also a hugely compelling challenge to push hard. It's crazy money – not least as you have to buy it with a DBS Superleggera Zagato – but if you had the cash it would be impossible not to be tempted.

LAWRENCE ALLAN

Want to feel as if Europe's economic activity is insignificant? Spend some time in a major Chinese city. I'd been to Shanghai before for its annual motor show, but good weather and less smog meant this year I could actually enjoy the cultural experience beyond merely the cars at the event. Shanghai's astonishing metropolis makes London feel pretty small and modest, and the fact that it's all happened in the past three decades or so makes it all the more astonishing.

The show itself? Bigger and better than ever. It seems silly that only a few years ago a Chinese motor show was a place where European journalists came to giggle at copycat cars. Now European brands are designing cars with China at the forefront, finding tough competition with literally hundreds of home-market start-ups with huge backing and some of the world's finest designers and engineers on board. Dismiss them at your peril.



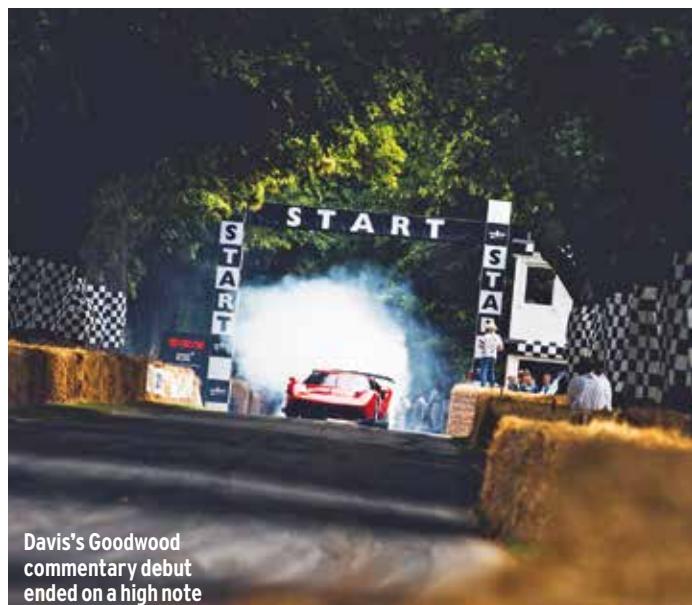
SIMON DAVIS

I'm not the chattiest soul, so being ordered to help out with some commentary at this year's Goodwood Festival of Speed brought with it a kaleidoscope



Continuation Aston DB4 Zagato at Silverstone: Duff is in heaven

“
I had the circuit to myself and one of the most beautiful sports cars to play with
”



Davis's Goodwood commentary debut ended on a high note



Bremner (on left) enjoyed a spot of dune-bashing in Peru

of butterflies. I'd be in the chair for the Friday leg of the Supercar Shootout, and from the moment I stepped into the booth, lead commentator and all-round motorsport guru Toby Moody made it clear road cars weren't exactly 'his thing'. No pressure, then. Nerves saw things get off to a bit of a stuttering, rocky start. The cars were coming thick and fast, and I felt like I barely had time to identify what I was looking at – let alone think of something interesting to say about them. But some semblance of rapport soon developed, and from that quite a heady adrenaline rush. I'd be the first to admit that I probably sounded like a complete amateur, but the sense of accomplishment was fantastic. Roll on FoS 2020.



JAMES DISDALE

Whether it's your first time or your umpteenth trip, any visit to Ferrari's Fiorano HQ is to be savoured. From Enzo's office through to the old stable garages, the place simply oozes history. Throw in the prospect of driving the new F8 Tributo, arguably the last of the pure internal-combustion breed, and it's a nailed-on number-one hit. Of course, lapping the hallowed circuit that has played host to everyone from Lauda to Leclerc was incredible, but the real highlight came on the road. Helicoiling

its way through some of the hills not far from Modena, this particular stretch of Tarmac is a popular spot for filming and photography, and once we'd used it for just that I had just enough time for one last thrash from top to bottom in the F8 before handing it back. Those intense few minutes in that howling metallic blue missile easily stand out as the best of the year.



COLIN GOODWIN

It might not sound very exotic but the most fun I've had in the line of duty this year was driving a Ford Fiesta ST all the way up to Scotland and then back down south via the Lake District, the North Yorkshire moors and north Wales.

Anything more powerful would have been frustrating (which is why driving the new McLaren GT in the south of France isn't the highlight of this year) and besides, the Fiesta ST is great fun.

Luc Lacey was along to take photos and he's good company, which is important on a three-day road trip. Glen Coe was a highlight and thanks to poor weather was deserted. As were the roads over the North Yorks moors.

We stayed in some great pubs and Lacey introduced me to the veggie full English breakfast,

which up until then I had considered to be a culinary oxymoron.

The whole trip was intended to demonstrate that in order to enjoy driving in this age you have to make an effort and – if you live in the south-east of the country – be prepared to travel. It exceeded my expectations, and you can be sure I'll be doing more of the same in 2020.



RICHARD BREMNER

Heading towards a towering wall of sand at 70mph was an eye-widening start to the year. The sand wall was one dune among thousands in the Atacama desert near Lima in Peru. It was bearing down on us because Dakar rallyist Kuba Przygonski was driving at it in his Mini Countryman as if he were trying to bat the dune out of his way. Instead, the Mini lunged to the right, its left wheels mounting the dune's flank to fling us into a deep sand channel.

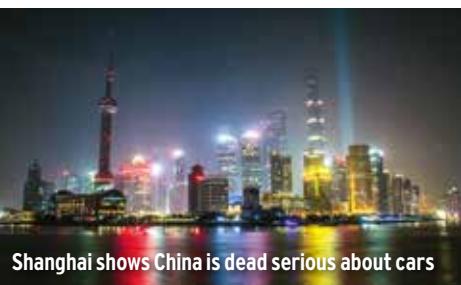
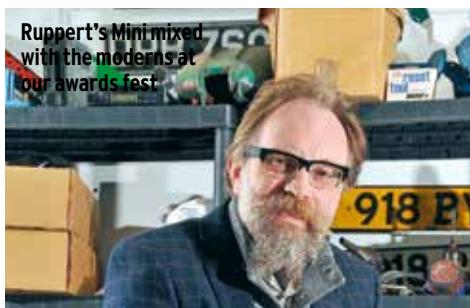
This was minute three of 20 minutes of pre-Dakar shakedown, Przygonski romping about the lunar terrain in an attempt to thrash out any last-minute troubles. But there were none, apparently, this bizarrely tall, BMW X5 diesel-propelled Countryman eventually finishing fourth. The fact of having ridden in this very car was almost as thrilling as the light violence of riding in it. **A**

F8 Tributo in the hills near Modena: not a lot to complain about here



What? No streaky Danish? Goodwin plots his escape

Ruppert's Mini mixed with the moderns at our awards fest



Shanghai shows China is dead serious about cars



Annual affordable driver's car contest was a cracking day out



Can you tell what it is yet?

Aston Martin takes its design secrets very seriously, as James Attwood discovers

If you have a Christmas tree, take a glimpse under it. There are presents there, right? They're difficult to miss, since they're probably wrapped in bright, shiny paper. Despite that, you probably think you know what some of them are – but you won't know for sure until you pull the wrapping paper off on 25 December.

There probably isn't an Aston Martin DBX under your tree (unless you have a very big tree), but you may well have spent time admiring a wrapped-up version of the car, trying to work out what it looked like underneath its mildly confusing covering. But if Sam Holgate did his job, you didn't actually know until

the SUV was launched last month.

When not designing machines such as the latest Vantage, Holgate is in charge of Aston's camouflage wraps. Like most aspects of the car industry, what started as a simple goal – to disguise a new model's looks – has morphed into a publicity-hunting arms race.

Camouflage livery isn't about hiding the existence of a new car. Wrapping a vehicle in black and white swirls – or other increasingly bright patterns – self-evidently isn't going to make it hard to spot, because it will clearly draw attention to a car. So why do it?

Blame the zebra. Possibly. There's a theory their black

and white stripes evolved to confuse predators, who would be dazzled by the jarring lines and left unable to work out which way said zebra was heading. The idea is disputed by some, but that hasn't stopped

'dazzle camouflage' being applied elsewhere: in the First World War, allied forces painted battleships with bright, bold stripes to bewilder German U-boat commanders.

When a car starts testing in public, designers have to accept it's going to be spotted; the camouflage wrap is about hiding the details. "It gives us breathing space," says Holgate. It's not just about ensuring the reveal remains a surprise: the intellectual property of key design features of cars will be patented, so firms need to keep those designs under wraps until that process is completed.

With a car such as the DBX, when the first prototypes left



Undisguised DBX should have been a surprise

Early DBX mules used 'off-the-shelf' Aston camo wrap



These days, grilles are too big to keep hidden

the factory, Holgate admits "it was obvious it was our first SUV on the road". Which leads us to how camouflage wrap has developed: firms know the machines will be photographed, appearing online and in the likes of Autocar. So the wrap has become "a great moving billboard to showcase us, our logo and even our partners", says Holgate. "It's all part of building anticipation."

Aston first used bespoke camouflage on the latest Vantage, with Holgate developing "crazy criss-cross stripes" that were inspired by both the firm's old logo and dazzling-pattered battleships. They also switched from black and white to the

distinctive green that featured on the Vantage GTE racing car. "It was a chance to really like the road and track versions," adds Holgate.

The Vantage wrap was used for the first DBX test hack, but when the first 'proper' prototype began testing, "it felt a nice point to make a step-change in terms of the camouflage to show the development of the car".

This time Holgate took the DBX name and reimagined it in the style of an off-road tyre tread. Holgate admits there's no exact science to the design, beyond creating something with sharp edges and patterns that

will distort the true shape of the car.

"The goal is to trick the eyes," says Holgate. "We create a tile pattern that we print it out on A0 vinyl sheets. When wrapped on the car, the scale and different angles cut across the feature lines, making it really hard to read the actual shape."

Holgate designs wraps using 2D images, sometimes completing a single 3D render as a proof of concept. Once the vinyl sheets are stuck on the car, partner logos and other design elements are added.

"We want to make the pattern quite complex, but it has to be easy to apply," adds Holgate. "When a car

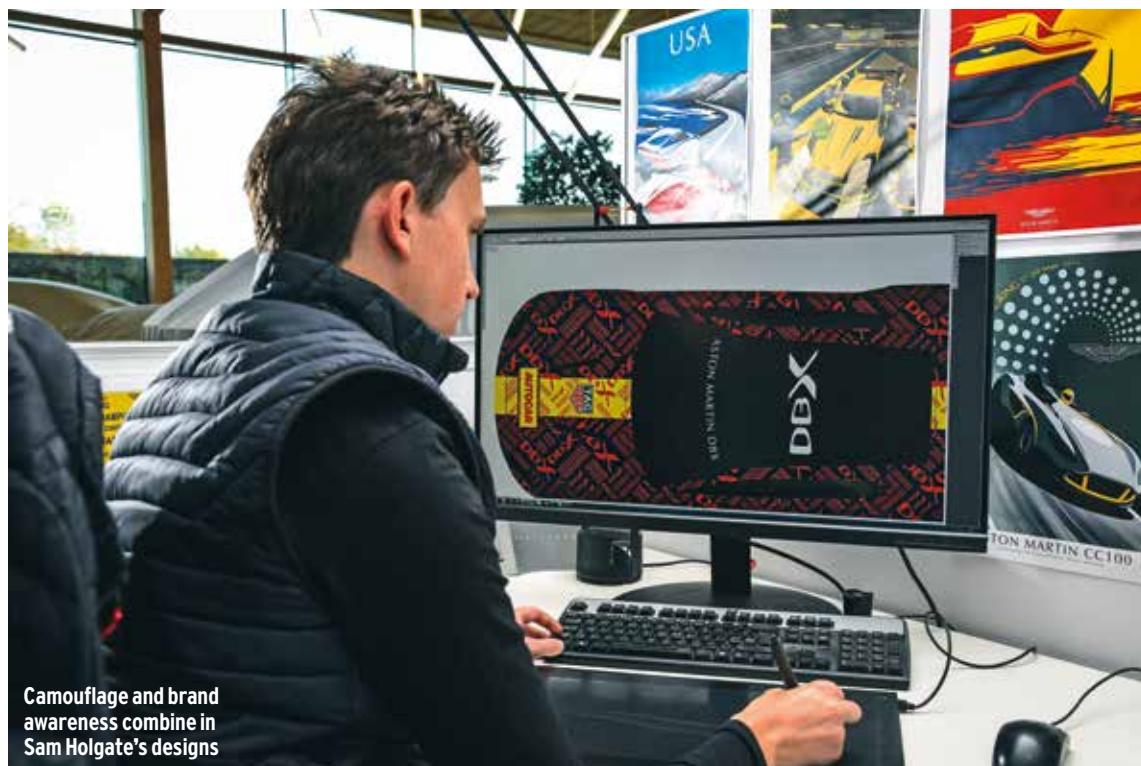
returns to the workshop we'll often swap parts, which means applying new camo each time. We don't want to make it too obvious we've changed a part."

Speed is also crucial: with test and development time limited, Aston's test team don't want to sit around waiting for complex wraps to be applied.

The volume of sculpture on an Aston Martin design makes disguising the lines particularly hard, so the firm also uses "more subtle" physical disguise elements in the form of foam blocks stuck to the car. The wrap helps to hide the placement of these elements. Lights, meanwhile, will also be covered, leaving just the minimum legal standard visible.

But there are some features that just can't be hidden, so Holgate doesn't try. "We've started highlighting the grille," he says. "It's very difficult to hide, so you just have to embrace some areas, while trying to hide other parts."

Another example is the DBX's rear wing, which deflects air down the back window, removing the need for a windscreens wiper. "We'd love to



Camouflage and brand awareness combine in Sam Holgate's designs

have kept that secret for the reveal, but the testers needed it working to ensure the results were right, so we couldn't disguise it," says Holgate. "When elements offer form and function, you just have to accept they're going to be seen."

Aston has updated the DBX wrap's design several times, at one stage switching it to red and adding a Welsh dragon to recognise the new St Athan plant where the model will be built. Holgate adds that since attention tends to lessen when the same livery is seen multiple times, it's seen an opportunity: "People get used to seeing the same camo, so you might be able to sneak a new bumper or something in under the radar."

The aim is that when the wrapping paper finally comes off a new car such as the DBX, the styling is still a surprise. And if Holgate has really done his job well, it won't be what you're expecting, either.

Speaking of which, that box under the tree that you think contains the keys to a new DBX? Sorry, but it's socks. □

BOHEMIAN WRAPSODIES



VOLKSWAGEN ID 3

Late test versions of VW's crucial electric hatch used a bold red and blue wrap – which was first shown with the car hidden inside a camouflaged glass box.



LAND ROVER DEFENDER

The new Defender wore traditional 'zebra' wrap, but it wasn't hard to work out what it was, not least due to the massive 'best 4x4 by far' hashtag down the side.



TOYOTA SUPRA

The Supra tested in a red, black and white camo that reflected Toyota's motorsport colours. It was also used by the company to create a wrapping paper last year.

TURRETS SYNDROME

A canny buy of a cheap tank has morphed into a thriving business serving thrill seekers and the film world. John Evans keeps the expletives to himself

PHOTOGRAPHY MAX EDLESTON



We gotta come up with another plan. They got a tank.' They certainly have and I'm driving it across the killing fields at Tanks-Alot, a tank driving experience and training centre.

It's the Chieftain tank from the action flick Fast & Furious 6 that inspires the famous line as it burst from a container in a convoy that moments earlier had been brought to a crashing halt by a steel cable stretched across a highway.

Dramatic stuff, and now here it is in a muddy field near Brackley, Northamptonshire, being driven rather less dramatically by me, concerned for the safety of Max, Autocar's photographer, out there knee deep in mud somewhere in my blind spot.

Make that 'blind area'. Seated low at the nose of the tank beneath its

120mm gun barrel I can only see what's ahead plus a little to either side. Anything beyond this small field of vision is the responsibility of my commander, if I had one. The fact that I don't is why the aluminium ladder I used to get onto the tank has been lost for good under 70 tons of Chieftain Mk10.

No, I didn't think a Chieftain was that heavy either. In standard form they weigh 56 tons but for this one's role in the Fast & Furious film, the production crew welded on an additional 14 tons of steel at a cost rumoured to be around £240,000.

You remember Mr Bean's Mini being crushed by a tank? What you didn't see was its crew picking the car's remains out of the tracks like food from your teeth. Had they allowed the jagged bits of metal to remain, as the tracks turned



Cordial warning sign keeps intruders away

they'd have ripped away the tank's side screens, bazooka plates and mudguards before setting about the tracks themselves.

Since, in Fast & Furious 6, the tank I'm driving would see quite a bit of car-crushing action, the producers calculated it would be cheaper to add some protection to it rather than stop filming every couple of flattened cars or so to patch it up.

In fact, this tank is still crushing cars – as I'm reminded when, churning through the thick mud, I see a line of around 40 flattened

wrecks at the side of the field. For a second I wonder if I've taken a wrong turn through the car park...

Starting the Chieftain is a straightforward affair. You fire up the 2.0-litre diesel generator that supplies the electrical power and then flick the three switches that trigger the main fuel pumps, press the starter button and the 19-litre, opposed-piston two-stroke diesel engine roars into life.

It's an interesting motor for having two opposing pistons per cylinder, each with its own crankshaft and, depending on its location, each in charge of an outlet or inlet port. It produces 950bhp and, being a multi-fuel engine, can run on whatever juice is to hand, from Shell V-Power to vodka. Down at your feet are an accelerator pedal and a brake pedal but you'll look in vain for a clutch or

HIDDEN TREASURE

In 2017, when restoring an Iraqi tank captured by the British Army during the first Gulf war and bought for £30,000, Nick Mead and Todd Chamberlain, Tanks-Alot's chief mechanic, found five gold bars, each weighing 5kg, hidden in the fuel tank.

"We couldn't understand why, having drained it of fuel, we still couldn't lift it," says Mead. "Turns out

it was the sheer weight of the gold bars, which we discovered when we levered the tank upright and noticed a hole had been hacked into its underside."

The gold was estimated to be worth around £2.5 million but Mead knew there was only one thing to do: declare his find to the police. He's still waiting for his reward.

even a gearstick. In fact, if you're a biker you'll like the Chieftain because you shift gear using a foot change like a motorcycle's. Curiously, though, you have to change gear up the 'box but it changes for you going down. If all that leaves you seriously confused, the gear you're in is displayed on a small gauge set in the instrument binnacle, just below the hatch. That's doubly useful because the Chieftain has not one but two reverse gears.

Steering is achieved by pulling and pushing on levers either side of you. Pull the right lever to brake the right track and go right, and vice versa, although when going in reverse you operate the opposing lever, which is difficult to get your head around at

first. You must pull the lever firmly and deliberately, since anything less risks burning out the huge discs and pads that brake the tracks.

I'm sitting in a conventional seat but were this a standard Chieftain, I'd be lying almost on my back with the hatch closed and looking out through a periscope – a chilling prospect if this muddy Northamptonshire field were a real battle ground.

With the engine running I select first gear – and nothing happens. The sheer weight of the tank prevents it from moving. So I feed in a bit more gas and 70 tons of Chieftain Mk10 creeps smoothly forward over the field as if it were a parade ground.

With the revs building I glance →

The Tanks-Alot collection currently amounts to 180



It's not easy steering 70 tons of Chieftain tank when you can only see straight ahead; Tanks-Alot offers a car-crushing experience for would-be mechanised warlords. It's popular

↙ down at the foot change and toe the 'box into second. The indicator needle flicks to the next number obligingly. I change up to third before trying a few changes of direction with the track brakes. The tank responds immediately and precisely.

My attempts to steer it around its own axis – called a neutral turn – are thwarted since the Chieftain requires maximum power and near-perfect conditions to contra-rotate its tracks. Still, it can out-turn most cars, which is necessary if it is to dodge enemy fire or, if I'd seen them, a set of aluminium ladders.

Despite the tank spending its days crawling around at walking speeds crushing cars, the engine has proved to be perfectly reliable. Nevertheless, owner Nick Mead's ears are permanently tuned to unfamiliar noises emanating from it. He's particularly alive to the possibility of the supercharger seals failing, resulting in the engine ingesting 35 gallons of its own oil and, as a final flourish, ejecting its 12 pistons into the crew compartment.

It's not a pleasant prospect to contemplate and, discretion being the better part of valour, I decide to return the Chieftain to its parking spot and have a play in Mead's off-road Bentley GT instead.

It's parked among an array of tanks, Abbott self-propelled guns, armoured personnel carriers and even a mighty Ural-4320 6x6 diesel, currently for sale and with a camper conversion in the back. Another of the vehicles, an Alvis Stormer purchased from Northern Ireland, still has elements of its Starstreak missile system attached to it.

Mead began collecting tanks 30 years ago when he bought a couple costing £3600 apiece. He was a butcher at the time but the fact that you could buy a barely used tank, which cost millions of pounds new, for just a few thousand intrigued him. He could only see their prices going one way and sure enough they



Evans (left) takes a lesson in tank control



The collection includes all sorts of militaria

have, as private collectors from all over the world pile in.

"I've another Chieftain here that's worth £40,000 today but next year it'll be £45,000 and the year after that, £50,000," says Mead.

He has 180 tanks, mostly British, on his 100-acre site. Four of them are Chieftains, for sale at prices ranging from £18,000 to £50,000. Buying a tank is straightforward enough but Mead has to be careful who he sells to. "I can go to prison if I sell to the wrong country," he says.

It's not only collectors who value Mead's tanks. He's just back from providing some of them to the British Army for its annual demonstration of firepower. They included some of his Russian tanks and a Mitsubishi L200 pick-up he's converted into a rebel mobile rocket launcher.

"They like to have alien vehicles to target so they can practise vehicle recognition and tell friend from foe on the battlefield," he says.

What would the army make of Mead's Bentley GT W12? The 'Dakar-inspired off-roader' was created by TV's Supercar Megabuild team, who fitted it with raised and stiffened suspension, extended wheelchairs,



Tastefully modified Conti GT W12 picks up where Bentley's own configurator leaves off. It's as posh as anything inside, but the spare wheel and jerrycan do the aero no favours

“
Chieftains can out-turn most cars.
It's necessary to dodge enemy fire
”



If you want your own Chieftain, prices start at £18,000

crash bars and a rear screen-mounted spare wheel, before painting it a drab shade of green. It was sold at auction in 2017 and now resides at Tanks-Alot, sporting an undignified advertising hoarding on its roof.

Bizarrely, given its outrageous exterior, its pure GT inside, right down to its magnolia hide. It fires up and settles to a hushed tickover but requires a hefty prod of the accelerator to coax it around the yard. It has lost a lot of its original tightness and warning lights blaze from the instrument binnacle but its value as a promotional tool, rather than a rival to the Bentayga, is obvious.

With my wellies heavy with mud, it's time to stop playing soldiers. In any case, Mead has a T54 and an Alvis Saladin with deactivated 76mm gun to sell. As I leave, the air explodes with a cackle of curses from some of the 34 parrots I've only just noticed.

CHIEFTAIN MK10 TANK

Price	£18,000-£50,000
Engine	Rolls-Royce 13 Alpha 12-cylinder, 19-litre, opposed-piston, two-stroke diesel
Power	950bhp
Torque	1460lb ft
Gearbox	Triple differential semi-automatic
Weight	55 tons (70 tons in Fast & Furious configuration)
Top speed	30mph (road), 9mph (cross-country)
Range	310 miles
Rivals	T54, T64 and T69, M60 Patton, Porsche Leopard 1

“They're from broken homes,” says Mead, as one of them tells me not to darken the front step again. It wants to be careful I don't come back in my Chieftain. □



Some vehicles are for sale, but Mead could go to jail if he doesn't properly vet buyers



BEST IN GLASS

Amid all the high-tech, some Volvos have an exquisite gear selector made from crystal using processes and skills that are centuries old. **James Attwood** sees how it's done

Volvo gear selector (inset) has a fiery, laborious gestation



Molten glass will be turned into crystal - but not by Attwood



Hot room has many furnaces, each with a team of four



Heated glass is placed carefully into the mould

and, of course, entirely unnecessary: swapping a regular selector for a glass one doesn't improve the shift times of an XC90 Inscription at all. But they're increasingly popular and Volvo is widening their availability in its range.

"I loved the idea of taking something from outside the industry and bringing it into a car," says Anders Bergström, a colour and materials designer at Volvo. "We wanted to build on our Scandinavian heritage, which gave me the idea to use crystal glass."

A gear selector works, Bergström says, because "it needed to be a big lump. The beauty of crystal glass is that you see it come alive. The gear selector is in the centre of the car and you touch it, so you feel the material and enjoy it that way as well."

Amazingly, it took 10 years to turn that idea into reality. To find out why, we headed deep into rural Småland, the heart of Sweden's Glasriket – the Kingdom of Crystal.

Natural resources – silicon-rich sand and ample forests to provide fuel – nourished the glass industry

there and dozens of glassworks are dotted around the region.

The town of Kosta is named for the founders of the glassworks there. The nearby town of Orrefors gained its own glassworks in 1898. The Orrefors and Kosta Boda firms merged in 1990 (consolidation isn't just a car industry trend) and, since

Volvo and Orrefors first collaborated on the 2009 S60 Concept, which featured a one-piece glass dashboard. They've also launched a Volvo-branded tableware range.



Sjögren (left) withholds a couple of secrets

When the glassworks in the small Swedish town of Kosta was founded, its owners didn't foresee it would one day make gear selectors. It was 1742, after all, when demand for car parts was somewhat limited.

Yet 277 years later, Kosta's hot shop is an unlikely hotspot for the production of Volvo gear selectors. Not regular gear selectors, of course: Orrefors Crystal Eye units are handmade from crystal glass, forged and shaped using tools and techniques that are near identical to those employed in the 18th century.

They're beautiful, terribly fancy

2013, their handmade operations have been combined in Kosta.

The town is, predictably, dominated by the glass industry: the Kosta's Art Glass Hotel, for example, features a glass bar, glass sculptures of food on the breakfast buffet and glass artwork on the bedside tables (our review: not child-friendly).

The hot shop is the heart of the Orrefors-Kosta Boda operation.

Inside are a number of large furnaces, each of which is the centre of a glass production line. It's a far cry from a modern car factory, with no robots or automation. Everything is done by hand.

Each furnace is crewed by a team of four and two teams make two types of Crystal Eye: one for the Volvo XC40, and a larger one for the XC60, XC90 and V90. "Bigger cars need a bigger selector," says Bergström. "It's a bit posher."

A glass gear selector starts life as sand. The lead-free pelleted batch is prepared locally by sibling firm Glasma to what Lars Sjögren, head of the Crystal Eye production team, calls "a special secret recipe". Yes, secret sand. "It's



◀ all about the mix of elements,” says Sjögren.

The first task is to melt the secret sand, which takes 16 hours at 1400deg C and is done in a clay pot in each furnace. Because of the limitations of how much sand can be melted in a pot, each team uses two furnaces, swapping halfway through each day. Once the sand is melted, the oven is turned down: at 1400deg C, molten glass is too hot to work with. At 1180deg C, apparently, it’s just right.

Production begins with a glass maker expertly hooking a suitably sized lump of molten glass onto the end of a metal rod and carefully lifting it to a bench, where it’s rolled roughly into shape.

It’s formed into its gear selector shape using a cast-iron mould before being placed on a rack. It’s then rotated while it’s moved down a line,

variously being cooled by a fan or heated by a flame. It looks random, but it’s science: the process strengthens and polishes the glass.

On a frequent basis, a glassmaker

will pause, look closely at the gear selector they’re working on, sigh slightly and then plunge the metal rod into a nearby bucket of water. That’s a rejection and the standards are exacting. The team makes around 50 units an hour, but only 35 or so will make the cut.

According to Sjögren, employees spend at least five years at the firm



Bergström (left) is a Volvo materials designer

before they even start to learn glassmaking. Most have been there for decades and focus on a single product. At this stage, I’ve been in the hot shop about 30 minutes but am still determined to try.

A glassmaker eventually allows me to ‘help’ by carrying a rod loaded with a molten glass selector from one station to the next. He

helpfully warns me that it’s hot (although the glowing molten glass on the end is a clue). I feel I’m doing a decent job of twirling the selector, although every unit I go near is then dumped straight into the water bucket. I succeed only in bumping up the rejection rate.

The surviving gear selectors are placed into an annealing lehr, a sort of oven in which the glass is put through another heating and cooling cycle, emerging eight hours later at room temperature. Then the Orrefors logo is printed on the

XC40 selectors and on the larger unit is created inside it in a 3D effect. Sjögren won’t explain how. It’s another secret.

Once that’s done, there are more checks by another expert glassmaker, who minutely examines each selector. Next to him is a bin filled with gear selectors that failed to meet his standards. The most common fault? “Bubbles,” says Sjögren, with a shudder. Sjögren *hates* bubbles. “If there’s one bubble, we’ll reject it.”

Since I clearly have no future making glass, perhaps I can help with quality control. Except, rummaging through the rejection bin, I find units with bubbles so small that

Although the firms have merged, the Orrefors and Kosta Boda brands remain separate. Orrefors focuses on crystal glass, Kosta Boda on coloured glass.



“

The first task: melt the secret sand, which takes 16 hours at 1400deg C

”



Attwood has a go at telling his glass from his elbow

Orrefors has produced tableware for Swedish royal weddings, a Nobel prize banquet and numerous Michelin-starred restaurants - and trophies for the Eurovision Song Contest.

I can only see them when Sjögren points them out.

Fortunately, the high rejection levels don't create waste: rejected units are simply melted down and used again. "Sustainability is really important to us," says Sjögren.

By Sjögren's count, each gear selector is checked at least six times before being shipped to Volvo, ready for installation into a car. The multitude of checks is partly for standards, and partly due to the challenge of meeting the exacting regulations required for car parts.

"It's not easy being a supplier to a car firm," says Sjögren. "We have to be able to guarantee the production of every gear selector is the same. We're not an automobile manufacturer: we make glass tableware. It took a lot of help from Volvo to sort."

The gear selectors also had to undergo extreme temperature tests and prove they could survive when a Volvo was driven on extremely



bumpy roads – not tasks usually required from, say, a champagne glass. So far, not a single selector has broken. "It will never happen," says Sjögren. "Never, never, never."

Both companies think the effort is worth it. "It's helping us to become more innovative and raise awareness of our firm," says Orrefors boss Ulf Kinneson. "It shows what else we can do."

The pride shines through, as does the amount of effort that goes into production – for something that is, essentially, entirely unnecessary. Except that in a world ever more focused on technology, the glass gear selectors are a tangible link to something more solid. "It's something real customers can hold onto," says Bergström. "Crystal glass is a cutting-edge, timeless material – but we're using it in a new way." □

IT'S A MATERIAL WORLD

Crystal glass isn't the only unusual material you'll find inside new cars

GOING FOR GOLD

If crystal glass isn't exclusive enough, how about making car parts from gold? That's what McLaren did when it created the F1 back in 1992. Borrowing concepts from its grand prix cars, it finished the heat shield for the F1's V12 engine with gold foil. That wasn't just to show off: gold is excellent at absorbing heat.



GOING BEYOND GOLD

But if gold still isn't exclusive enough, how about ruthenium? It's an ultra-rare precious metal from the platinum group, with only a limited amount produced. It's used to craft the 'gallery' of the ultra-luxurious Rolls-Royce Phantom Gentleman's Edition, created by the British firm's Bespoke arm.



BENTLEY'S 4800-YEAR-OLD INTERIOR

Bentley teamed up with the Fenland Black Oak Project charity, which is creating a 13-metre table out of a 4800-year-old Fenland Black Oak reclaimed from former swampland in East Anglia. Strips of the material featured inside the Bentley EXP 100 GT concept car – although given the scarcity of the wood, wider usage is unlikely. Still, wood is an integral part of many cars: Morgan machines still feature frames crafted from ash.



SEATBELTS MADE FROM SEATBELTS

As sustainability becomes more important, car firms are increasingly using recycled materials in their cars. The new Renault Zoe features seatbelts and other interior trim produced using a recycled fabric made from plastic bottles, textile strips – and old Renault seatbelts.

COLIN'S GRAND DAY OUT

A day out for the enthusiast doesn't have to mean race tracks and motor shows. **Colin Goodwin** heads off early

PHOTOGRAPHY LUC LACEY



Broad Lane Garage in Hampton has been in the business of fixing cars since 1960

Please join me for an enthusiasts' day out in which we make a small tour of some of my favourite establishments. Editor Mark Tisshaw has given me a free hand to go where I want in what I want. This is going to be a day escaping from all talk of connectivity, fast charging and autonomy and from testing bland and dull-to-drive Korean and Volkswagen Group SUVs and crossovers, all of which have snuck into my professional life uninvited.

I've chosen something very much the opposite of a Volkswagen T-Cross: a brand-new Chevrolet Camaro, supplied by Ian Allan Motors down the road in Virginia Water. Ian Allan is the only official GM dealer in the UK and is the establishment that lent us a Corvette in which I had a very pleasant day driving from Brooklands to Brighton earlier this year (Autocar, 26 June). The Camaro has the same engine as the 'Vette. So let's fire up the 6.2-litre V8 and select D for our first port of call.

In the past two years, both of my local garages have shut. They weren't

dealerships – that wouldn't have been a great loss – but traditional garages staffed by mechanics who really knew what they were doing. The sort of place that would remove a broken-off stud in a cylinder head in exchange for a pint.

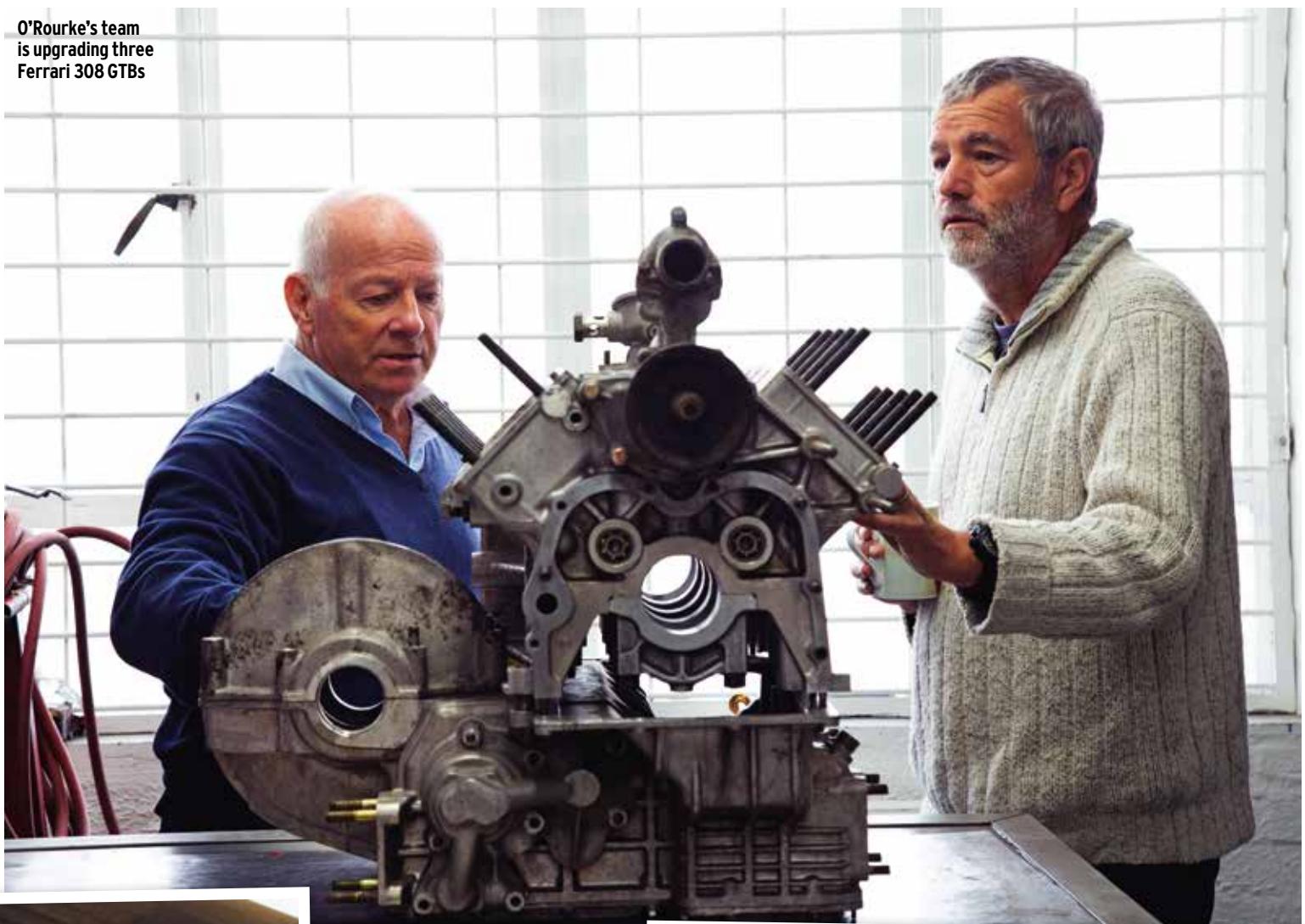
But it's not all disaster because, just a bit farther away from home, still in Hampton and still within walking distance, is Broad Lane Garage. It is one of the coolest garages I've ever seen. Its small yard always contains something interesting, like a '50s Buick, a beach buggy or, as it does today, a family tree of VW vans. There are two split windows, a bay window and several T4s. I'm having a cup of tea with Mike Scotney who, along with his sister Jane, runs the garage that their father founded with a partner in 1960.

Scotney doesn't just cater for the enthusiast, he is one himself. In reception, there's a flathead Ford V8 bare block, a more complete version of which is in Scotney's own toy. "I've got a Model T roadster with a '37 flathead V8 in it," he explains. "I take it down to Pendine Sands for the hot-rod races. I tow it behind my 1949

I've chosen something very much the opposite of a T-Cross: a Chevy Camaro



O'Rourke's team
is upgrading three
Ferrari 308 GTBs



Chevrolet Station Wagon. It's known as a Tinnie and is the cheaper version of the famous 'woodie' wagon, which is what I'd really like to own."

I'd love to spend longer with Mike and Jane but we've got more people to see. Next stop is only about 10 minutes away, an outfit called Moto Technique, hidden away on a light industrial estate in West Molesey.

I've been a regular visitor at this place for more than 30 years and have been mates with founder Kevin

O'Rourke for the same length of time. He and his team have restored some incredible machines over the years. I've seen at least two 250 GTOs having ground-up restorations, along with dozens of other Ferraris, Lamborghinis, Maseratis and pretty much any exotic you care to mention being brought back from the dead to be concours winners.

O'Rourke has shifted with the times. Restoration has always been the core business but a few years ago

Moto Technique did a lot of insurance work. I remember a crumpled F40, and a 288 GTO before that.

O'Rourke's current passion is restomods. Lined up in the squeaky-clean workshop are three Ferrari 308 GTBs, each undergoing tasteful upgrading. The green one has strengthened wishbones, 360 Modena brakes and a Moto Technique-manufactured carbonfibre engine lid that saves an enormous amount of weight. →



Derek Bell (above, on right) was at Goodwood. He kept smiling despite a quick spin

Off in the even cleaner engine shop, a thorough reworking of the cars' 3.0-litre V8 is taking place. They're bored and stroked and fitted with throttle body injection and a full engine management system. I've driven a 246 GT that O'Rourke had given the engine management treatment to and it was transformed. His own Dino is fitted with an F355 engine and is a work of art. These 308s are going to give their owners a lot of pleasure.

If I have an interesting car to test (and it's sadly rare these days – see dull crossovers and SUVs), then I head down into Sussex to Goodwood for a sarnie and the hope of seeing something interesting circulating the track – which is what Luc Lacey and I decide to do today.

The Camaro most definitely fits into the 'interesting' category. It's a wonderful car to drive slowly. I much prefer Chevrolet's pushrod V8 to Ford's 5.0-litre overhead-cammer in the Mustang. Kevin Hurl at Ian Allan will sell you one of these gems for only a few quid over £40,000. When he's run out of his stock of coupés and convertibles, it's unlikely that any new Camaros will come to our shores. It's not even certain that Chevrolet will continue to build its iconic pony car for much longer.

We're in luck. There seems to be

some sort of manufacturer-customer day in progress at Goodwood. McLaren is here with a few 720Ss, Aston Martin has a Vantage wearing the company's famous AML 1 numberplate, Ferrari has a 812 Superfast and there's a Singer here too. Aside from the Singer 911, I'd rather have the Camaro than any of these exotics.

More luck, Derek Bell is here. Bell is a constant presence in our world, popping up like Zelig at car launches and various events. If you've had the pleasure, you'll know what a warm-hearted bloke he is. "You'll never believe it," he exclaims. "I've just spun that BMW M4 at Madgwick." If I'd come out with this sentence, the world would have replied 'and so?', but D Bell losing it is unusual. "It's modern steering: no feel for what the car is doing." Quite.

We must crack on as we want to be at our next stop for afternoon tea. We've got to negotiate the A27 east of Brighton and then head north to the village of Buxted in East Sussex, home of Crosthwaite & Gardiner. Put simply, this outfit is one of the finest automotive engineering →

There's no other country in the world that has so many cool places for the enthusiast to visit in a day. That said, you could do the same sort of day out in Los Angeles, visiting hot-rod and speed shops. Now there's an idea...



Goodwood was playing host to a dealer day, with plenty of top-notch exotica to gawp at

OTHER OPTIONS

A lifetime of being around cars has blessed me with a fat address book, and there are lots of options for future tours like today's. Next time I might head west, drop in on Nick Mason (like Derek Bell, arch-enthusiast Mason pops up everywhere) and kick the tyres of his amazing collection that's based in Gloucestershire. Then visit a company nearby called Retro Track & Air, which is a bit like Crosthwaite & Gardiner but specialises in rebuilding Rolls-Royce Merlin engines. I'd finish the day with a blast up the Fosse Way to Caffeine & Machine.



↳ companies in the world. A bold statement but, given that Mercedes-Benz and Audi trusted the company to build replicas of their Silver Arrows racing cars, the claim is somewhat justified.

Dick Crosthwaite, who set the company up in 1969 with the late John Gardiner, is now semi-retired and his son Ollie runs the business day to day. There is much going on at C&W that we're unable to photograph or talk about, but that doesn't overly restrict us as there's plenty to gawp at and ogle. The machine shop is fascinating, with cutting-edge computer-controlled tools producing parts to ridiculously tight tolerances.

A trip around the stores is worth

another couple of hours of our time. Beautifully turned nuts (with integral washers) for Bugattis, brand-new D-Type cylinder heads. Talking of which, C&W will supply a brand-new E or D-Type racing engine ready to go. Or a 2.5-litre Coventry Climax engine for a Cooper or Lotus F1 car. Then there's the room where hundreds of patterns are kept. The last time I felt this in awe of history, I was standing in the Museum of Cairo.

Dick Crosthwaite might be retired but he can't keep away. He was pottering about the place when I last visited and he's here today. He's

full of stories, as is Ollie. I could stay for hours but Lacey and I have to hit the road again.

We're winding up our day out with supper at the Ace Cafe on London's North Circular Road. The cafe holds a meeting virtually every evening and tonight it's British sports cars and performance cars. Our Camaro fits the latter category, then. The traffic is horrendous on the A40 into town (we went north on the A22 from Buxted and then followed the M25 around to the M40),

and I'm beginning to wish we'd not bothered and instead stayed longer chatting cars with Dick and Ollie. I've been to the Ace Cafe when its car park was rammed, but that was on a balmy summer's evening. Tonight there's just us, a TVR Griffith and an Aston Martin Vantage. London is so busy these days that unless you're local to the Ace or come by motorcycle, it's a nightmare to get to. It's a pity that Caffeine & Machine is a bit too far away.

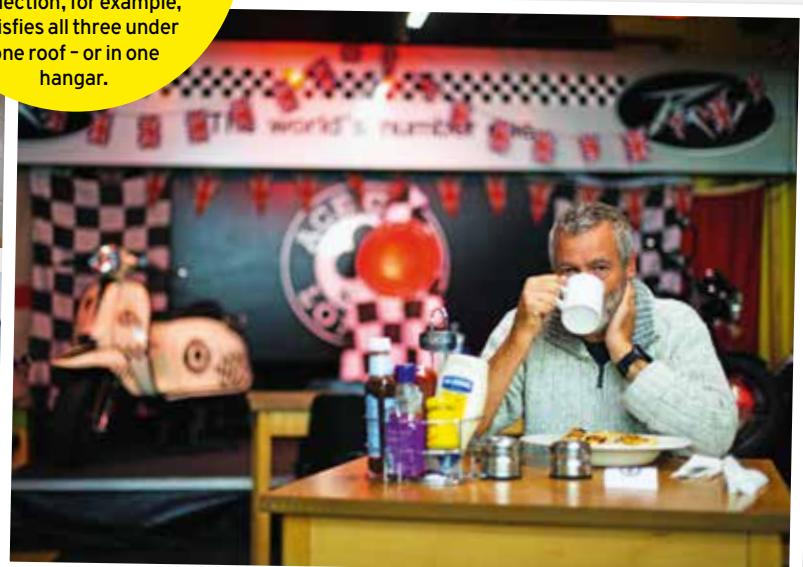
But never mind, it's been a great day out. A simple one with friends met, lots of coffee drunk and good company in a great car that's full of character. There will be lots of grand days out in the future. □



Crosthwaite & Gardiner are recognised as world leaders in automotive engineering



If, like me, and my great friend Steve Cropley, you love not just cars but also bikes and aeroplanes, your options for great days out are virtually limitless. The Shuttleworth Collection, for example, satisfies all three under one roof - or in one hangar.



“
The Ace Cafe holds a meeting virtually every evening
”





THE WICKER PLAN

From figgy pudding to Gentleman's Relish, piccalilli and bizarre preserves, Christmas hampers can be a minefield of culinary disappointment. So we decided to build our own by way of a national road trip in an everyday all-round. **Richard Webber** procures a 520d Touring and hits the road

PHOTOGRAPHY MAX EDLESTON





Under way in Edinburgh and the 520d's noisy run-flats make their presence known

Taking reprieve from a festive fug of fortified wines and gin, it was the Victorian ruling class that struck upon the idea of a Christmas hamper: an annual gift of seasonal goodies for its servants. Things are a little less formal in the Autocar office these days, but master of the house Tissaw has nonetheless tasked me with sourcing a cache of yuletide treats for the team this year.

Hamper champs Fortnum & Mason charge up to £6000 for filled baskets, but we reckon we can build our own for considerably less than that, even accounting for the overheads of a nation-wide road trip. And so it is that photographer Max Edleston and I set off from Edinburgh driving an everyday hero that ticks all of our mission's boxes: a BMW 520d xDrive Touring. In its generous boot sits an empty hamper, ready to fill with the finest local produce we can find.

There's a bassy rumble from the 19in run-flats as we skip over the West End's cobbles, but having slacked off the adaptive dampers (a worthwhile £985 option), we first sample the car's talent for comfort, which soon extends to a northward

motorway blast into Perthshire. The tyres pipe down and the punchy 187bhp engine settles at 1600rpm in top, the 5 Series channelling the spirit of the 7 Series limo with which it shares many innards.

Our first stop is the Innis & Gunn brewery on the edge of Perth. Inside the high-roofed industrial unit and among huge, gleaming, 30,000-litre tanks, office co-ordinator Neil Everett shows us one of the company's defining secrets – an 'oakerator' that percolates the beer through wood chips made from ex-spirit barrels. A few days of this transforms a red beer into 'Blood Red Sky' with the help of rum-soaked chips, while 'The Original' uses toasted bourbon casks to make a sweet, rich, buttery ale. Everett recommends 'Vanishing Point', an 11% ABV stout mellowed in bourbon casks for 12 months, as a Christmas



Innis & Gunn's beers are infused with wood chips made from casks used to store spirits

E-F
RAEME EADIE MURRAY EARL SHIRLEY & JOHN ESSON KAROLIN ECNE STEVEN EDI JAIN EDGAR SUSAN & JAMES EDGAR LISA EDMOND MICHAEL EDWARDS ROBERT EDWARDS ROBIN EDWARDS JOHN ELDER NATHAN ELLIOTT JANE & PETER ELLIS SOPHIA & GREGORY ELLIS JOHN ELTON MIKE EMBREY ADRIAN & SHARON EPP DAVID EVANS GORDON EVERSHIELD JACK & HARRIET EVERETT DONNA EWING PETER & ELIZABETH EWING EXCELERATOR RESOURCES CRAIG FAGAN NEIL FAIR IAN FAIRBAK KENNETH FAIRBAK HELEN FAIRBAK TONY FAIRBAK MATTHEW FAZAKERLEY LYNN & JANETTE FAZAKERLEY GORDON FERRIS KIRK FINLAY SCOTT FINLAY SCOTT FINLAY JR STEWART FINLAYSON PAUL FINNIE FIRST CALL MEDIA ANDREW FIRTH MARK FIRTH DANIEL FITZGERALD COLIN & ANNE FLORANCE CHRISTOPHER FOOTT IRINE FORBES MALCOLM FORBES FRASER FORDICE GARY FOREST JOHN FOREST OWEN FOREST RICHARD FOSTER DAMIEN FOURNIER ALICE FRASER JAMES FRASER STEPHEN FRASER DEBORAH FRITH MIKE FRICKER PETER FRITH GEORGE FRITH JORDAN FRITH IAN FULLER ELEANOR FRIZZLER WILLIAM FYFFE JONATHAN FYNN NADINE FYNN

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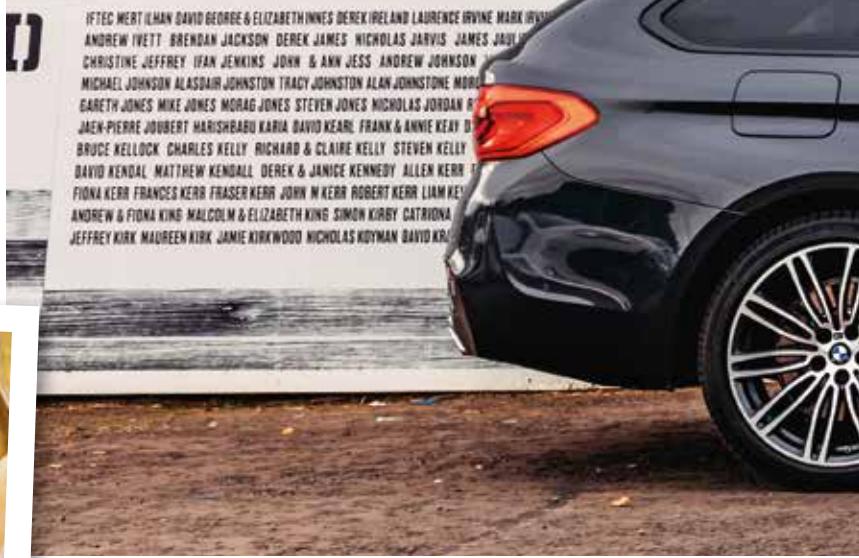
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AURIL GALL NICK GALL MALCOLM & MARY GALLETT MARK & MARGARET GAMBLE JAMES GANNON YVONNE GANNON NEIL & KATE GARDHOUSE KIRSTY GARDNER JOE GARE FRANCES GARNER GRACE GARNER IAN GASSNER SEAN GAUL DAVID & SANDRA GEE SEAN GEENY STEPHEN GELLATLY DAVID GEMMELL JOHNATHAN GEORGE KATE GEORGINA REBECCA GIBSON DEREK GILHOOLY JOHN GILL CRAIG & VICTORIA GILLESPIE MARK & FELICITY GILLESPIE PATRICK GILLESPY ANN GILMOUR PETER GLASGOW DAVID & MORAG GEDDAGH ROBIN GOOLDSMITH DAVID & DIANA GOOCH CLAIRE GOOBALL LESLIE GOOBALL KATHERINE & TONY GOODES ALEC GOODMAN EWAN GOOLAH BRIAN & DIANE GOODSON CRAIG GOODSON JOHN & DIANE GOODSON TORquil GOODSON DUFF GRAEME GOOMLEY CRAIG GOOSIE ALAN GOULDING HENRY GOW GARY GOWANS LUKE GRAHAM PHILIP GRANT DAVID GRAY JUDITH GRAY PETER GRAY STUART GRAY STUART & LYNN GRAY PETER GREEN JOHN & ANNE GREENE LEE GREENHALGH PAUL GREENWOOD FABRIZIO GRENA DAVE GRIFFITHS STEVEN GRIFFITHS MARK GRUBB ALEX GRUN BRIAN GULLAN DAVID GUNN JOHN GUNNER ALASTAIR GUY

H

JOHN HADDOW CHRIS HAINES ANDREW HALDANE ALISON HALL DAVID HALL SUZETTE HALL WILL HALL WILLIAM HALL COLIN & ANNE AGNES HAMILTON HALEY HAMMOND LU HAN JO HARDINHAM JOHN HARE PAUL HARRIS ALLISON HARRISON SHEREAH HARRISON CAMERON HART KIRSTIE HARTLEY DANIEL HAWKINS DANIEL HAWKSWORTH ANNE HAY CHRISTOPHER HAY MARTIN HAY PAULINE HAY KATIE & DIARMUID HEARNIS TREVOR HEDGE PETER HELLER ANDREW HENDERSON DAVE & GRAEME HENDERSON JIM HENDERSON FIONA HENDRIE ANGELA HENNESSY KENNY & IRENE HEPPURN VALERIE HERCOK CHARLES HERRON ANNE HEWITT VINCENT & WENDIE HEYWOOD NICOLA & JOHN HUGGINBOTTOM GAVIN HIGGATE ANNE HILL CALUM HILL CHARLIE HILL DAVID HILL ALEXANDER HIRSCH GEOFFREY HISCOCKS NIGEL HOBBS ALISDAIR HODGSON DOUGLAS HOGARTH ROBERT HOGG FREDERIC HODGE TINA HOLBORG PAUL HOLDEN ANNEMARIE HOLDING MALCOLM & SUSAN HOLDELL WILLIAM HOLMAN ARCHIBALD HOLMES GUY & FIONA HOLMES GUY HOLMES-HENDERSON JAMES & ANTHONY HOOD LINDA HOPELY VICTOR HORNBLOW ADRIAN HOSEY BRENDAN HOSEY ROBERT HOWARD RUPERT HOWARD MARK HOWARTH RICHARD HOWARTH DAVID HOWIE DAVID HOWIE JAMES HOWLETT WILLIAM & MARGARET HOWLETT NEVILLE HUGHES MCWILLIAN HUNG PAUL & NICOLA HUNT TONY & VALERIE HUNT

I



alternative to port, so we grab a couple of bottles among others including the Inveralmond real ales also brewed here.

With the hamper clanking, we break west in search of an even stronger poison. The back road to Crieff is well-surfaced and open enough to merit the BMW's Sport mode, toggling the damping, steering, transmission and engine into their most aggressive settings. That's a relative term, of course, because while our car carries M Sport spec, comfort is never abandoned. Still, we're able to carve enjoyable lines and carry ample pace beneath the autumnal canopies, red squirrels diving from our path.

Just past Crieff we park alongside the rushing River Turret, where a cluster of ancient, postcard-ready

white buildings wear the pagoda tops that mark out Glenturret as a whisky distillery. Officially they first made the national spirit here in 1775, although illegal production began in 1717, arguably making it Scotland's oldest distillery.

Traditional methods prevail: general manager John Laurie shows us the 6000-litre Douglas fir washbacks where yeast ferments the warm, malted barley solution into booze. Carbon dioxide oozes from it, and a large bubble pops just as my colleague hangs his head in for a peak, almost flooring him. A worker named Grace Gow perished that way in 1870 and today a single cask whisky is named for her, but thankfully the 'Edleston 22-year-old' remains unbottled for now.

We see the chubby copper stills

THE INNIS & GUNN BREWERY

**"BEER IS LIKE LIFE ITSELF.
ITS MOMENTS ARE BEST SAVOURED WITH THOSE WHO JOIN YOU ON THE JOURNEY."**



that help produce a smooth, light whisky, and meet the mouse-hunting Glenturret cats that bask in their warmth. Then we learn about the bourbon barrels and sherry casks of American and European oak that, in time, lend flavour and colour to the spirit. All are used to create the sweet and fruity 'Triple Wood' single malt, so that's the bottle we leave with.

Another short westbound hop comprises generously wide A-road, along which the 5 Series bounds effortlessly below the seasonal tan, titian and tangerine of Perthshire's rolling hills as the eight-speed auto 'box melts between gears.

We turn onto the River Earn floodplain at Comrie and soon find Cultybraggan – a vast WWII POW →



Glenturret has been a distillery since 1717, albeit illegally at first; John Laurie (above, on left) warns Webber of the potential dangers

HAMPER SCAMPER CHRISTMAS DRIVE

WEBBER'S ROUTE

Starting in Edinburgh, we drove north into Perthshire then cut west for our first few stops before looping into The Trossachs and turning south towards Glasgow.

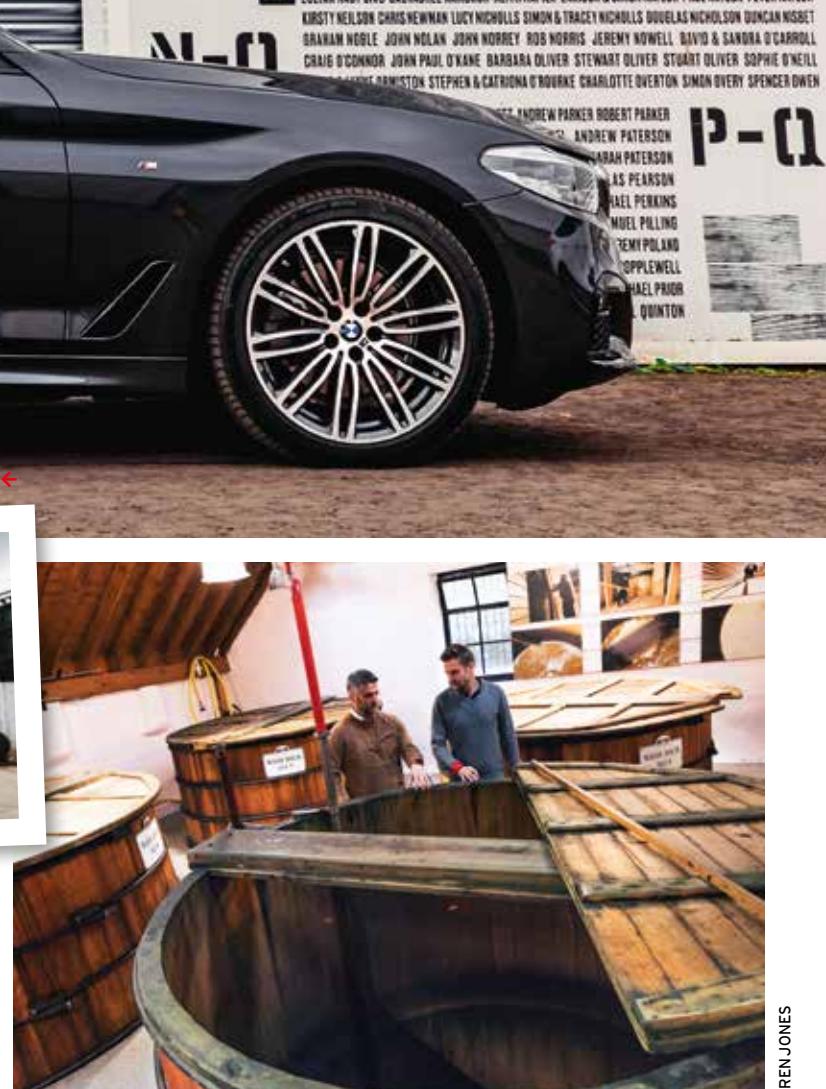
We then followed a south-easterly path to London on the motorway network, with forays into Dumfriesshire, the Lake District and south-east Staffordshire.



COLIN SALES STEPHEN
JELIA SANDBURG
PETER SCHOFIELD
MARGARET SCULLIN
REBECCA SHAW
NEIL & TREENE
MARK SHORT
GRAEME SIMS
ADRIAN SMITH
DAVID SMITH JR
ROBBIN SMITH
RICHARD SOY
MARK STEVENS
BRIAN STEWART
GORDON STANNETT
LUMSDEN &
LYALL & RITCHIE

ALLAN
ALLY
BOOTT
ELLAR
HOUSE
MOAR
MORE
NORLEY
GRIGGE
MURCHIE
MURRAY

DARREN JONES



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Former POW camp at Cultrybraggan is now home to 31 businesses

“ Taking to the moorland south of the camp, the car gets a workout over the undulating B-road ”



← camp of 100 Nissen huts built to hold 4000 of the Wermacht's deadliest. It fostered its share of horrible wartime histories before becoming a training camp that hosted almost every Scottish army cadet for decades. I earned an exemption (pipe band duties, not bone spurs), and a peek inside a peeling, unrestored hut makes me glad.

The camp is now community-owned, reborn as both a tourist attraction and a home to 31 diverse small businesses – one of which is Strathearn Cheese, which uses local

milk to make up to 200 cheeses daily from a tiny room in what was the camp guards' kitchen block.

Co-owner Drew Watson greets us while hand-turning truckles of 'Wee Comrie', a pleasantly mild, buttery cheese named for the nearby village. But his star product is 'The Strathearn' – a rinded cheese repeatedly washed in whisky from our friends at Glenturret while maturing for a month. It won gold at the World Cheese Awards shortly after production began in 2016.

A sniff of the chilly maturing

room's regulated atmosphere gives a preview of The Strathearn's 'robustness'. Then we try a sample, prompting Edleston's face to fold, while my tongue takes a conniption. It's addictively flavoursome and we buy some immediately. Watson throws in some oatcakes and we procure a complementary tomato chutney at nearby Hut 17.

Taking to the moorland south of the camp, we trace the River Knaick while birds of prey circle overhead. The car's Adaptive mode gets a workout over the undulating,

twisting B-road, predictively adjusting the Drive Control settings to deliver swift, composed progress, then it's an easy, half-hour main-road amble to Callander, just south of the Highland Boundary.

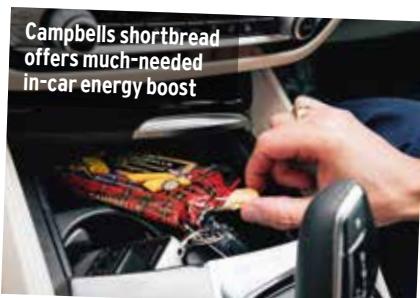
The town is home to the Campbells Shortbread bakery – the oldest in Scotland – which has been run by seven generations of Campbells since 1830. We're tight for time so buy some from a shop on Main Street: a tin for the hamper and a pack for immediate sustenance, which charges us nicely for the final stint to an overnight stop near Glasgow.

We take the indirect route, skirting Lochs Venachar and Achray as the sun sets somewhere unknown among the cloud bomb above us.

It's dark by the time we reach the Duke's Pass, catching only glimpses of its heathy beauty as the optional adaptive LEDs squint into each bend. In Sport mode there's a muted growl as revs are kept usefully high to help punch out of corners, but the apices tighten and body roll escalates, so I ease off in favour of passenger comfort. It's the first time the car has felt its 1810kg kerb weight. Civilisation is soon re-joined at Stirling, →



Strathearn Cheese has made its home – and a name for itself – at Cultrybraggan



Campbell's shortbread offers much-needed in-car energy boost

1700L

Maximum boot capacity is, in theory, big enough for 39 hampers such as ours – or £114,000-worth of Glenturret single malt.

A black BMW 5 Series Touring is shown from a high-angle perspective, driving along a two-lane road that curves through a rural, hilly terrain. The road is bordered by green grass and small wooden fence posts. The surrounding landscape consists of rolling hills with patches of green and brown vegetation under a cloudy sky.

“
We switchback onto the A701
to enjoy the sinuous stretch
to the Devil's Beef Tub
”

OPTIONAL EXTRAS: BUILT-IN HAMPERS

**ROLLS-ROYCE PICNIC HAMPER****From £30,000**

For fine dining al fresco, this leather, teak and aluminium box includes Wedgwood porcelain plates, stainless steel cutlery and wine glasses made from hand-ground lead crystal.

**MULLINER PICNIC HAMPER****From £22,000**

Penned by luxury design house Linley, this customisable set of three Beluga hide-trimmed compartments contains a dining set, illuminated champagne cooler and cashmere rug, all securely docked in the Bentley Bentayga's boot.

**MERCEDES-BENZ PICNIC HAMPER £83**

Stuttgart's contribution is a steal in this company, its more rustic - not to mention more modestly priced - willow basket containing a full dining set for two, including tablecloth. A volkshamper, relatively speaking.

then it's a hushed and painless 26-mile motorway tab to our overnight stop in Uddingston.

Day two is my Charlie Bucket day, for Uddingston is home to Tunnock's, the glorious maker of the sweet treats I've adored since I was a sugar-charged ankle-biter. In a towering brickwork factory on Old Mill Road, 600 staff are working around the clock to make 13 million Teacakes, Caramel Wafers, Caramel Logs, Snowballs and more every week.

Our guide is Tunnock family member Stuart Loudon – coincidentally an accomplished rally co-driver who has competed in 22 WRC events. We pass huge tanks of chocolate (20 tonnes are made daily), then see boilers turning out molten caramel that's cooled into thick cables that disappear tantalisingly through the floor.

Arcing conveyors slowly waft freshly baked wafer sheets that are dispatched to assembly stations where each is smothered in caramel before the next layer is hand-placed.

The enormous sandwich is then chopped into bars before entering an 'enrober', coating them in chocolate.

The whole place is a buzz of machines and strip-coated workers, with sweet aromas ranging from roasting coconut to baking biscuit swirling all around. Some parts are top-secret – such as the custom-made contraption that de-peaks

the blobs of mallow – but we can photograph others.

Many are electronically controlled, but the machine that individually wraps 420 Caramel Wafers in foiled paper each minute works via a blur of gnashing, manually adjustable metal cams. Another sensor-driven station uses robotic carbonfibre arms tipped with super-soft vacuum cups

to neatly place each Teacake into a pack of 12. It's both mesmerising and mouth-watering, and we leave with a generous haul of goodies in tow.

The M74 provides an express conduit to our next stop at Moffat, but before reaching town we switchback onto the A701 to enjoy the sinuous stretch leading to the dramatic natural hollow of the ↗

36.0mpg
Our final fuel economy calculation after 652 miles – some way short of the WLTP figure of 42.8mpg.



Confectioners Tunnock's prefers a less anonymous form of delivery vehicle



Tunnock's makes 13 million of its treats every single week; Caramel Wafers and Teacakes in particular are national institutions

← Devil's Beef Tub. It's damp, but the xDrive system staves off understeer to make for confident fast cornering. A truly engaging drive would need a bit more keenness from the engine, gearbox and steering but in the context of this trip, I'll take those slight concessions. Presumably the Police Scotland 5-Series Touring training vehicle we encounter was chosen for similar reasons.

In town we collect some Moffat Toffee from the eponymous shop. These boiled, pearlescent golden lozenges sold in distinctive houndstooth packaging have been made by the Blacklock family since the late 1800s using a secret ingredient that gives an unusual, tangy flavour.

It's really not like toffee at all but it is delicious. It's a struggle to tear ourselves away from the rows of traditional confectionery jars, but as is becoming routine, we open the Touring's indispensable tailgate window and the load cover electrically retracts so we can pop our swag straight into the hamper.

We soon cross into England then veer off to become enveloped by

Webber is spoiled for choice but the Moffat Toffee is the one to go for



the brooding, sun-streaked peaks of the Lake District. Opting for another back-road diversion, we take the B5322 through St John's in the Vale. It's a landscape straight from Postman Pat, all tweed farmhouses and dry-stone walls that dice the lush hillocks into tiny fields.

Upon reaching Grasmere, we weave through slate-stone

buildings to pull up outside the little whitewashed Church Cottage on the edge of St Oswald's Churchyard – resting place not only of William Wordsworth but also Sarah Nelson, who started selling her distinctive Grasmere Gingerbread from the cottage in 1854. The spiced slices – at once chewy and crumbly – are still baked here and sold from behind a minuscule counter, the queue to

which regularly spills out of the door and on to the pavement.

Attired in shop-regulation Victorian garb, Abbey Davison hands us a tin of gingerbread, thoughtfully tied in Autocar-branded ribbon, and a jar of Cumberland Rum Butter – a boozy local spread that's ideal with mince pies. I can't sample that but the gingerbread must be



“
It's late, it's cold and I'm glad
of the heated steering wheel
as we press on to Kendal

”

Buzzard Valley's
Pete Viggers talks
grape growing



Grasmere Gingerbread has a 165-year history; Autocar magazine isn't that far behind



All ready for the ingrates at the office



eaten fresh, so I oblige as we drive on: messy but worth it.

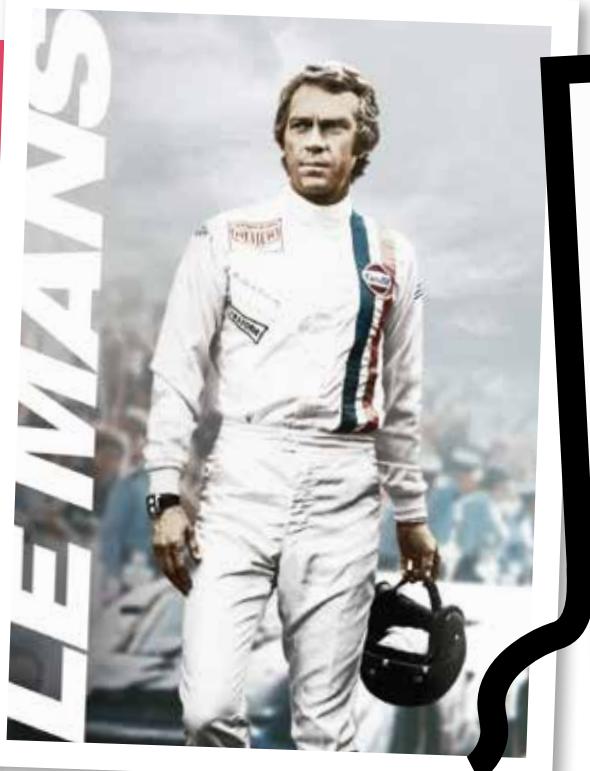
In the gloaming we pass pretty Rydal Water, the scene fringed by autumn leaves – beside the lake, beneath the trees, fluttering and dancing in the breeze – then Edleston artfully captures the last of the light on the slipway at Royal Windermere Yacht Club. It's late, it's cold and I'm glad of the heated steering wheel (£185 well spent in these climes) as we press on to Kendal where we grab a slab of Romney's Mint Cake during our first fuel stop before eventually bedding down outside Preston.

Our closing day is a motorway slog to the office in London, but we bisect the trudge with a final stop at the bucolic haven of Buzzard's Valley Vineyard near Tamworth. Co-owner Pete Viggers leads us through the 8000 vines of red and white grapes that wine-maker Leon

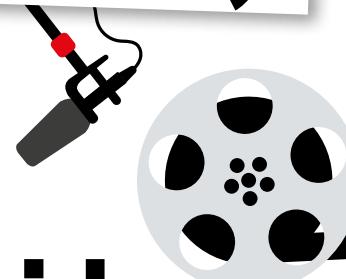
Jones uses to turn out up to 18,000 bottles annually. The soil here is good for grape-growing, and all are hybrid varieties developed to cope with the English climate – they even produce a sparkling wine using the Champagne method, and have diversified into gin, too.

We buy a selection, including the 2017 Sly Fox – an award-winning red that apparently goes perfectly with strong cheese. We've had to confine The Strathearn to Tupperware in favour of retaining long-term nose function, but that pairing should work beautifully.

All that remains is the final schlepp to the office, which the 5 Series ruthlessly gobbles up to complete a 652-mile total. What an excellent companion it's been: practical yet luxurious, comfortable yet game. And what a hamper we deliver, groaning under the weight of indulgences



Baby Driver, Le Mans, Cannonball Run, School For Scoundrels. Big names in all, but the real stars are the cars



Our favourite

Looking for a dose of automotive movie action instead of the usual Yuletide flicks this

GRAND PRIX (1966)

Directed by John Frankenheimer

Starring James Garner, Eva Marie Saint, Yves Montand

Grand Prix is just as well filmed as Steve McQueen's Le Mans but comes with the sizeable benefit of actually having a plot. But my interest here is personal, because I once spent a day with its star, the late James Garner. He was so good he not only did all his own driving but also doubled for other actors who were too scared to get behind the wheel. And when he bails out of his burning 'Yamura' at Brands Hatch, that really is Garner you're seeing. Far more importantly, he was also not only an incurable petrolhead but one of the nicest men I've ever met.

ANDREW FRANKEL

SCHOOL FOR SCOUNDRELS (1960)

Directed by Robert Hamer

Starring Ian Carmichael, Terry-Thomas, Alastair Sim
For a start, that wonderful celluloid cad and bounder Terry-Thomas is in it – and not only that, he's also driving a Benelli. Well, actually an Aston Martin DB3S, but here's your first clue that

this is no ordinary film, which uses four-wheeled plot devices. Hero Ian Carmichael is conned by Peter Jones and Dennis Price into buying the preposterous Swiftmobile, which underneath the serpent and elephant bonnet ornament is actually a 4.5-litre Bentley. It all comes good in the end as Carmichael part-exchanges it for a Healey 3000 and £100.

JAMES RUPPERT

CARS (2006)

Directed by John Lasseter and Joe Ranft

Starring Owen Wilson, Bonnie Hunt, Paul Newman
Yes, it's a computer-animated kids film about a world populated by anthropomorphic cars. But beyond the talking cartoon jalopies and Nascar racers, Cars celebrates the joy and romance of open-road motoring like few other films.

The characters' personalities encapsulate the spirit of the (surprisingly accurate) cars they represent, while the plot – racer Lightning McQueen gets stuck in the sleepy town of Radiator Springs – is really a touching lament to a golden age of motoring ended by the rise of highways. Plus it helped to make petrolheads of a generation of

kids growing up in a world hostile to cars.

Sadly, follow-up Cars 2 was turgid, although I will forever love Cars 3 for containing a Jocko Flocko reference.

JAMES ATTWOOD

THE CANNONBALL RUN (1981)

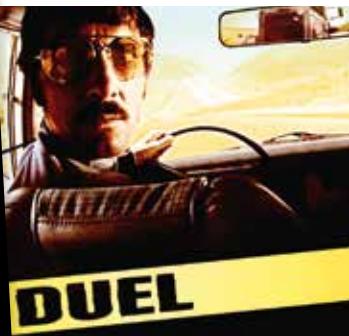
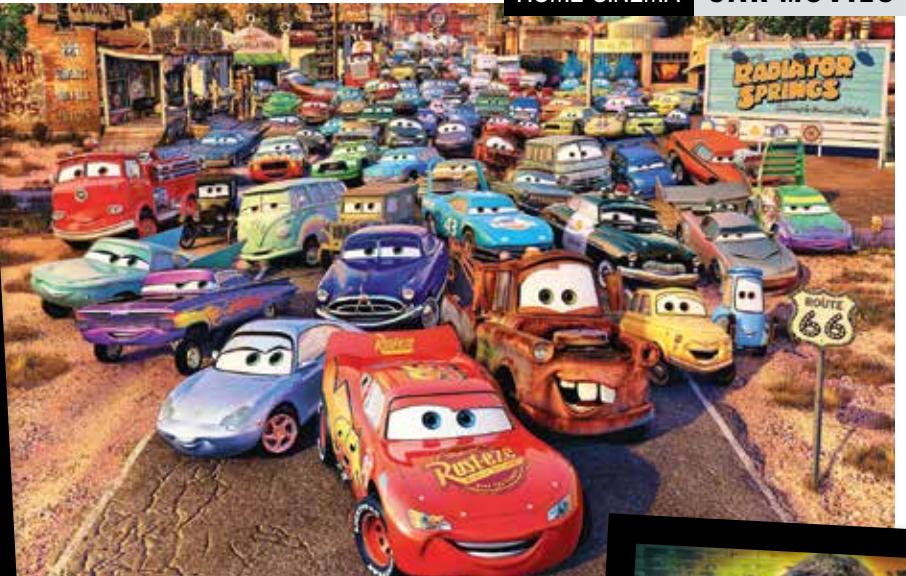
Directed by Hal Needham

Starring Burt Reynolds, Roger Moore, Farrah Fawcett

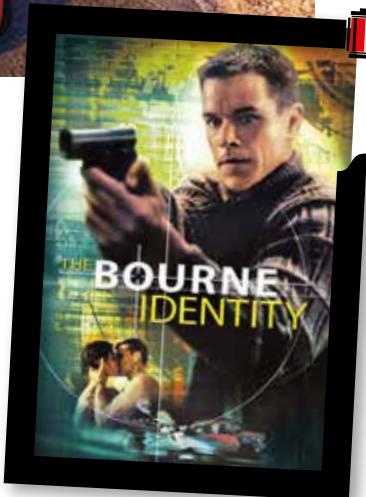
There's no point pretending car chase films are high art; they're all about entertainment. And you can't get more entertaining than the hammed-up megastar-fest that was The Cannonball Run.

The cast read like a Hollywood who's who: Roger Moore, Farrah Fawcett, Peter Fonda and – most importantly – the god-like Burt Reynolds. All they did was have a daft race across the US, but it was hilarious: the cars were brilliant and the character cameos likewise. Jackie Chan drove a rocket-powered Subaru GL. Dean Martin and Sammy Davis Jr dressed up as Catholic priests, for heaven's sake. What's not to like?

I haven't seen it for years, but as a teenager my best mate had a copy on VHS that we wore out over a couple of otherwise uneventful summers. And I



Grand Prix, Cars, Duel, Bourne Identity: all big hits, but the cartoon motors delivered the most poignant message



car movies



Christmas? Take our advice and dig out these films that feature cars in leading roles

will remember the title sequence, with the white Lamborghini Countach on the run from the patrol car that gets 'resprayed' red, for as long as I live.

MATT SAUNDERS

BABY DRIVER (2017)

Directed by Edgar Wright

Starring Ansel Elgort, John Hamm, Jamie Foxx

The exhilarating blend of epic driving scenes and hip soundtrack makes Baby Driver my winner. Main character Baby is a music lover coerced into working as a getaway driver for a crime kingpin. Cue the six-minute opening scene, with Baby pulling in to pick up his partners in a Subaru Impreza then driving like a (skilled) maniac to evade the police. It sets the tone for an outstanding driving movie scored by tunes such as Harlem Shuffle and Know How. If only we could all be as cool as Baby.

RACHEL BURGESS

THE BOURNE IDENTITY (2002)

Directed by Doug Liman

Starring Matt Damon, Chris Cooper, Brian Cox

A drive from Zurich to Paris doesn't sound promising but when the car is a Mini, even 10mph

looks like a high-speed chase. Things really kick off, though, when Bourne is pursued through Paris. It was a stroke of genius to lump him with a Mini, because we find ourselves rooting for the little car. Obsessives can enjoy the way the crew had to swap it (early on the steering wheel says 'Mini' but later on 'Cooper') while manoeuvring the same BMW 7 Series into multiple scenes. Add cameo appearances from a cast of 1990s European hatchbacks and this is a car movie to savour.

JOHN EVANS

DUEL (1971)

Directed by Steven Spielberg

Starring Dennis Weaver, Jacqueline Scott, Carey Loftin

A nail-biting horror – and no, that's not a description of the burbling Plymouth Valiant in which the great Dennis Weaver spends most of this movie sweating first in confusion, then in cold fear. Weaver plays salesman David Mann, who is cruising on a business trip through the Mojave desert when he inadvertently triggers road rage in the driver of a rust-riven tanker. Bad luck for our hero: the truck driver, who we never

see, just happens to be a demented psychopath, who relentlessly pursues Mann's Plymouth to an inevitable conclusion. The second feature from a promising young director foreshadows the chilling tension and sheer terror he'd tap back into four years later in a slightly more successful movie starring a shark. But forget about not going back in the water – *Duel* is your worst nightmare.

DAMIEN SMITH

LE MANS (1971)

Directed by Lee H Katzin

Starring Steve McQueen, Siegfried Rauch, Elga Andersen

A lack of realism – affecting everything from the Fast & Furious to Rush – bothers me. Step forward, then, *Le Mans*, starring Steve McQueen and with action so authentic that the film crew had a camera car drive during the race itself, while an accident in filming cost David Piper his leg. McQueen was apparently an unpleasant man so is no hero of mine, but he was an intense on-screen presence to accompany what I think are the best car visuals – and sounds – ever put on the big screen.

MATT PRIOR



TRY THESE FOR SIZE

Tamiya is world renowned for its intricately detailed scale model kits and iconic radio-controlled cars. **Jesse Crosse** traces the brand's roots

PHOTOGRAPHY LUC LACEY



Peeling back the wrapping paper on Christmas morning to reveal the famous twin-star Tamiya logo is a thrill that has set the hearts of millions racing. Tamiya was the first company to make radio-controlled models that were easy to assemble but a world away from being simplistic. For countless thousands it ignited an enduring love of cars and machines and sparked a worldwide cult following.

Since the 1960s, Tamiya has made its name through the quality of its static plastic and radio control (R/C) scale kits and, most of all, the ingenuity that goes into their design and the detail in them. The R/C cars and buggies that so many grew up with have intricate chassis and drivelines, with wishbone suspension, dampers, differentials and interchangeable gear ratios (a bit) like the real thing. Driving takes real skill: there's nothing quite like flinging an R/C buggy around a tight course to sharpen up the reflexes.

Two of the latest Tamiya R/C releases are the Mercedes-Benz G500 and the Toyota Supra. The G500 is based on a new CC-02 chassis – the 'CC' stands for 'cross-country' – with a ladder chassis construction rather than a simple tub, and the complex suspension and driveline gives the same kind of axle articulation as the full-blown Merc. That makes it ideal for rock-crawling competitions, as does the choice of 20 gear ratios for the single-speed gearbox.

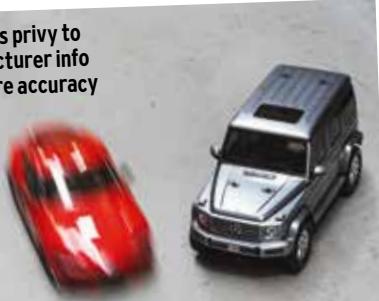
The Supra is based on Tamiya's road-going TT02 chassis and was launched at the same time as the real thing. Such is the trust and respect companies have for the Tamiya brand, the model company was allowed access to Toyota's classified design and CAD information long before the Supra was revealed.

Both are a far cry from Tamiya's early days. Once a timber company, it started making crude wooden model kits after the war. Budding modellers could whittle them into shape with a freshly sharpened penknife, but it took plenty of determination to make a decent job of it. One such youngster was Shunsaku Tamiya, son of Tamiya founder Yoshio Tamiya.

In the 1960s, Tamiya's attention turned to the newfangled plastic kits and the company developed metal →



Tamiya is privy to manufacturer info to ensure accuracy



R/C cars' chassis are intricately well engineered

← moulds to make them. Shunsaku Tamiya's passion for making models never left him and, unusually for a company boss, he takes a hands-on approach, preferring to measure, study and document new subjects personally. Initially, Tamiya sold exclusively to the Japanese and Asian markets, but that would soon change.

In the UK, David Binger of toy wholesalers Richard Kohnstamm Ltd (which many will remember as RIKO) was on the lookout for new products that European sellers didn't have. In 1966, he spotted some grey-import Tamiya kits while on a trip to the US and travelled to Japan to meet the young Shunsaku Tamiya and his father for the first time. That meeting marked the beginning of a long and successful relationship between the two firms and introduced Tamiya to the UK and Europe.

David's son, Pete, is now managing director of Hobby Company Ltd, the current importer of Tamiya products. Shunsaku Tamiya would later write to him: "David passionately encouraged us to sell Tamiya goods in the United Kingdom... I was a sceptic about the idea back then, but eventually David's courage and insight allowed our products to flow into the European market and led to establishing our brand worldwide."

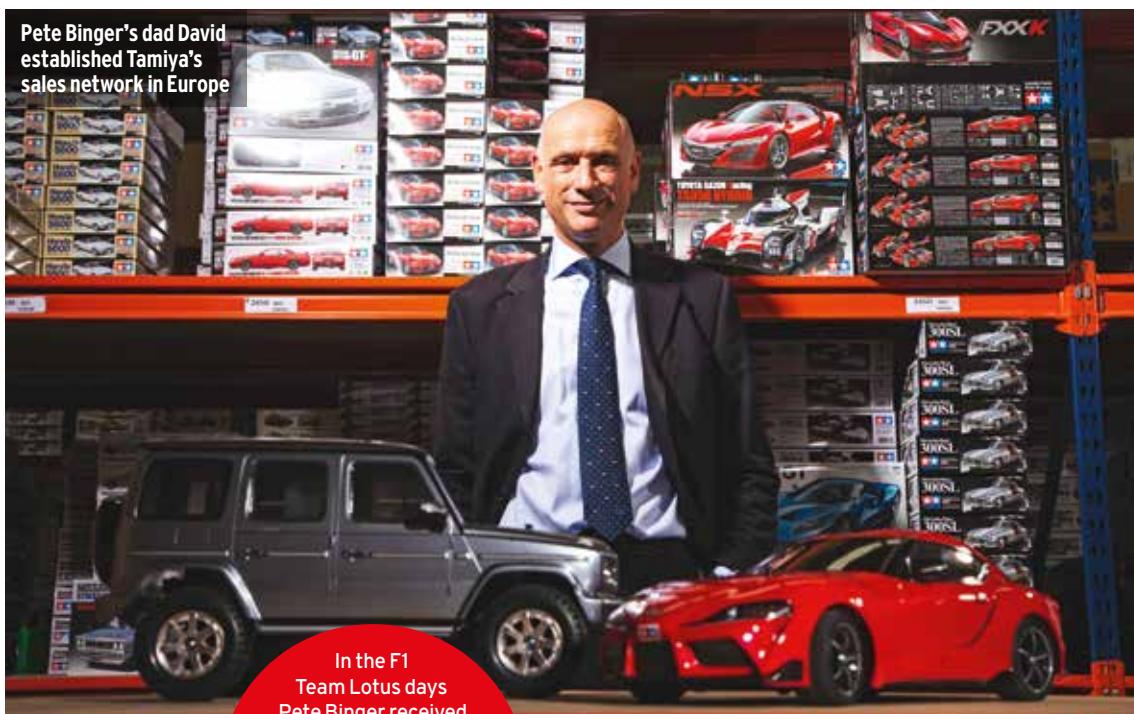
Binger takes up the story: "My father established an entire European network and managed it. He quickly established that the growth of sales was linked to expansion of the range."

As the range grew, Tamiya plastic kits became renowned for quality and the almost excruciating detail with which they were modelled. Formula 1 was seen as a potentially big market, so Glynn Pearson, who worked with Binger senior, was dispatched to befriend all the F1 teams in the UK and gain licensing rights to model the cars. Some legendary model cars emerged, including the F1 Honda →



Tamiya's Mini 4WD, only sold in Japan and Asia, was a flop in the '80s before becoming a huge craze. In 1997, 15% of all AA batteries sold in Japan were used in them. In total, 150 million were sold.

“
Tamiya's boss measures and studies new subjects personally
”



← RA273, the Lotus 49 and the Lotus 72. "The Lotus 72 was a huge seller and put Tamiya on the map in the UK," says Binger.

Binger describes Shunsaku Tamiya as "the ultimate archivist" with an eye for perfection and detail. "Other people looked at the cost-effectiveness of a project; he just looked at creating perfection, and still does to this day. He was always one for gathering his own reference material and was never satisfied with being supplied photographs and information. He used to travel the world to study and photograph new subjects himself."

In the more rustic days of F1, engines were repaired instead of replaced, and the welded-up sump of one subject Tamiya used as a reference duly appeared on the finished model. Military tanks are a passion of Shunsaku Tamiya's. He once crawled into the tiny gap beneath a German Panzer to

In the F1 Team Lotus days Pete Binger received a call from team manager Peter Warr asking if he could deliver some models to a hotel to keep a young driver amused. That youngster was one Ayrton Senna.

photograph the underbelly details at the US Army Ordnance Museum, and he once burned the midnight oil at the Bovington Tank Museum photographing every detail of a Tiger tank.

To make an accurate model of the Porsche 911, Tamiya bought a full-size car that was dismantled in-house to scrutinise every detail. Nobody at Tamiya had the expertise to reassemble it afterwards, so bemused technicians were called in from Porsche Japan to do the job.

Tamiya moved from static into radio-controlled models almost by chance. One lunchtime, Shunsaku Tamiya noticed one of his designers, Fumito Taki, driving an electric radio-controlled car around. He'd fitted a battery-electric drive to a Tamiya F1 car kit, and the result was just what the boss had been looking for. The company's first radio-controlled model had been a Sherman tank in 1974 and, inspired by Taki's efforts,

the first car, a Porsche 934 in 1976. The scale body of the Porsche was based on a plastic kit that had received critical acclaim but not great commercial success. The Porsche was the first in the R/C world to have a scale body, but there was room for improvement. The body was too fragile for an R/C car and the dry non-rechargeable batteries limited in performance and life. That didn't stop the R/C version being a smash hit, though, and more robust one-piece bodies for R/C cars followed. Many of the purpose-built R/C cars that followed in the 1970s and 1980s went on to become icons which fired the enthusiasm of budding car nuts.

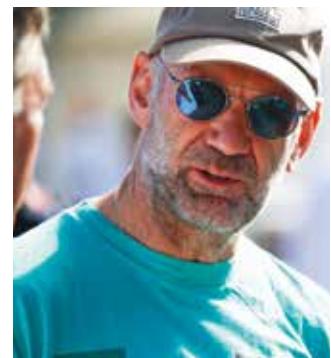
One such icon was the Sand Scorcher, a 1/10th replica of a Baja Bug that, says Binger, really set Tamiya on its way. It was the first real off-road R/C car with an accurate Baja-based chassis, sealed gearbox and oil-filled differential and one-piece ABS body. After being discontinued for a time, the icons were reintroduced, so now grown-up kids who were unable to afford them back then can fill their boots. □

A MODEL APPRENTICESHIP

Everybody starts somewhere and, in the case of legendary F1 designer Adrian Newey, it was a Tamiya Honda RA273 V12 F1 kit.

"My dad was a vet but maintained his own cars and was a keen hobbyist," he says. "When I was nine I built my first model, the Tamiya Honda F1 car, and my dad helped me. The second one was a Lotus 49 and that was probably a bigger influence. I found it incredibly useful because the parts were all labelled, like 'front upright' or 'upper wishbone', so I learned the terminology. As I built the models, I learned how F1 cars were assembled. The models have all the same components: engine, monocoque, gearbox and so on."

"Because the suspension and steering moves, it teaches you how the suspension articulates and how it all works. From the age of about 11, I started sketching my own designs and making them in Dad's workshop. I'd make cars out of folded-up bits of aluminium and laminated glassfibre, then cannibalised the Tamiya models for the bits I couldn't make, like the engine and wheels. I was learning as I went along and it's that age-old thing: to become expert in something, you need to spend at least 500 hours doing it – and, without realising it, that's what I was doing."



TAMIYA'S RADIO-CONTROLLED ICONS



SAND SCORCHER

Got the R/C ball rolling for Tamiya with an authentic 1/10th reproduction of the real thing. Funky yet technically intricate, even the swing-arm suspension echoes that of the original Volkswagen bug.



LUNCHBOX

Vans may not have been a thing in the UK in 1987 when the wacky Lunchbox was first launched, but it has been a hit ever since. Tinkering can include the fitting of constant volume adjustable – or CVA – dampers.



AVANTE

A bit more serious, this one. Not an entry-level kit, the Avante is designed for racing with a stiff aluminium and glassfibre construction. Suspension is adjustable for toe and camber and it has oil-filled adjustable shock absorbers.



HORNET

The 1/10th Hornet is one of Tamiya's most popular ever R/C cars and is credited with helping to kick off the two-wheel-drive off-road buggy craze when it was first launched back in 1984.

Lamborghini Aventador SVJ
North Wales
OLGUN KORDAL



Toyota Yaris GRMN
Great Orme, north Wales
MAX EDLESTON

"Could you jump a bit higher, please?" asked snapper Luc Lacey to driver Richard Lane ahead of this spectacular Bowler jump shot. Not happy with Richard's first attempt, Luc could have no complaints about the second - more concerted - effort.

You can see why Wales is so popular with our photographers after looking at the trio of photos to the left. Olgun Kordal said it was worth getting dust in his eyes for the low-down Lamborghini tracking shot, and worth ruining a pair of Converse plimsolls for the equally stunning shot of the gorgeous Alfaholics GTA-R (you wore Converse in Wales, in November, Olgun?).

"I love the contrast of the greenery with the ribbon of Tarmac running through it," says Max Edleston of his shot of the spectacular Great Orme road.



Alfa Romeo GTA
Llandow Circuit, south Wales
OLGUN KORDAL



FREEZE FRAME

Another year, another photo album crammed full of world-class pictures of amazing cars doing incredible things. Our snappers choose their favourites



Bowler Bulldog V8 SC
Bovington Camp, Dorset
LUC LACEY

Carta Rallye
Morocco
LUC LACEY



"A rear-wheel drive, rear-engined car with Mauro Calo at the wheel always makes for a dramatic image," says Olgun Kordal of his Porsche 911 shot.

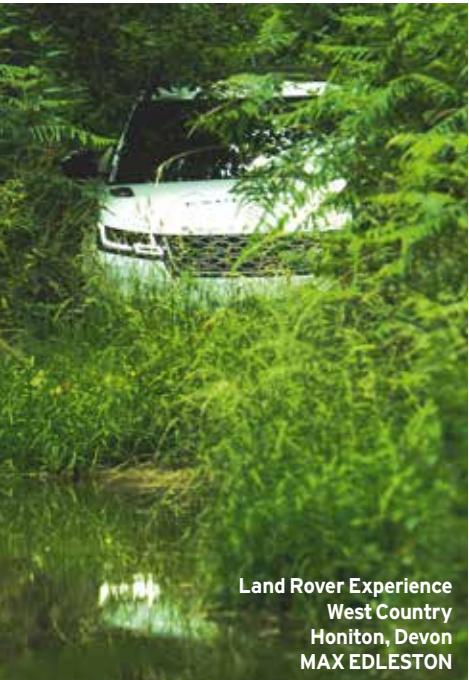
If the 911's natural habitat is a track, then the Range Rover Velar felt just as at home on the off-road course at Land Rover Experience West Country. "It reminds me of a photo in National Geographic magazine, of a tiger creeping through towards a lake and it's prey," says Max Edleston. "I feel this is the automotive equivalent." Maybe, Max, if you squint a bit..

Luc Lacey had his own pitch for National Geographic on his trip to the Carta Rallye in Morocco. "This young lad was slightly perplexed at finding a car full of cameras documenting his daily commute," he says.



Porsche 911
Anglesey Circuit, north Wales
OLGUN KORDAL

OUR BEST RENDERS OF 2019



Our resident artist Ben Summerell-Youde has been busy again previewing the cars of the future – or, in some cases, the cars of his own mind. Starting at the bottom, this rally raid-style Peugeot 208 sadly will remain the stuff of Ben's dreams. "As soon as the new 208 pictures landed I wanted to create a 208 GTi, but the factory yellow paint just shouted 405 Dakar to me," says Ben, who rates the 208 as the supermini segment's best looker. White wheels and a body kit were the order of the day for the sporty Honda E, too. "I got a bit carried away, which is fine, because no one actually has to build what I come up with." The Maserati Alfieri is destined for production, however, and we hope Maserati is taking inspiration from Ben.

FAVOURITE CONCEPTS OF 2019

AUDI AI-TRAIL



MERCEDES-BENZ EQS



ASTON MARTIN VANQUISH VISION CONCEPT



Bravo to Audi, Mercedes-Benz and Aston Martin for filling our concept car podium this year, each chosen by our in-house designer Ben Summerell-Youde. "It's good to see a concept that doesn't just have wider arches and some knobbly tyres," says Ben of the Audi AI-Trail. "Silent, battery powered off-roading appeals far more than plug-in sports cars." Ben feels the Mercedes EQS really shows how electric propulsion can benefit proportions. "I hope the new S-Class isn't too dissimilar." There's not an electric motor to be seen on the Vanquish concept, Aston's preview of a mid-engined supercar. "It looks fresh, and has a better visual balance to it than the Valhalla," the latter car the Vanquish's big brother.

David Brown Mini Remastered
Chelsea Bridge, London
MAX EDLESTON

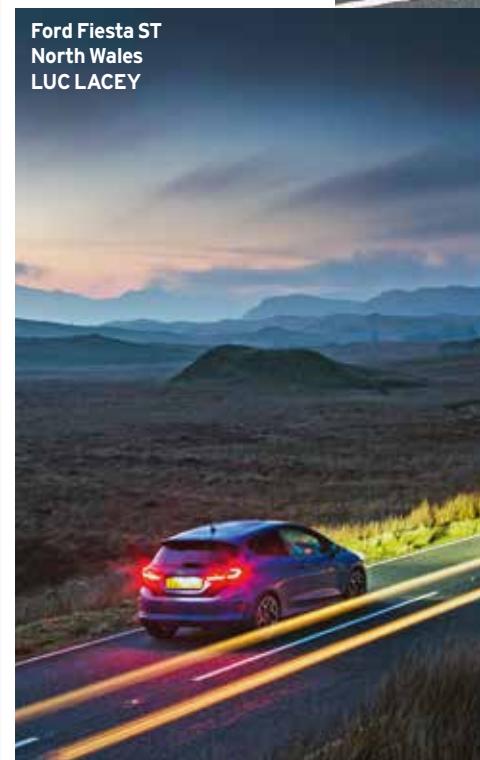


Central London rush hour traffic in fading light threatened to turn this David Brown Mini Remastered shoot into one to forget, until a gap appeared on Chelsea Bridge. "It looks a bit like being back in the '60s," reckons Max Edleston, who was born in the 1990s...

"I'm quite a fan of the cool, relaxing tones of this one," says the cool, relaxed Luc Lacey of his Fiesta ST snap, taken at dusk. "A simple long exposure and a passing car highlighting the curves of the road lead your eyes through the landscape."

And it's a fading-light, last-shot-of-the-day hat-trick with Olgun Kordal's Ferrari shot. "The light was finessing the side of car, highlighting its muscular stance."

Ford Fiesta ST
North Wales
LUC LACEY





Ferrari F8 Tributo
Emilia-Romagna, Italy
OLGUN KORDAL



Dallara Stradale, Ariel Atom
Anglesey Circuit, north Wales
LUC LACEY

"A unique angle on two unique machines," says Luc Lacey of the Dallara Stradale and Ariel Atom he caught together at our Britain's Best Driver's Car contest. "A bit of camera trickery was used here, with the camera being mounted six feet from the car." Sshh, Luc, you're giving away all the secrets...

Olgun Kordal is giving a sneak peak here of a feature we're running next month, starring this Ferrari F40. "It's a dream car and was a joy to shoot even if it was a very busy Cotswolds road," says Olgun. A slow shutter allowed the background to blur into insignificance."

'Insignificant' isn't a charge you'd level at the size of the BMW Concept 4's grille, not that Olgun's shot here shows it (thankfully). Finally, Luc was up at 4am to shoot the Evoque in Greece. "I love the calmness the mist and motionless turbines give to this image."



Ferrari F40
The Cotswolds
OLGUN KORDAL



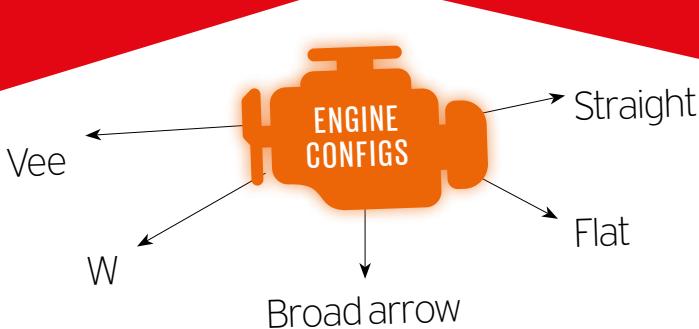
Range Rover Evoque
Greece
LUC LACEY



BMW Concept 4
Studio in Munich, Germany
OLGUN KORDAL

FRANKEL'S FESTIVE MISCELLANY

'Tis the season of goodwill, so, pray, let veteran road tester and Autocar's jolliest man Andrew Frankel entertain you



EXTANT BRANDS OWNED BY GENERAL MOTORS

- 1 Cadillac
- 2 Chevrolet
- 3 Buick
- 4 GMC
- 5 Holden



Drivers who have won the Monaco Grand Prix and Le Mans 24 Hours

Tazio Nuvolari
Maurice Trintignant
Bruce McLaren
Fernando Alonso



Drivers who have won Le Mans and the Indianapolis 500

AJ Foyt



Drivers who have won the Indianapolis 500 and Monaco Grand Prix

Juan Pablo Montoya



The only driver to have won the Indy 500, Monaco GP and Le Mans

Graham Hill



RANDOM RACING FACTS

8 The Lotus 76 of 1975 was fitted with a clutchless transmission and V-shaped brake pedal to allow its drivers the option of left-foot braking.

7 The wiring loom of the Porsche 909 Bergspyder was made from silver thread.

5 The Indy 500 was part of the F1 World Championship for 11 seasons, from 1950-'60.

9 When Brands Hatch was first used, cars and bikes raced around the circuit anticlockwise.

6 Claudio Langes tried to qualify for 14 grands prix, all in 1990, and never started a race.

10 The Marathon De La Route was the world's longest motor race and was held at the Nürburgring between 1965 and 1971. In 1967 it was won by a Porsche 911 driven by Vic Elford (among others), his winning margin over the second placed car being just short of 1000km.

4 Where fathers and sons have raced in F1, fathers have been twice as likely to win a race.

3 Britain and Italy are the only countries to have held grands prix in every year since the start of the F1 World Championship.

11 Alan Stacey became a works Lotus F1 racing driver despite having an artificial lower right leg and having to use a twist grip motorcycle throttle. He was killed at the 1960 Belgian Grand Prix, some say after being hit in the face by a bird.

12 The knob on the gear lever of a Porsche 917 is made from balsa wood and its ignition key drilled, both to save weight.

AUTOMOTIVE URBAN MYTH Duncan Hamilton drove while drunk to win Le Mans in 1953



1 Steve McQueen came second in the 1970 Sebring 12 Hours sharing a Porsche 908 with Peter Revson, despite having a left foot in plaster.



Had he been anything like as fast as Revson, they'd have won.

2 Paul Newman came second at Le Mans in 1979, driving a Porsche 935 in usually very wet weather. The race was won by brothers Don and Bill Whittington, who would both later serve time for fraud.

3 James Garner was such a natural driver than he actually doubled for other members of the cast during the filming of Grand Prix.

4 Burt Reynolds owned his own Nascar team, called Mach 1 racing.

5 Gene Hackman raced a Toyota for Dan Gurney at the 1983 Daytona 24 Hours, finishing in 57th place.

6 Rowan Atkinson used to own a Lancia Thema 8.32.

7 Princess Grace of Monaco died in a Rover P6.

8 Successful sports car driver and actor Patrick Dempsey would rather be a racing driver than a film star.

TYPES OF GEARBOX

- 1 Manual
- 2 Robotised manual
- 3 Automatic
- 4 Semi-automatic
- 5 Dual-clutch
- 6 Direct-drive
- 7 Continuously variable
- 8 Straight-cut
- 9 Synchromesh
- 10 Crash
- 11 Flappy paddle



TOP GEAR PRESENTERS



- 1 Angela Rippon
- 2 Noel Edmonds
- 3 Kate Humble
- 4 Brendan Coogan
- 5 Jon Bentley



- 6 Sue Baker
- 7 Frank Page
- 8 William Woollard
- 9 Jason Dawe
- 10 Jason Barlow



Aga
Albany
Alfa-Romeo
American Bantam
Amplex
Arrol-Johnston
Aston Martin
Atalanta
Austro-Daimler
Avanti
AZLK

Grands prix on the F1 calendar Lewis Hamilton has not yet won

CURRENT OR FORMER MOTORSPORT FACILITIES AROUND THE WORLD

- 1 Barbagallo Raceway (Australia)
- 2 Bushy Park (Barbados)
- 3 Autodromo Internacional Ayrton Senna (Brazil)
- 4 Dracon Race Track (Bulgaria)
- 5 Calabogie Motorsports Park (Canada)
- 6 Circuits des Remparts Angoulême (France)
- 7 Solitude (Germany)
- 8 South Dakota Circuit (Guyana)
- 9 Irungattukottai Race Track (India)
- 10 Autodromo Riccardo Paletti (Italy)
- 11 Mellaha Lake (Libya)
- 12 Agadir (Morocco)
- 13 Pukekohe (New Zealand)
- 14 Ponce International Speedway Park (Puerto Rico)
- 15 East London (South Africa)
- 16 Rest And Be



14 INDIGENOUS CURRENT AND FORMER MAKERS FROM COUNTRIES NOT KNOWN FOR MAKING THEIR OWN CARS

- | | | |
|----------------------|--------------------------|-----------------------------|
| 1 FSO (Poland) | 7 Naz (Azerbaijan) | (Canada) |
| 2 Rimac (Croatia) | 8 Minerva (Belgium) | 12 Spyker (Netherlands) |
| 3 Pegaso (Spain) | 9 Tatra (Czech Republic) | 13 Monteverdi (Switzerland) |
| 4 Mastretta (Mexico) | 10 Zenvo (Denmark) | 14 Wallyscar (Tunisia) |
| 5 Shamrock (Ireland) | 11 Electra Meccanica | |
| 6 Puch (Austria) | | |

BIG FAT QUIZABOUT CARS

Stop your brain seizing up over the festive period with our motoring-themed quiz. **Andrew Frankel** pops the questions. Answers on p13

1 What animal will you find on the badge of a Gordon Keeble?

2 What was the name of Karl Benz's wife?

3 Which WW1 flying ace inspired Enzo Ferrari to use the prancing horse emblem?

4 In which town and country were Porsches first built?

5 Which two drivers put the equal greatest number of years between their first and last Le Mans wins?

6 What do the two-cylinder 500cc of a Fiat 126 and the 4.5-litre V12 that powered Ferrari to its first grand prix win in 1951 have in common?

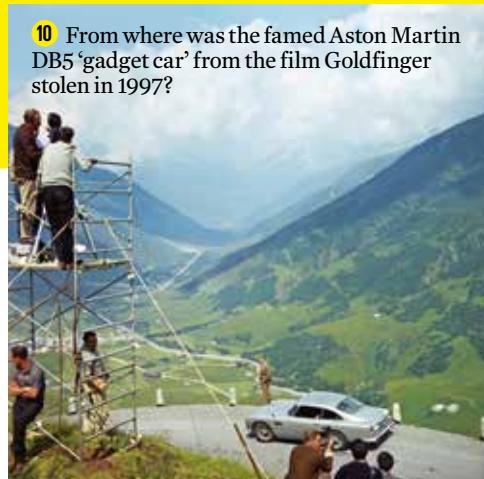
7 Who founded Alfa-Romeo? Clue: it was not Nicola Romeo.

8 What do the three points on the Mercedes-Benz star represent?

9 What was the make and name of the first mainstream production radial tyre and on which car was it introduced?



10 From where was the famed Aston Martin DB5 'gadget car' from the film Goldfinger stolen in 1997?



11 What was unusual about the Ferrari 166S in which Clemente Biondetti contested the 1950 Italian Grand Prix?

12 What was unusual about the Kurtis Kraft that took pole position for the 1952 Indianapolis 500?

13 Which car manufacturer also makes condiment dispensers?

14 Which man was known as 'the hyphen in Rolls-Royce'?

15 What is the only car manufacturer selling cars in the UK whose name begins with a double letter?

16 Who was the only woman to finish in the points in a world championship grand prix?

17 Who was the first person to win a race in a car using disc brakes?

18 What and where was the world's first purpose-built race track?

19 Which is the world's oldest motorsport facility to have been in continual use?

20 What role in the James Bond film The Living Daylights did then Aston Martin chairman Victor Gauntlett turn down?



21 What is the unique claim to fame of Louis Chiron, after whom the Bugatti Chiron is named?

22 Why in 1964 did Porsche change the name of its new sports car from 901 to 911 after just 82 had been built?

23 What was unusual about Eddie Hall's participation at the Le Mans 24 Hours in 1950?

24 What four companies do the four rings of Audi represent?

25 What was unusual about the door bins of the Lancia Stratos?



26 Where are the interior door handles of a McLaren Senna located?

27 Who was the first person to travel at greater than 400, 500 and 600mph and where did he do it?

28 What was unusual about Vittorio Brambilla's victory in the 1975 Austrian Grand Prix?

29 Which was the last grand prix not won by one of Mercedes-Benz, Ferrari or Red Bull?

30 Which was the first production road car to use monocoque construction?

31 Which was the first production road car to use independent suspension?

32 Why did the 1939 Bentley Corniche fail to make it into production?

33 What was unique about the engine of the Cizeta-Moroder?

34 How many valves does a Ferrari F355 engine have?

35 What was unusual about the Ferrari Tipo 116 engine?

36 Which was the first production road car with a turbocharged engine?

37 What was the name of Wales's only indigenous production car manufacturer?

38 What were cars produced at the BMW Eisenach factory called after WW2 when the factory was located in East Germany?

39 What make of car was apparently driven by all Janis Joplin's friends?

40 What was the first car to come with anti-lock brakes?

41 What was the only four-wheel-drive car to win a Formula 1 race?

42 For what is Eleanor Velasco Thornton most famous?



43 For what car was the engine of the Ferrari F40 originally conceived?

44 In which song does the following lyric appear? 'Told my girl I'll have to forget her/Rather buy me a new carburettor'

45 Who is the only driver to have scored maiden F1 victories for three different constructors?

46 Before what year is a car entitled to call itself 'vintage'?



47 What is unusual about the Citroën 2CV Sahara?

48 What was the nickname of Ferdinand Porsche, son of Ferry Porsche and designer of the 911?

49 For which two brands was the 1965 Mexican Grand Prix an F1 maiden win?

50 In which year did Lotus dealer Caterham Cars become a manufacturer in its own right when owner Graham Nearn bought the rights to the Lotus 7?



BIG FAT QUIZ ABOUT CARS ANSWERS

- 1 Tortoise
- 2 Bertha
- 3 Francesco Baracca
- 4 Gmünd, Austria
- 5 Luigi Chinetti (1932-49), Hurley Haywood (1977-94) - 17 years
- 6 Both were designed by Aurelio Lampredi
- 7 Pierre Alexandre Darracq
- 8 Land, Sea, Air
- 9 Michelin X, Citroën 2CV
- 10 Boca Raton airport. It has never been recovered
- 11 It was powered by a Jaguar engine
- 12 It had a diesel engine
- 13 Peugeot
- 14 Claude Johnson
- 15 Ssangyong
- 16 Lella Lombardi. She scored 0.5 points in the 1975 Spanish Grand Prix after the race was shortened from 75 to 29 laps
- 17 Stirling Moss in a Jaguar C-Type at Reims in 1952
- 18 Brooklands in Weybridge, Surrey, which opened in 1907
- 19 Shelsley Walsh Hillclimb, founded in 1905
- 20 KGB colonel
- 21 He is the oldest person ever to take part in a World Championship Grand Prix, coming sixth at Monaco in 1955, aged 55
- 22 Peugeot claimed the right to all three-digit numbers with a zero in the middle
- 23 He drove the race solo
- 24 Horch, DKW, Wanderer and Audi
- 25 They were shaped to accommodate a helmet
- 26 Above the occupants' heads
- 27 Craig Breedlove, Bonneville Salt Flats, between 1963 and 1965
- 28 He lost control and crashed his car after taking the chequered flag
- 29 2013 Australian Grand Prix. It was won by Kimi Räikkönen, Lotus E21
- 30 1922 Lancia Lambda
- 31 1922 Lancia Lambda
- 32 A Luftwaffe bomb fell on the only prototype on Dieppe docks as it waited to go home
- 33 It was and remains the only transversely mounted V16 used in a road car
- 34 40
- 35 It had two cylinders
- 36 1962 Oldsmobile Jetfire
- 37 Gilbern
- 38 EMW
- 39 Porsche
- 40 Jensen FF
- 41 Ferguson P99 in which Stirling Moss won the 1961 Oulton Park Gold Cup
- 42 She was reputedly the model for the Rolls-Royce Spirit of Ecstasy mascot
- 43 Lancia LC2 Group C racer
- 44 I'm In Love With My Car by Queen
- 45 Dan Gurney: Porsche, Brabham and Eagle
- 46 1931
- 47 It has two engines and four-wheel drive
- 48 Butzi
- 49 Honda and Goodyear
- 50 1973



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Until next month,
Happy New Year
and all the best for
2020