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NEW MINI

2020's electric revolution begins



FIRST PICS
New 400bhp Focus RS



VERDICTS



Honda E: good – at a price



BMW M8: full road test

DRIVEN

New Jag F-Type: still want that 911?



Defender in Slovakia

VW'S DISCO RIVAL • WHY EVEN CARS ARE GOING VEGAN • THE GRENFELL GARAGE

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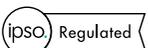


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THIS MONTH



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COMMENT

THE TIMELESSNESS OF CARS



CARS DON'T GET old. They get redesigned, restored or their bodies reused, a sort of Motor

Zombie Apocalypse, if you will. This month, the new Land Rover Defender comes off the production line in Slovakia, the Bentley Blower 'rebuilt' and the Beetle is regenerated.

Need a spare part that's no longer in production? Find out how 3D

printing is easing every classic car owner's headache.

One engine, several guises, does your car share its heart with

another more esteemed model? Find out which are the 10 best engines and the cars that share them.

Also, did you know that besides designing cars and motorcycles, BMW also build the Team USA Olympic bobsleds and takes on interior design projects. Closer to home, that includes the Singapore Airlines First Class Cabin?

They're just six of the 12 feature stories we have this month besides the First Drives. Enjoy!



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NEWS

GOT A STORY?

Email our news editor
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“
A unique glasshouse
treatment makes the
C-pillar appear translucent
”



AUTOCAR
IMAGE

Two electric motors
will make the new ID
SUV four-wheel drive

Rugged 4x4 ID tipped for 2023

Electric VW SUV will have a boxier shape than the ID 4 and greater off-road potential

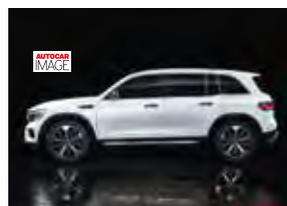
Volkswagen is on the verge of giving the green light to a new ID-branded SUV to rival the upcoming BMW iX3 and Mercedes-Benz EQB.

The electric-powered SUV is known to officials at Volkswagen's Wolfsburg headquarters in Germany as the Ruggdzz, a working title that draws on the word 'rugged'. The new model forms part of a so-called Icon project to establish what has been described to Autocar as "a line of ID models with the same timeless and classless qualities as the original Beetle".

Measuring 4600mm long in standard-wheelbase form, the four-wheel-drive SUV has been conceived to complement a

number of more conventionally styled ID models, including the similarly sized ID 4 - a production version of the ID Crozz concept - which is set to be unveiled at the New York motor show in April.

Although it is still at a preliminary stage of development, the new ID model is expected to enter production in 2023 as part of a 30-strong SUV line-up



Mercedes' EQB will be a key rival

planned by Volkswagen by the middle of the decade.

The Ruggdzz joins a production version of the ID Buzz, due next year, and a yet to be confirmed production version of the ID Buggy (above, right) in an initial three-strong range of Icon models designed under the guise of newly appointed Volkswagen Group design boss Klaus Bischoff.

Those privy to an early styling model of the new Volkswagen SUV say it departs radically from the ID 4, with a distinctly boxy profile. It's said to have a bluff front end with a full-width grille incorporating rectangular headlights, an almost horizontal bonnet, upright windscreen, nearly flat roofline and sheer sides.

The Ruggdzz is also understood to be distinguished from other ID models by a unique glasshouse treatment that makes the C-pillar appear translucent through the application of a glass panel on the outer body.

As well as a standard-wheelbase five-seater, Volkswagen has drawn up plans for an extended-wheelbase, seven-seat version of the Ruggdzz. This is likely to be aimed primarily at the Chinese and North American markets.

Autocar sources indicate that there could be a number of Ruggdzz derivatives, with the most extreme model featuring raised ride height and other off-road-inspired elements such as roof-mounted spotlights.

The basis for the new ID SUV is Volkswagen's versatile MEB (Modularen Elektrik Baukasten, or modular electric toolkit) platform.

Technical details are scarce, although it is thought to use a twin electric motor set-up similar to that of the ID 4 to provide it with four-wheel-drive capabilities, including the ability to transfer drive to individual wheels for added traction in rugged terrain.

As well as providing the basis for the Ruggdzz, a similar MEB set-up is also planned to underpin similarly styled models from Volkswagen sibling brands Seat and Skoda, plus newly formed Chinese marque Jetta.

GREG KABLE

TWINGO TURNS EV - BUT SWERVES UK

Renault's Twingo will gain an electric ZE version this year, but it won't be sold here. The Twingo was withdrawn from the UK last year after slow sales. The Twingo ZE will be joined by a Kadjar-size electric crossover in the next 12 months.



UBER SIGNS UP FOR 2000 NISSAN LEAFS

Nissan will supply 2000 Leafs at £4500 below retail to Uber, which wants its London fleet to be electric-only by 2025. The firm has added a 15p 'Clean Air Fee' to all London trips to help its drivers - of whom there are 45,000 - pay for the cars.



KARMANN NOW IN FRAME FOR ID BUGGY

VW is looking for a specialist firm to build the ID Buggy



Karmann has emerged as one of the favourites to put the open-top Volkswagen ID Buggy into limited production, according to sources close to the German car maker.

Under Volkswagen ownership since 2010, Karmann is described as "a key candidate" to assemble the modern-day beach buggy, which made its world debut at the 2019 Geneva motor show.

The focus on Karmann, which currently produces the Porsche 718 Boxster and Volkswagen T-Roc Cabriolet at its factory in Osnabrück, Germany, follows doubts over the future financial sustainability of e.Go Mobile – the German company originally chosen by Volkswagen to become the first external partner to produce cars based on its MEB electric car platform.

The company behind the e.Go Life electric city car signed a memorandum of understanding with Volkswagen early last year in a deal it said involved a "dedicated vehicle project".

This led to speculation that e.Go Mobile had already been chosen to produce the ID Buggy in volumes of up to 5000 per year. But with mounting financial problems, e.Go Mobile has been forced to seek credit lines to stave off bankruptcy proceedings.

One key element in Volkswagen's proposed partnership with e.Go Mobile was the latter's expertise in plastic body panels and limited-run production.

A source close to the matter said: "Volkswagen's strength is in platforms, driveline, battery architecture, sourcing and marketing. With its experience in plastic body panels and small-scale production, e.Go Mobile brings further key strengths that could make the ID Buggy a success."

Speculation within the German car industry suggests Volkswagen could now buy e.Go Mobile's body panel construction know-how and produce the ID Buggy itself on a dedicated electric car line at Karmann.



ID 4 will precede the new SUV but will be very similar under the skin

Evora refined for everyday use

LOTUS IS LAUNCHING a more refined European version of the Evora 410 that's designed to improve the car's comfort in day-to-day use without harming its high-speed capability.

Called the Evora GT 410, it sits beside the existing, notably more hardcore GT 410 Sport, which itself receives some running improvements. The new model is known internally as 'Phil's spec', because Lotus boss Phil Popham called for its UK

launch after trying a quieter, more supple, US-spec Evora.

The new car costs £82,900, a price that includes additions to the usual standard equipment level. Its spec includes air-con, Sparco sports seats, improved door trims, a tailgate with a larger glass area and a reversing camera. The whole package saves buyers around £3000, says Lotus, and is on sale now.

The new variant is intended to offer more refinement

through the fitment of all-weather Michelin Pilot Sport 4S tyres. It also has more sound proofing and its damping – as with all Lotus models – has been tuned by the firm's chief attributes engineer, Gavan Kershaw.

"It's still extremely stable and quick," Kershaw said, "but it's quieter on coarse surfaces and it rides ridges better, with smaller impacts. You could say it 'breathes' better on challenging road surfaces."



Evora GT 410 is quieter, softer and better equipped

Future of Suzuki Jimny in doubt

SUZUKI UK HAS responded to media reports that the Jimny will soon be removed from sale in Europe by claiming that it will still be sold in "very limited numbers throughout 2020".

The rugged 4x4, launched in 2018, was reported to be under threat due to its relatively

high CO₂ emissions, a factor that Suzuki UK admits would "adversely affect its whole-range CO₂ average in Europe after 2020". The Jimny emits 154g/km of CO₂ in its most efficient form.

Although not officially confirmed, it's suggested the

model will be removed from sale in 2021. However, there are also rumours that it could instead become an N1-class commercial vehicle to avoid affecting CO₂ targets. This would involve the removal of the rear seats and a loadbay conversion, among other homologation changes.



Jimny will be sold in 2020 in "very limited numbers" in Europe

AIWAYS READIES £30K EV FOR EUROPE

Chinese start-up Aiways will show the European version of its U5 electric SUV at the Geneva motor show in March. The VW Tiguan-size model will go on sale in mainland Europe in April, priced from about £30,000, with a UK launch expected in 2021.



JLR CUTS JOBS AT HALEWOOD PLANT

Jaguar Land Rover has announced hundreds of redundancies at its factory in Halewood, Merseyside. The site, which produces the Range Rover Evoque and Discovery Sport, is moving from a three-shift to a 'two-plus' shift pattern.





New i20 interior will be revealed at the Geneva show next month



i20 starts next era for Hyundai

Supermini arrives with new styling theme, a wealth of tech and mild-hybrid engines

The all-new i20, revealed ahead of its public debut at next month's Geneva motor show, represents the start of a "revolutionary and ambitious" new design language for Hyundai.

The third-generation Vauxhall Corsa rival is set to go on sale in May and introduces what Hyundai describes as a theme of "sensuous sportiness" that will be applied across the rest of its line-up in due course.

The latest i10 city car features a watered-down version of the i20's angular look, while the facelifted i30 (see below) and new Tucson SUV for 2021 will adopt a similar design approach.

Further to the adoption of distinctive creases and other styling details new

to Hyundai, the latest i20 is proportionally different from its predecessor, being 30mm wider, 5mm longer and 24mm lower. Its wheelbase has been lengthened by 10mm to increase passenger space, too, while the boot is now slightly bigger, at 351 litres.

Ten paint colours across a broad spectrum are available, as is the option of a two-tone scheme by way of a black roof.

Although the interior of the new car has yet to be shown, Hyundai has published a detailed sketch that reveals

a significant redesign. It has a sculptured look that continues from the front doors across the dashboard, itself dominated by an infotainment touchscreen (10.25in or 8.0in on lower trim levels) mounted at eyeline height.

This sits next to a 10.25in digital instrument display and above an air vent panel whose horizontal 'blades' extend across the fascia. Ambient LED lighting is also present.

Best-in-class connectivity

is claimed for the supermini, with wireless Apple CarPlay and Android Auto introduced to the sector for the first time and Hyundai's Blue Link system offering a variety of services including a no-cost five-year subscription for TomTom-supplied live traffic data. Wireless phone charging also features, while the i20 is the first European Hyundai to offer a seven-speaker Bose premium sound system.

Highlights among the huge provision of new safety kit includes sat-nav-based adaptive cruise control, which can anticipate corners or straight stretches and lower or raise your speed appropriately, an intelligent speed limiter and lane-following assistance, a system that keeps the car centred within its lane.

Other new features include parking collision avoidance, forward collision warning with pedestrian and cyclist detection, blindspot collision avoidance, rear cross-traffic alert and even a system that warns you if the car in front has moved off and you haven't.

Despite adding all this new tech, Hyundai claims a 4% weight reduction over today's i20. In theory, that should lead to improved performance and efficiency for the petrol-only engine range.

This is topped by a 118bhp 1.0-litre turbocharged triple with a 48V mild-hybrid system - itself responsible for a 3-4% efficiency boost, according to Hyundai. Although efficiency figures aren't yet official, we know it can do 0-62mph in 10.2sec with the six-speed



FIRST SIGHT OF NEW-LOOK i30

Hyundai will reveal an updated i30 at Geneva alongside the new i20. The family hatchback will get an exterior redesign, a digital instrument display and a 10.25in touchscreen. It will be revealed a few days before the show.



BRITISH ELECTRIC SPORTS CAR COMING

Hampshire-based sports car maker Apex, which last year revealed the 600kg AP-1, will show a 'hyper EV' at Geneva. Weighing 1200kg, the AP-0 uses a carbonfibre-only tub. Apex claims "rapid acceleration" and "exceptional cornering ability".





2019 Imagine concept combined saloon and SUV design elements



Electric Kia saloon due in 2021

THE NEXT ELECTRIC Kia, due to arrive in 2021, will sit above the existing e-Niro and Soul EV and be based on the Imagine concept that was revealed at last year's Geneva motor show.

The zero-emissions model will take a new name and design, rather than be a variant of an existing model. Kia's policy is to have stand-alone model lines for its electrified vehicles.

The Korean manufacturer recently announced a plan to launch 11 electric vehicles by 2025. This is part of its £19 billion strategy to transform into a maker of electrified vehicles and mobility solutions within the next five years.

Kia currently sells two

electric models, the e-Niro and Soul EV, both compact crossovers. Adding a larger one will help the brand reach its goal of taking a 6.6% share of the global EV market by 2025.

Kia UK boss Paul Philpott said: "The Soul EV and e-Niro sit in the same sort of part of the market, so you either go much smaller or bigger [for another EV]. Assuming [EV] supply becomes less limited in 2021, I think [a model that's] a bit bigger would fill a gap."

The third model will sit on a new platform, shared with sibling brand Hyundai, that's set to serve as the basis for a range of larger and more powerful electric saloons and SUVs in the future.

It promises 310 miles of range - 28 miles more than the e-Niro - while an 800V charging system will enable a full charge in just 20 minutes. Ultimately, Kia is working towards a range of 500 miles for its EVs, but this target won't be reached for some time yet.

The new EV for 2021 will have a "crossover design which blurs the boundaries between passenger and sports utility vehicles", echoing the four-door Imagine concept.

Around 10% of all Kias sold in the UK this year will be electric and 20% hybrid or plug-in hybrid in order for the company to ensure it hits its EU-mandated emissions targets, according to Philpott.

'Sensuous sportiness' is how Hyundai describes it



manual gearbox or one-tenth slower with the seven-speed dual-clutch automatic.

A 99bhp version of the same unit is offered with the same gearboxes. It's likely the UK will get only the mild-hybrid version of this, too.

The entry-level motor is a naturally aspirated 1.2-litre

four-cylinder that puts 84bhp through a five-speed manual gearbox to complete the 0-62mph sprint in 13.1sec.

Hyundai hasn't revealed UK pricing, but expect an entry point of just over £15,000 and to pay more than £20,000 for the highest-spec variants.

LAWRENCE ALLAN

HYUNDAI 45 CONCEPT IS CLOSER TO REALITY

What appears to be the production version of the Hyundai 45 concept has been spied testing. Despite the heavy camouflage, we can see the 2019 concept's angular design - inspired by Hyundai's first-ever car - has been tempered slightly, but the proportions suggest this will still be an electric C-segment crossover to rival the Mazda MX-30. Expect it to be unveiled next year.



BEIJING MOTOR SHOW POSTPONED

Autocar understands that the biennial Beijing motor show - usually China's biggest - will be postponed in the wake of the coronavirus outbreak. This has already curtailed the Mobile World Congress in Spain and the Shanghai F1 race.



MULLINER CHRISTENS ITS OPEN-TOP GT

Bentley's in-house coachbuilder, Mulliner, will reveal an exclusive model at Geneva. Called the Bacalar, it is thought to be the £1.5 million open-top grand tourer, of which only 10 examples will be built, that Autocar first detailed last year.





Original 914 (main image) unlikely to inspire an EV like next Boxster (left)



Porsche paves way for 914

Design chief hints that work is under way on a modern-day, entry-level 914

Porsche has talked openly about the possibility of bringing back the 914. The move has fuelled rumours that the German car maker is actively preparing the way for the launch of a new back-to-basics model aimed squarely at enthusiast drivers.

In an official interview posted to its Newsroom website, Porsche has detailed the history and design of the 914, launched in 1969, recognising it as a successor to the iconic 550 Spyder and describing it as a “typical Porsche” in terms of engineering.

It also asked if there is a future for the mid-engined 914 in an interview with head of design Michael Mauer.

Mauer said that a “cheaper,

entry-level Porsche would be the right thing to do”.

He added: “We have this discussion all the time... A modern 550 in the broadest sense - a very simple, unpretentious car.”

Mauer - who recently relinquished duties as head of design for the Volkswagen Group to focus on design operations concentrated at Porsche’s Weissach R&D centre - hinted that Porsche is considering two alternatives for a spiritual successor to the 914 in a move aimed at reaching out to young customers.

The first is what he described as “a car with almost no electrics, everything mechanical, puristic”. The

second, he said, is “a car for a target group of people who drive Audi TT RSs or Golf R32s”.

Mauer, who is credited with the design of the original Mercedes-Benz SLK, indicated that internal discussions about a modern-day 914 at Porsche are split along two lines.

He said: “Sales might see things differently. From this standpoint, a much cheaper entry-level Porsche would be



Four-pot from 718 is a possibility

the right thing to do - but that’s not my approach.”

Instead, Mauer called for a “puristic, reduced, back-to-the-roots” type of car. “I think the time has come. That would be typically Porsche again,” he said.

Mauer praised the styling of the original 914, saying: “To have the courage to design something like this, so big but without a swage line, without fashioning everything, that’s really fantastic.”

His comments also reveal that work to revive the mid-engined model has already progressed beyond discussions into a design phase. He said: “Modern, reduced style - the more I work with the 914, that’s exactly what I’m fighting for

now. This reduced, puristic approach. Integrating things. Not one line too many.”

Whether a 914 successor would remain faithful to the original in terms of combustion-engine propulsion remains to be seen.

In theory, Porsche has the perfect powertrain in the form of the compact, mid-mounted flat-four turbo motor in the 718 Boxster and Cayman - perhaps with revisions to help it appeal more to purists.

A fully electric powertrain - such as that set to be launched in the 718 models by 2022 - is also a possibility, but Mauer’s description of a car with “almost no electrics” appears to counter that.

GREG KABLE

UK ELECTRIC VAN START-UP GETS HUGE BOOST FROM UPS

Global logistics firm UPS has ordered 10,000 electric vans from London-based start-up Arrival. The vans will be introduced across Europe and North America by 2024.

UPS has the option of ordering another 10,000 vans, having made an investment in Arrival said to be worth “hundreds of millions of euros”. Other recent investors include Hyundai and Kia, which put £85 million into the start-up. Technical details for Arrival’s electric van remain unconfirmed, but the company claims it will “surpass traditional vehicles in cost, design and efficiency”.

Arrival claims its vans can save fleets 50% on operational costs





Czinger of a new hypercar

“Revolutionary” performance car set for Geneva show debut



New car brand Czinger will unveil a bespoke hypercar called the 21C at the upcoming Geneva motor show. Promising to showcase a “paradigm shift in the way vehicles are designed, developed, engineered and manufactured”, the year-old brand is named after founder and CEO Kevin Czinger, the man behind the Divergent Blade supercar. The Blade was claimed to be the first car of its type to use 3D printing to form the body and chassis components.

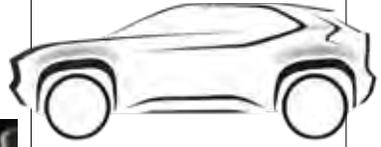
Details of the new model are scarce, but Czinger claims its “revolutionary technology” has led to “a groundbreaking hypercar with an iconic design and dominating performance”. It uses a hybrid powertrain of unconfirmed size and output, with the car and its propulsion system designed, developed, engineered and manufactured from scratch at the company’s base in Los Angeles, California. The 21C also features an in-line seating arrangement in a fighter jet-style driver-passenger compartment, with a single seat behind the driver.

The preview images also reveal a large carbonfibre rear wing, extensive use of carbonfibre in the bodyshell and what looks to be a centrally mounted exhaust. A full-width LED light strip stretches across the rear, which is dominated by a honeycomb grille design. Czinger claims to be “the first of its kind to develop novel additive manufacturing technologies” including “cutting-edge chassis and bespoke structures”, plus “high-performance components”. It seems likely

that the 21C will make use of a further developed version of the 3D printing system used on the Divergent Blade. Czinger claims boldly that the 21C will be “one of the 21st-century’s most advanced performance vehicles”. There is full production intent with the 21C, although it’s not yet clear how many cars are expected to be built. Autocar understands that, given the amount of bespoke engineering and innovation included in the car, a seven-figure price tag is likely. **LAWRENCE ALLAN**

MERCEDES-BENZ AIMS to sell 25% of its new cars online by 2025 and is looking to make the buying process as seamless as possible to achieve that, according to head of sales and marketing Britta Seeger. She declined to give a specific figure of how many cars the firm sells online today, saying only that it is “less than 5%”. Even in 2025, at least 80% of buyers will still interact with a dealer, to research, test or collect a new car, Mercedes data suggests.

THE CHIEF ENGINEER of the Toyota Yaris, Yasunori Suezawa, is also developing the next-generation Aygo alongside “other A- and B-segment cars” – likely to include a new supermini-sized SUV. It’s expected all will use versions of the TNGA platform, and could also benefit from sporting GR variants.



Kevin Czinger’s new 21C hypercar features plenty of carbonfibre, a full-width LED rear light strip and, inevitably, bold design touches

VOLVO WILL NOT be investing in hydrogen fuel cell technology, according to boss Håkan Samuelsson, who believes the wider industry is committed to EVs and the infrastructure and legislation are being geared up to support them. A radical shift to another technology would not therefore be welcomed. “We need to be very clear and stop dreaming of the greenest grass,” he said.

DIESEL ENGINES are “complicated and expensive” to engineer to meet future emissions regulations, according to Volvo boss Håkan Samuelsson. Volvo will no longer launch diesels in any new models, and Samuelsson believes it is “better to go with hybrids” to make a significant cut in CO₂ emissions ahead of increasingly strict legislative targets.

Gordon Murray reveals Motiv EV quadricycle

GORDON MURRAY DESIGN has unveiled an autonomous, electric and ultra-lightweight quadricycle that is claimed to meet new car crash safety requirements. Called the Motiv, it has been launched as part of a consortium alongside Delta Motorsport and itMoves. The single-seater pod is said to provide “significant cost savings and improved refinement” over similar concepts thanks to Murray’s patented iStream Superlight

tech. The 2.54m-long Motiv is targeted for use as private city transport or last-mile deliveries, and is “ready for immediate adaptation for driverless use”. A 20kW electric motor mated to a 17.3kWh battery pack promises a range of about 62 miles and a top speed of 40mph. A 450kg kerb weight is claimed without the battery. The consortium is looking for tech partners to begin real-world trials ahead of mass production in two to five years.



The Motiv is said to have a range of 62 miles

Stroll buys stake in Aston Martin

Consortium's confirmed share leads to major revision to firm's new-model strategy



Lawrence Stroll will rename his Racing Point F1 team in '21



Valkyrie deliveries are still due to start this year

WHAT HAPPENS NEXT

- Lawrence Stroll leads investment consortium
- Takes new position as chairman of Aston
- CEO Andy Palmer stays on
- Job and cost cutbacks to follow
- Valkyrie coming this year and Valhalla in 2022
- Lagonda launch delayed until at least 2025
- Stroll's Racing Point F1 team to be rebranded Aston Martin

A consortium led by billionaire Lawrence Stroll has bought a 16.7% stake in Aston Martin for £182 million - sparking a major revamp of the firm's future product plan.

The deal, confirmed in a filing with the London Stock Exchange and revealed by Autocar last year, also includes a £318 million cash infusion through a new rights issue, giving the British maker a £500 million boost.

Stroll also owns the Racing Point Formula 1 team, which under the terms of the new deal will be rebranded as the Aston Martin F1 works team from 2021 onwards. Aston has pledged to launch its Valkyrie hypercar this year, committed to a revised mid-engined car strategy and revealed it will delay the launch of its electric vehicles, including the relaunch of the premium Lagonda brand, until after 2025.

Stroll beat Chinese car maker Geely - the owner of Lotus and Volvo, a part-owner of Smart and a significant shareholder in Daimler - to the deal after an emergency board meeting was held the night before the announcement.

To secure the 16.7% stake, the consortium led by Stroll, called Yew Tree Overseas Limited, will buy 45.6 million new ordinary shares in Aston Martin Lagonda at a price of £4 per share. The consortium includes JCB chairman Lord Anthony Bamford, former Power Corp Canada boss André Desmarais and Hong Kong fashion investor Silas Chou.

The £500 million investment includes £55.5 million of short-term funding from Stroll to improve the immediate liquidity of the company. Aston says the investment will be used to "finance the ramp-up in production of the DBX and turnaround of the company's

performance", stating it would "strengthen its balance sheet to necessarily and immediately improve liquidity".

Stroll will also join the Aston Martin board in the role of executive chairman, with the consortium also gaining the right to appoint a second board member.

Aston Martin was floated in 2018 with a valuation of £4.5 billion but, based on today's share issue, it's currently worth around £1 billion.



Stroll's consortium includes JCB chairman Lord Bamford

Aston Martin claims its current technology partnership with Red Bull Advanced Technologies "will continue until Valkyrie is delivered." There had been questions whether the partnership would survive with the new investors in place, and it is unclear if Red Bull's involvement in the mid-engined Valhalla project will continue unabated.

Aston Martin will continue to sponsor the Red Bull F1 team throughout 2020, but has thereafter agreed a 10-year deal under which Racing Point will become the official works Aston team. This includes a five-year sponsorship agreement from 2021.

Due to its recent struggles, Aston has also agreed a "reset business plan" to raise its performance, which includes both cash generation and restructuring its product roadmap. It includes delaying

investment in electric vehicles until beyond 2025, including delaying the relaunch of the Lagonda brand - scheduled for 2022 - until after that date. The Rapide E electric car project has been "paused pending a review".

There remains a commitment to deliver on its range of mid-engined cars currently being developed, starting with the Valkyrie this year. The immediate priority is getting DBX production under way, with the firm saying it has received 1800 orders to date. It will then update the Vantage in the spring - including a Roadster version - and start Valkyrie deliveries later this year. It also seeks to trim costs by £10 million per year, meaning a possibility that some jobs will be lost.

The mid-engined Vanquish will now be revealed after the Valhalla in 2022, while Aston will also develop a "fuel-

HYUNDAI SLASHES EV WAITING TIME

Hyundai UK has responded to demand for the Kona Electric by "drastically" cutting order waiting times from around 12 months to three or four months. The lengthy wait was due to supply issues and underestimated demand.



VW ANNOUNCES PRICES FOR E-UP EV

The updated VW e-Up electric city car will be priced from £19,695 after the government grant, with standard kit including heated seats, cruise control, auto wipers and DAB. Range has nearly doubled from 83 miles to 159 miles.



Q&A ANDY PALMER, ASTON MARTIN CEO

When did you conclude negotiations?

"I'm getting too old for all-nighters, but let's just say it was a late night! As I sit here now, the company is better funded than it has ever been in the past, with a good product cadence and with a commitment to build our own V6 hybrid in the UK."

We understand you had rival bidders, so why choose Lawrence Stroll?

"Lawrence and his consortium... have huge experience in luxury brands. That gives the company - and me personally - a group of mentors to work with. On a personal level, Lawrence shares a lot of my beliefs and passions. He was clear that the mid-engined plans had to progress, he has a passion for F1 and he's an investor who wants to engage."

Is his investment enough for you to do what you want?

"It allows us to once and for all start doing the right things, chief among them controlling supply and demand in a way that Ferrari has demonstrated can be so effective. Now we can reset, reduce our stock and start operating properly."



are a bit late, but no more than that. It will be phenomenal."

Could you work with Red Bull Advanced Technologies again in the future?

"I'm not discounting anything."

How disappointing is it to delay your electric car plans?

"I am wedded to the idea of electrification going forward. But we had to cut our cloth accordingly - for me, the V6 hybrid is the priority. You also have to remember that none of our competitors, bar Porsche, will have an electric car on sale before 2025."

How do you see your own future at Aston Martin now?

"I hope that people remember I've had four good years at Aston Martin and one bad one. I know people have short memories and that I am responsible for the lot, but I believe I have the support of Lawrence Stroll, his investors and all of our shareholders."

"This is a tough industry, but I've been in it 40 years and I hope people recognise that I'm good at innovating new vehicles, bringing those innovations to market and then marketing them with success."

Shouldn't you have done that before?

"We had to pay our bills, most notably the one to build a new factory. We made that decision in 2016 when the going was good. You can't build a new factory and a new SUV that's true to your values by cutting corners. The costs were fixed in a bullish market that turned to crap."

What would have happened without this investment?

"We would have had to take on more debt at nosebleed levels. \$100m at 15% interest is pretty alarming, and inevitably would have created problems down the road."

How hard has the Valkyrie project been?

"If you are asking if it has been easy, then the answer is no. I'm not blaming anybody, because we are trying to make a car of the decade. We



Safety of smart motorways is in the spotlight

Review halts 'smart motorway' work

THE GOVERNMENT has paused all ongoing 'smart motorway' development, as it awaits the results of a review into their safety.

The move means that a £92 million project to convert a stretch of the M20 in Kent into a smart motorway has been put on hold, and could be axed entirely. The works, which have been under way for two years, were anticipated to finish in March.

Other roads affected include a lengthy section of the M23 between Gatwick airport and the M25, part of the M6 near Coventry and a 10-mile stretch of the M62 in Greater Manchester.

The decision follows confirmation that 38 people have been killed in crashes on smart motorways in the past five years, while 'near-miss' incidents have skyrocketed.

Smart motorways have come under heavy criticism since they were first trialled in the West Midlands in 2006. The removal of the hard shoulder to improve traffic flow means broken-down vehicles unable to reach a refuge area are forced to remain stationary in 'live' lanes, with no protection against oncoming traffic.

Smart motorways are used on around 200 miles of the UK's 2200-mile network.

If the government decides to continue with the smart motorway project, it will consider various means of making them safer. A radar-based car detection system could be rolled out more widely over the next three years, automatically detecting stationary vehicles and triggering warning signs to alert drivers behind.



From left: Red Bull sponsorship remains - for now; deal should boost DBX; Valkyrie still pledged for 2022

efficient, modular V6 engine with hybrid capabilities", due to be delivered in the middle of this year. It's unclear if the new deal affects Aston's longer-term use of Mercedes-AMG technology and powertrains, such as the V8 in the Vantage, DBX and DB11.

Special models will continue to be a key part of its plan, with one 'heritage special' and two 'contemporary specials' delivered each year.

Stroll, father of Racing Point F1 driver Lance, is estimated to be worth in excess of

£2 billion, having made his money building up brands including Pierre Cardin, Ralph Lauren, Tommy Hilfiger, Michael Kors, Asprey and Garrard. The 60-year-old, born Lawrence Strulovitch, grew up in Montreal, Canada, and now mostly lives in Switzerland.

He is also famed for his car collection, including what many regard as the most valuable collection of classic Ferraris in the world, including a 330 P4 and a Daytona Spider. He also owns the Mont-Tremblant racing circuit in Canada.

The majority of Aston's shares are still held by the Kuwait-based Adeem/Primewagon group, while the Strategic European Investment Group, part of the Italian private equity group Investindustrial, currently holds around a one-third of the company. While the two groups previously owned a combined 61%, the shares issued to Stroll's consortium reduces their holding to 50.5%. Daimler also owns 4%.

JIM HOLDER AND JAMES ATTWOOD

OFFICIAL PICTURE

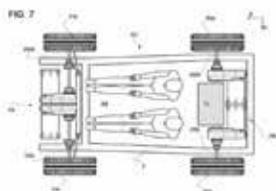


SKODA TAKES WRAPS OFF INDIAN SUV CONCEPT

Skoda has revealed a concept for the first model built off its India-specific MQB AO IN platform at the Delhi Auto Expo. Called the Vision IN, it's an SUV similar in size to the Kamiq and will go into local production in 2021. A Volkswagen model based off the same platform is also planned. The brands aim to secure a 5% market share in India by 2025.

FERRARI PLANS SHOW LAYOUT FOR EV

Patents have revealed details of Ferrari's first production electric car. They show a two-seat or 2+2 layout, long bonnet and short overhangs. It appears to feature an electric motor on each wheel, but is years away from launching.



ALLIANCE FRAMES POST-GHOSN ERA

The Renault-Nissan-Mitsubishi Alliance has revealed plans to move on from the Carlos Ghosn saga. Nissan will lead in China, Renault in Europe and Mitsubishi in south-east Asia. They will also pool their CO2 average fleet emissions in Europe.



Evoque buyers can ditch leather for eco textiles at no cost



Car makers look to go vegan

Changing public attitudes are pushing the development of animal-free upholstery

Could a vegan steak bake change the car industry? It may sound tenuous, but the phenomenal success of the unlikely offering from Greggs bakery, along with myriad other vegan products that were rolled out by national retail chains for 'Veganuary' this month, demonstrate that catering to the growing demand for animal-free products is big business.

The rise in veganism is driven by a combination of health, environmental and animal welfare concerns. It's not just about eating only plant-derived food but entirely avoiding using animal-based products - such as leather upholstery in cars.

Leather has long been used as a luxury material for vehicle interiors, and it remains a very popular choice. But in the past few years, there has been a major push by premium brands

to develop animal-free leather alternatives, with some firms in the process of phasing out leather options completely.

There are growing public calls for manufacturers to offer vegan options, a prime example coming from Britain's six-time Formula 1 world champion, Lewis Hamilton, who recently asked his employer Mercedes-Benz to ditch leather entirely.

Animal-free alternatives to leather aren't a new concept. For example, Mercedes has employed a synthetic leather called Artico since 2003, Toyota uses a material called Softeck and Ferrari offers Mycro Prestige in some models.

Yvonne Taylor, director of corporate projects at animal rights organisation People for the Ethical Treatment of Animals (PETA), told Autocar that, compared with industries



PETA pressured EV firm Tesla into going vegan



Mercedes has offered faux leather since 2003

such as fast food, fashion, aviation and hospitality, the car industry "has been slower to capitalise on the demand for vegan products". "This is ironic," she said, "given that many of the biggest companies have been using vegan leather for its high quality and durability for years."

Taylor wants car makers to offer fully vegan interior options for every model, saying that leather isn't a by-product of the meat industry, as many people think, but a "global, \$100 billion-a-year [£77bn] industry that slaughters more than one billion cows, sheep, goats and pigs [annually]".

According to Taylor, a PETA investigation into cattle ranchers in Brazil who supply leather producers that sell to car makers found evidence

of factory farming, extreme crowding and animal cruelty.

For the car makers, it has been a question of demand: Mercedes says leather remains the most popular choice in its cars - although it's developing new vegan materials - and other premium brands are reacting to the changing demand, too.

Land Rover has been among the leaders in this area, working with partner firms on a range of non-leather fabrics: the Evoque and Velar can be upholstered with Kvadrat's premium wool-polyester blend, a synthetic suede made by Miko and a eucalyptus fibre textile.

In a recent interview, Land Rover's chief colours and materials designer, Amy Fascella, said: "Premium car customers still love luxury, but they're also dialling back

the consumerism and doing some good if they can."

Tesla has phased out the use of leather entirely from its upholstery options, in part because of pressure exerted by PETA after it bought shares in the California-based EV maker.

And Polestar, Volvo's new sister brand, will instead use a water-based PVC material called Weavetech that was developed in-house. Polestar boss Thomas Ingenlath says this represents that "our care for the environment goes beyond the electric drivetrain", with the aim to "promote and accelerate the shift of the car industry towards leather-free interiors".

The industry's commitment to cutting carbon emissions is also driving a move away from leather, and that's partly why



Earth is home to 1.5 billion cows



Hamilton is an outspoken vegan

ANIMAL-FREE MATERIAL OF THE FUTURE

**Volkswagen ID Roomzz: apple skin leather**

Electric large SUV concept revealed at last year's Shanghai motor show features a leather-style fabric made by mixing polyurethane with apple skin left over from juice production.

**Bentley EXP 100GT: grape leather**

Red wine and upholstery don't usually mix well, but Bentley's 100th anniversary concept features a material made from grape skins that are a waste product from wine production.

**Mercedes-Benz Vision AVTR: recycled bottles**

This year's futuristic Vision AVTR concept contains Dinamica microfibre, a material made from old clothing, plastic bottles and flags. Similar fabrics are already used in production cars, including a number of Volvos and the new Renault Zoe.

the Ford Mustang Mach-E and Volkswagen ID 3 EVs will offer only animal-free materials.

The leather industry believes that its product has a strong and necessary future, however.

The director of Leather UK, Dr Kerry Senior, said: "The reality is that more than 90% of the world's population eat meat, and that consumption is rising. While this is the case, more than seven million tonnes of hides and skins will be produced every year, which will need to be dealt with. The most efficient and elegant solution to that problem is the production of leather. Leather is unarguably a by-product of the meat industry."

He also pointed out that vegan alternatives to leather all use synthetic chemicals themselves in their production.

The challenge for car firms is finding premium materials they can produce in volume that feel similar to leather and are just as durable over potentially a decade or more of hard use.

To test Weavetech, Polestar artificially aged it for 6000 hours, including submerging it in a 'boiling water-like environment' for four weeks. New production processes are creating new options, too; new materials are often showcased in concept cars (see above).

With leather remaining very popular, the car industry is unlikely to stop offering it in the near future - just as Greggs still sells real steak bakes. But as demand for vegan and other ethical products grows, car makers will be keen to stake a claim to that business.

JAMES ATTWOOD

UNDER THE SKIN
JESSE CROSSE

DOWN TO THE WIRE: REMOVING YOUR MECHANICAL CONNECTION



Saving weight and space are just two of brake-by-wire's numerous benefits.

WHEN ALFA ROMEO introduced its Intelligent Braking System (IBS), on the Giulia and Stelvio, it was the first use in production of the MKC1 brake-by-wire system. Developed by Continental, this wraps up usually separate components into one neat package that's lighter and far more compact than the sum of its parts.

Drive-by-wire concepts were originally aimed at making everything electronic, with no mechanical connection between the driver and the car. The idea was that electric calipers would do the braking and electric steering racks would enable fancy features such as enabling the car to take major avoiding action in emergency situations without ripping the driver's thumbs off on the steering wheel spokes.

The MKC1 system goes part of the way to full brake-by-wire but stops short of electric brake calipers. What it does do is integrate the tandem master brake cylinder (which generates the hydraulic pressure to apply the brakes), the brake booster, the ABS unit and the ESC unit, saving about 4kg.

Aside from the packaging and weight, pedal feel can be tuned by engineers using driving simulators to give a more aggressive response on track and a more relaxed response in traffic. Another advantage is that pedal travel doesn't increase when the brakes take a beating and get hot. What the driver actually feels is a simulator built in to the MKC1 that generates the sensation normally fed back through the hydraulics, only it remains consistent however hard the brakes are working.

Full drive-by-wire wire brakes would also allow manufacturers to dispense with hydraulic brake fluid, giving them dry chassis and production lines that have no need for the messy liquid. Complete corners consisting of suspension, wheel hubs, discs and brakes could be preassembled ready to bolt on the car. A further advantage of doing away with hydraulic brake fluid is that it's hygroscopic (it absorbs atmospheric moisture) so needs changing at intervals.

What about steer-by-wire? Although electric power assisted steering (EPAS) is common now, mainly because it's far less energy-hungry than a hydraulic steering

pump, it still maintains a mechanical connection between driver and steering; it just takes away some of the steering effort from the driver by using a motor. Full steer-by-wire would mean decoupling the driver from the steering gear altogether and that would require a change in legislation.

Although complete brake-by-wire and steer-by-wire haven't yet made production, another form of full drive-by-wire tech has been around for a while. Electronic throttles have no mechanical connection between the accelerator pedal and the engine's throttle. Instead, an array of sensors on the pedal box and engine pass the information the engine computer needs to adjust the throttle and the amount of fuel injected. What's the point? Mainly to help control fuel consumption and therefore emissions.

Both brake-by-wire and steer-by-wire have made it to the prototype stage and will reach public roads eventually. Indeed, they will have to if driverless autonomous cars are to become a reality. But, for now, both are consigned to the back-burner.

R2-D2 WILL CHARGE FOR YOU

Volkswagen has come up with a novel idea for overcoming the problem of installing charging infrastructure in awkward places, such as underground car parks: robots that can autonomously tow 'battery wagons' to EVs and plug them in. This may sound far-fetched, but the idea of taking the charger to the vehicle rather than the other way around makes sense and solves the problem of charger space hogging at the same time.





Drop-top to revive Vantage sales

Aston pins hopes on new Roadster to shore up sales of coupé; priced from £126,950

Aston Martin has revealed the new Vantage Roadster, which the company hopes will provide a boost to underwhelming Vantage sales. The Porsche 911 Cabriolet rival costs from £126,950 and is available to order now, with deliveries beginning in the second quarter of this year.

That price would have been a modest £6000 increase over that of the hard-top but, as part of a round of updates for the

2021 model year, the list price of the coupé has been reduced from £120,900 to £114,800.

The convertible Vantage is said to “amplify the emotional appeal” of the two-seater and receives what Aston claims is the fastest fully automatic soft-top hood in the business, going from opened to closed and vice versa in under seven seconds at speeds of up to 31mph.

The roof itself adds a modest 60kg to the overall weight of the Vantage thanks to a

‘Z-fold’ roof mechanism and lightweight structural bracing. It means the Roadster, which uses the same 503bhp 4.0-litre V8 as the coupé, is capable of 0-60mph in 3.7sec and a top speed of 190mph, figures that are 0.2sec and 5mph slower than those of the hard-top car.

Aston says the Roadster retains the coupé’s “strong dynamic ability and sporting character with no compromise to feel or refinement”. It uses the same electronic

and mechanical chassis systems as the coupé but has a bespoke tune for the rear suspension, altered software for the adaptive dampers and a recalibrated ESP system. The three-mode chassis control system has also been tuned specifically for the model.

The Vantage loses 150 litres of boot capacity compared with the coupé, keeping an albeit respectable 200 litres, which Aston says is large enough for a full-size golf bag

and its accessories.

The British manufacturer is also using the launch of the Vantage Roadster to introduce a range of new options across the Vantage range. Most notably, the seven-speed manual gearbox launched on the limited-run Vantage AMR is now available to order on the standard coupé. There’s also a new, more traditional ‘vane’ grille design option that can be ordered on both the coupé and the drop-top, sitting alongside



Roadster's hood can open or close in under seven seconds



'Vane' grille option and new colours are part of Vantage revamp



Deliveries of the Vantage Roadster are due from the summer

the existing 'hunter' grille. New colour finishes and alloy wheel designs are also available.

Weakening demand for the Vantage, particularly in Europe, was cited as a major factor in a "disappointing year" for Aston in 2019. Mounting losses led to last week's announcement of a consortium, led by billionaire businessman Lawrence Stroll, investing hundreds of millions of pounds in return for a 16.7%

stake in the car maker.

Aston Martin registered 1029 examples of the Vantage across Europe last year. That represents less than half the number it registered in 2006 in the first full year of sale for the outgoing V8 Vantage. By contrast, Mercedes-AMG registered in excess of 5500 AMG GTs across Europe in the same period.

LAWRENCE ALLAN

UNDER THE SKIN

JESSE CROSSE

HOW NEXT-GEN TECH IS TURNING CAR CABINS INTO SPEAKERS



New immersive audio tech makes cars lighter and sounds better.

MOST PREMIUM CAR makers have used some sort of active sound technology to get rid of unwanted resonance, either by sending noise-cancelling signals through speakers or by using active engine mounts to quell vibrations – especially on models using cylinder deactivation technology.

At the Consumer Electronics Show, Continental AG showed off a Speakerless Immersive Sound system it has developed in collaboration with premium sound specialist Sennheiser. While not a sound cancellation system, 'Ac2ated', as it's called, takes an unusual approach to broadcasting audio sound inside the cabin of a car.

Instead of conventional speakers, the system turns the car's internal trim panels into speaker surfaces. Continental likens the tech to the way the wooden body of a musical string instrument, such as a violin or cello, acts as a resonance chamber to project sound as it's played. In this case, selected surface areas within the car vibrate like the diaphragm of a speaker in order to produce the sound.

Small actuators, attached to the back of the panels and out of sight, excite the surfaces exposed to the cabin to generate the sound. The frequency ranges usually handled by specific sizes and types of speaker are produced by vibrating different-sized surfaces, such as the A-pillar trim, door trim, roof lining and rear parcel shelf.

Sennheiser's Ambeo 3D audio technology, which produces immersive sound, has been integrated with the Ac2ated technology. On a strictly practical level, using activated surfaces saves space and weight. Continental says a conventional audio system can weigh as much as 40kg, but by using existing surfaces it can reduce that by between 75% and 90%.

Weight reduction in cars is crucial in order to reduce fuel consumption or increase the range of an EV, and it comes at a cost. Aluminium, carbonfibre, magnesium and lightweight steels all cost more. Being able to slice over 30kg from one of the features most customers want and ending up with a more desirable product at the same time is a win-win for manufacturers.

Perhaps even more radical is Harman's Individual Sound Zones (ISZ) system, which allows each occupant of the car to listen to their own audio without wearing headphones. Two small micro-speakers, mounted in each headrest, interact with sound waves from standard audio speakers to modify what each person hears. As well as that, Electro Dynamic Planar Loudspeakers (EDPL), one in the headlining above each passenger, project directional sound downwards, like a spotlight, so only the individual can hear it.

The system lets occupants listen to their own audio without hearing the others, and only the driver has to listen to driving-related commands, such as navigation instructions or other alerts from the car. The system also enables passengers to take a phone call and patch it through to someone else in the car. Even if two people are listening to the same audio channel, they can set the volume individually and even turn it right down if they want.

ISZ: A LONG GESTATION

Harman's ISZ has its roots back in 2000 when Mercedes co-developed its 'Audio Spotlight' concept. Speakers made up of ultrasonic transducers, a bit like parking sensors, were mounted in the headlining and projected a beam of sound to the person below. The high frequency would be naturally modified by the surrounding air to an audible frequency. A demo system worked convincingly well.



New Focus RS will get four-wheel drive and should approach 400bhp

AUTOCAR
IMAGE



Hybrid lifeline for Focus RS

Engineers are battling to make a new Focus RS possible after a switch to full-hybrid

The future of a new Focus RS hinges on its engineers creating a high-output, full-hybrid powertrain that fits in with the new EU regime for average fleet CO₂ emissions - a challenge that Ford bosses describe as "waiting for a solution".

A senior Ford executive told Autocar: "We are waiting for our engineering team to come up with a solution on the powertrain and that is not easy given the new fleet CO₂ regulations."

Eighteen months ago, Ford was understood to be looking at a mild-hybrid 48V powertrain. To minimise CO₂ figures, the firm now believes the engine has to be a full hybrid. "The mild hybrid is not enough," said our source.

The challenge of the new fleet average figure - set industry-wide at 95g/km, but

varying according to a car company's mix of vehicles and their kerb weights - now means the Focus RS won't be seen in 2020 as rumoured. Instead, it is more likely to be launched in 2022/23.

In order to achieve both high performance and low emissions, Autocar understands that Ford has

switched its attention to an RS version of the full-hybrid 2.5-litre petrol unit that will power range-topping models of the new Kuga this year.

In that application, the Atkinson-cycle 2.5-litre four-cylinder engine and motor deliver 222bhp, with drive through a CVT auto and optional four-wheel drive.

All-wheel drive will be vital to harness the Focus RS's required power, which is likely to approach 400bhp. The last Focus RS was all-wheel drive and delivered 345bhp and 376lb ft from a 2.3-litre turbo four but equivalent models from Audi and Mercedes have since hiked outputs to nearer 400bhp and beyond.

To achieve a similar output would require a blend of combustion and electrical power - possibly 300bhp from a turbocharged 2.5-litre engine and 100bhp from the electric motor.

Another engineering issue to be resolved is whether or not the project's goal can be achieved at a sensible cost,



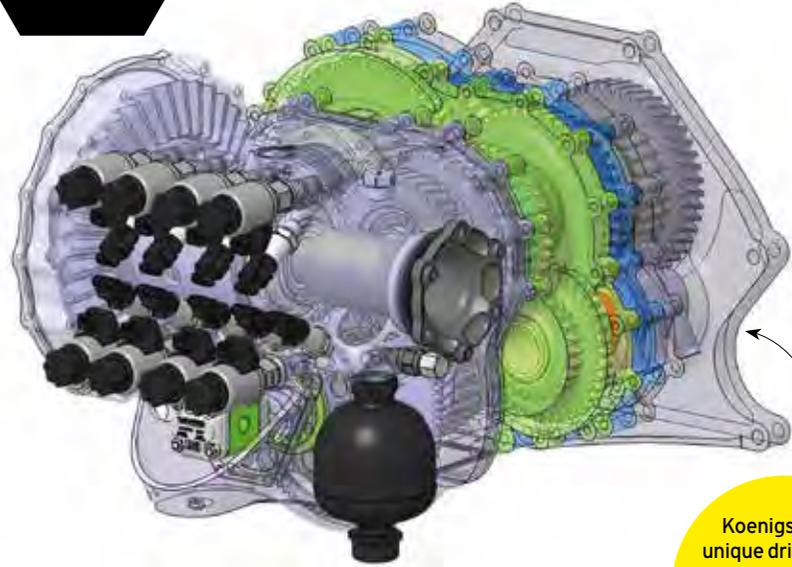
Engaging character of previous Focus RS is expected to remain



Highly tuned version of the Kuga's plug-in hybrid set-up is likely

UNDER
THE SKIN
JESSE CROSSE

KOENIGSEGG'S INGENUOUS TRANSMISSION SOLUTIONS



Koenigsegg's unique drivetrains break with conventional thinking, albeit for a lot of money.



KOENIGSEGG WON'T SAY what, but it will hopefully reveal something special on the morning of 3 March at this year's Geneva motor show. Rumour has it the Swedish supercar maker, known for its highly innovative drivetrains, will reveal a production car concept capable of breaking the 500km/h barrier (a smidge over 310mph).

Koenigsegg currently employs two bespoke transmission technologies in its existing models, neither of which exists in mainstream production cars. The question is which, if either, will be used to help raise the speed record bar yet higher.

The first is the Koenigsegg Direct Drive (KDD) fitted to the Regera, which does away with selectable gear ratios altogether. However, it's not a continually variable transmission (CVT); instead, it blends three electric drives with power and torque from the engine via a Hydracoup, a special type of torque converter developed in-house.

The axial flux electric motor-generators are supplied by British specialist firm Yasa and integrated into the drivetrain at Koenigsegg. These units are larger in diameter but much shorter than conventional radial flux motors, so they resemble biscuit tins. Two Yasa 750 units fit either side of the rear axle final drive, producing 1180lb ft of torque each. The third, a Yasa 400, is mounted on the engine's crankshaft. This produces 258lb ft and fills any torque gaps in the operating range.

The fixed final drive ratio is equivalent to the Agera's seventh gear, at 2.73:1, but the engine produces 1085bhp and 922lb ft in its peak operating range and nothing at 0rpm. Without something to replace conventional gears, then, it would be impossible to even pull away, so the powerful electric motors add another 661bhp and 2618lb ft from standstill.

At around 3500rpm, the engine starts to come into play, feeding in torque via the Hydracoup until it locks up to provide a direct mechanical drive to the wheels.

A motorsport-grade battery capable of discharging and recharging 10 times quicker than a regular production car battery supports the powerful electric drive.

The KDD was first shown in 2015, while the Light Speed Transmission (LST) was revealed as part of the Jesko in 2019. Koenigsegg says this nine-speed multi-wet-clutch gearbox is capable of shifting much faster than a conventional dual-clutch transmission (DCT), partly because it can make simultaneous changes between any forward speeds, whereas DCTs need to predict and preselect the next gear.

If the driver changes his or her mind, the DCT has to deselect and reselect, causing a slight interruption of torque to the wheels. DCTs are also sequential, so can't skip gears, whereas the LST's multi-clutch system can select the right gear instantly, bypassing several ratios if needed to meet the demand.

It's unlikely that either design will make it into the mainstream, mainly because of cost, but that doesn't detract from the deliciousness of the engineering. Which one will make it to Koenigsegg's next step? Maybe neither, but it's sure to be a treat for tech fans everywhere, whatever it is.

with a performance-oriented gearbox and four-wheel drive system to deliver the much-loved Drift mode that was programmed into a clever GKN differential - key to the old RS's unique driving characteristics. Integrating that into a hybrid system without escalating project costs would be a challenge.

"The story of all the previous RSs is of the engineers working on the project in their spare time and weekends and coming up with the ideas and concept. On the new one, we're still waiting for the right concept, especially on the powertrain," said the source.

But there is hope that a new Focus RS will at least face a much easier journey to production than the last model, which was squeezed into ex-CEO Alan Mulally's strict 'One Ford' product development straitjacket.

As a result, the Focus RS had to pass every global standard set for a new Ford product, after dozens of hurdles were put in front of its engineering development teams.

In fact, the Focus RS project was close to being cancelled

because of these problems, until Ford's then chief engineer Raj Nair stepped in at a product review meeting to guarantee personally that the RS project could be successfully delivered on budget.

Since Mulally retired in 2014, Ford has stripped away the global red tape, allowing Ford Europe to develop market-specific models - such as the just-launched Puma crossover, which earlier this month was crowned What Car? Car of the Year, the first Ford to win the accolade since the Fiesta in 2009.

There is hope that this process, introduced by Ford chairman and former Ford Europe boss Jim Farley, will make it easier to clear the obstacles to a new RS.

Another hurdle will be finding the engineering resources while Ford's product development teams are working flat out on a huge electrification drive.

Around £8 billion is being pumped into a global offensive to deliver 40 new battery-electric, mild-hybrid and plug-in hybrid models by 2022.

JULIAN RENDELL

FROM OXFORD TO MARANELLO

A front-wheel-drive supercar? Ferrari also went for a tri-motor set-up in its most powerful road car yet, the 986bhp SF90 Stradale plug-in hybrid. One motor works in tandem with the engine, while the others power the front axle for driving in electric-only mode, giving a modest zero-emissions range of 16 miles at speeds of up to 84mph. These motors are also supplied by Yasa.



Speth to relinquish JLR helm

Sir Ralf Speth will stand down as Jaguar Land Rover's CEO after 10 years in charge

Jaguar Land Rover boss Sir Ralf Speth will step down from his role as executive director and chief executive in September.

A statement issued by Natarajan Chandrasekaran, chairman of parent company Tata Motors, confirmed that Speth "has agreed to maintain his relationship with Jaguar Land Rover by becoming non-executive vice-chairman". He will also remain on the board of holding company Tata Sons.

A search committee has been formed to look for Speth's successor, Chandrasekaran revealed. He also praised the outgoing CEO for his "passion and commitment over the last 10 years", having been in charge since Tata bought the company from Ford.

Autocar's editor-in-chief Steve Cropley reflects on Sir Ralf Speth's retirement

It's presumably a coincidence, but it could hardly be more fitting that Speth's departure announcement should have come on the dot of the UK's departure from the European Union last week.

Years before Brexit was a firm decision, Speth was a vocal critic of the idea, warning anyone who would listen - from voters to prime ministers - of the dire consequences likely to affect and diminish Britain's motor industry if the intricate relationship between UK manufacturing, its EU suppliers and its global customers were interrupted. In many important ways, Speth has been proved right: the UK industry has declined rapidly and that trajectory looks set to continue for several years yet, before it begins to reconfigure.

The fortunes of Jaguar Land Rover were clearly always at the front of Speth's mind: during his tenure, the two-marque company became Britain's largest and by far its most profitable car manufacturer. But a sudden shake-out in 2017, caused

Speth said: "I look forward to new and exciting challenges"



primarily by rapid public rejection of diesel engines and major difficulties in China, brought serious losses, plus the unforeseen need to lay off 4500 employees and to trim costs by £2.5 billion. The action worked and JLR returned to profitability six months ago.

However, Speth's legacy amounts to far more than some financial bumps in the road. He has built Britain's biggest car manufacturer - and given it manufacturing outposts in Brazil, Slovakia and China as hedges against both high manufacturing costs and the financial turbulence of the future. He has brought a new rigour to JLR, learned from his several formative decades as a young BMW engineer. Today, the relationship between JLR and BMW moves ever closer.

He has embraced and worked in impressive harmony with Tata Sons, JLR's Indian owners - whose arrival was a profound shock to many

in the UK - always reserving a special respect for Ratan Tata, who stoutly led the original acquisition and whose influence in old age continues to guide JLR.

Speth's innate love of cars led to the creation of a succession of well-targeted and enticing Land Rover and Jaguar products. His restless love of progress led JLR to put a successful, desirable premium electric car, the Jaguar I-Pace, on the market about a year before his German opposition could respond.

In recent years, Speth has been a remarkable servant of his adopted country, too. He has taken British citizenship - hence the recent, quiet confirmation of his honorary knighthood - and has used his knowledge of what matters in modern industry to press local politicians on key projects, in particular the establishment of a fully fledged battery manufacturing operation. His close relationship with Midlands universities has greatly helped: so far, we have a UK Battery Industrialisation Centre designed to take innovations developed in universities and point them towards full-scale production. The next step, as Speth keeps pointing out, is large-scale manufacturing.

JLR's brief announcement of Speth's forthcoming retirement as CEO next September proposes no replacement. A statement from the Tata Group's chairman implies the search is just beginning. But Speth's own comment concludes with the prophetic line: "Personally,

I look forward to new and exciting challenges." We interpret this as a strong likelihood that, set free from steering a large industrial conglomerate, Speth will revert to pure engineering, his first love, directing his skills towards future mobility. Hopefully, he'll do it right here in the UK.

NEW EVOQUE HELPS PUSH JLR PROFITS

Jaguar Land Rover posted a pre-tax profit of £318 million in the final quarter of 2019. The figure was boosted by the popularity of the new Range Rover Evoque, recovering sales in China and the success of a major cost-cutting drive.

The firm posted revenues of £6.4 billion in the three-month period - up 2.8% year on year despite a slight

dip in total sales. Continued recovery of the Chinese market pushed volumes up there 24.3% year on year.

Since JLR launched its Project Charge restructuring programme, the company says it has achieved £2.9bn in savings. The next restructuring phase aims to save a further £1.1bn of cost and cash-flow improvements by March 2021.

Success of the new Evoque was a factor in rising profits



Speth's vision helped JLR steal a march with the I-Pace

New Golf kicks off in the UK at £23,875

ORDER BOOKS FOR the Mk8 Volkswagen Golf have opened in the UK, with pricing starting from £23,875 until more variants are rolled out.

Initially, only two trim levels will be offered. Entry-level Life comes with standard kit such as 16in alloy wheels, automatic LED headlights, front and rear parking sensors, ambient lighting and keyless start, as well as a 10.25in digital instrument display and 10.0in touchscreen infotainment system with sat-nav.

Wireless phone charging, a wi-fi hotspot and a three-year subscription to VW's We Connect Plus services are also thrown in, as is 'Car-to-X' technology. A comprehensive suite of standard active safety tech completes the tally.

The other trim level is Style, which has 17in alloys, LED Plus

headlights, upgraded seats and upholstery, extra ambient lighting, decorative wood inserts and three-zone climate control.

The initial base price buys a 128bhp 1.5 TSI petrol engine, promising 49.6mpg combined. The 148bhp version is £600 extra and a 113bhp diesel is available from £24,875. Style spec starts from £25,470 with the same engine range, although it's also offered with a 148bhp auto-only (DSG) diesel from £29,170. Prices for the estate have yet to be revealed.

Further engine variants due in the coming months include a 1.0-litre three-cylinder petrol motor and auto-only mild-hybrid 1.0 and 1.5 petrols. Sportier R-Line variants will arrive soon, too, as a prelude to the launch of hot GTE, GTI, GTD and R models later in 2020.



New Golf is available in the UK initially with just two trim levels

HUMMER TO RETURN AS 1000BHP EV

General Motors has confirmed that it will resurrect the Hummer name for a new line of premium electric SUVs and pick-up trucks. The Hummer EV will arrive under the GMC brand, promising 1000bhp, 11,500lb ft of torque and a 0-62mph time of 3.0sec.

Little else has been revealed yet other than the promise of "incredible on- and off-road capability". It'll be built in Detroit by the end of 2021.



UNDER
THE SKIN
JESSE CROSSE

HOW 5G DATA NETWORKS WILL REVOLUTIONISE VEHICLE TECH



5G data networks will enable a huge leap forward in driver assistance systems.

WHAT IS 5G? Will it merely improve smartphones a bit and maybe in-car infotainment, or is there more than that? Hopefully the latter, simply because 5G is a superfast communications protocol that's likely to have far-reaching implications for many things vehicle related, especially safety-critical driver assistance systems.

One of 5G's biggest strengths is low latency, which simply means less delay between a command being given and received. In human terms, that could mean the time between seeing an obstacle and hitting the brake pedal. In data terms, the 20 milliseconds for 4G drops to between one and five milliseconds for 5G. That's virtually instantaneous. The latency in human reaction time is around 200 milliseconds, so there's more chance of avoiding a collision if 5G is there to step in.

V2X (vehicle to anything else, such as other vehicles and infrastructure) has been the subject of research for some time. It allows vehicles to communicate with moving, fixed and temporary objects, warning a driver of what's around the corner before it comes into sight. That could be roadworks, a pedestrian, an oncoming emergency vehicle or a broken-down car. Early efforts relied on standard wireless data transmission, using the same technology as a home wi-fi network. Problem is, its reliability would be about as good as that of, well, a home wi-fi network.

5G, on the other hand, was designed to be reliable for use with machines of all types, as well as to allow you to hear your mum properly when you phone her. It will hold up in busy urban environments and cope with objects moving at high speed, and it's expected to be a major enabler for allowing autonomous vehicles to interact with each other and other things.

The 5GCAR project, led by telecoms giant Ericsson, concluded last year having demonstrated, among other things, how 5G could help with synchronising the speed of vehicles merging onto motorways – something human drivers are often bad at.

Intelligent and autonomous 5G-based features will take time to roll out, so roadside cameras will be used to allow the systems to identify and track vehicles that aren't equipped with 5G and pass details of their speed, position and trajectory to those that are via a manoeuvre planning system. Other features trialled include a see-through function, where a car can receive data from the forward-facing cameras of those in front, giving its driver a real-time, unobstructed image of the road ahead.

Roadside sensors can also detect people walking out from a blindspot, such as a car waiting to turn right at traffic lights. The system can distinguish between a potential collision with a person and a non-critical situation, like a person who is on course but hasn't quite arrived in the danger zone yet.

All of this would involve a vast amount of data transfer, and that's where 5G also scores, because it's 100 times faster than 4G. There's still a long way to go but, after a long gestation, 5G rollout began in earnest last year and will hopefully keep up with evolving vehicle technology.

IT'LL DRIVE YOU LOOPY

Driving an alternator to charge a battery uses energy and fuel. But with smart charging, the alternator kicks in only when the car is decelerating so no fuel is wasted. Problem is, the alternator may be generating charge faster than the battery can accept it. To solve this issue, Mazda's i-Eloop set-up uses a capacitor to hoover up all the charge and feed it directly to the electrical system. The i-Eloop has been around for years, but it's now being used for the first time in the UK on the 1.5-litre MX-5.





Is wireless EV charging the future?

Convenience of induction pads may be the catalyst for a mass move to electric cars

Anyone who charges their phone in their car via a pad rather than a cable will know what a game-changer wireless electric vehicle charging will be. No plug, no cables, no interface.

The dream is for pads to be buried beneath where you park or just stop briefly: home, work, supermarkets, drive-throughs and even traffic lights.

"It has the potential to really make charging a non-event," said Dr Neale Kinnear, head of behavioural science at the UK's TRL research laboratory, which has overseen a range of EV charging trials.

Realisation of that dream is taking its time, however. The latest toe in the water is a government-backed trial, due to start in March, that involves

laying five pads outside Nottingham railway station to wirelessly charge 10 electric taxis (five LEVC TX black cabs and five Nissan e-NV200s) with retrofitted compatibility. The cabbies don't have to get out but just shuffle up the queue, continuing to charge at a rate of 11kW at the next pad along.

"If it works well and it's reliable, it would obviously be a very simple way to avoid having to plug vehicles into charge points," said Nottingham city councillor Sally Longford. "There would be less clutter on the street and it would be very convenient."

Induction charging is fairly simple. An oscillating magnetic field in the charge pad is picked up at the same frequency in the vehicle receiver, and that starts

the charging process. Those developing the technology, led by US-based Witricity, claim that it's both as safe and almost as efficient as plugging in, even when the receiver is attached to a higher-riding SUV.

The Nottingham taxis will be converted by UK electronics specialist Sprintpower, using technology from Witricity. The company is looking to carve a retrofitting business out of it, largely aimed at electric taxis.

CEO Richie Frost predicts private cars will follow. "It's not going to be as cheap as a cable, but if I had an electric sports car, I'd pay for that convenience," he said. He believes it could even change the design of electric cars: "This is an infrastructure story more than anything.



One-off electric Rolls from 2012 didn't need cables

When you've got opportunistic charging, range anxiety will disappear and actually batteries will get smaller."

Theoretically, it would reduce the need for rapid charging, too. Further into the future, it will also be a must-have for autonomous vehicles.

Right now, wireless charging

options are nil. BMW UK had planned to offer it on the 530e plug-in hybrid saloon back in 2018, but it reversed that decision and the current-generation battery doesn't support it. In Germany, it was a €3205 (£2700) option.

But it's coming. Frost reckons 90% of new global vehicle architectures will support wireless charging. For example, Volkswagen is understood to have engineered its MEB platform to support it. Rolls-Royce has long said that messing about with cables is way off-brand and so it won't sell an EV without wireless charging; this featured on the 102EX experimental electric Phantom from 2012. Concept cars, most recently the Lexus LF-30, often use the tech, too.

Volkswagen's EV platform supports induction charging



LEVC taxis are being used for a trial in Nottingham

BMW briefly offered wireless charging as an option in Germany



The problem is one of the chicken and the egg. Car makers don't want to engineer a system that won't be used, while charging pad providers aren't willing to offer the reciprocating technology if cars aren't being fitted with the capacity to use it.

"We don't see much movement from vehicle manufacturers, suggesting that it doesn't have much of a future for passenger cars," a BP Chargemaster representative said.

One solution is being offered by British firm Connected Kerb, which installs low-rise EV plug chargers that can be converted to wireless without much fuss if demand arises. It also piggybacks or deploys fast fibre networks delivering the internet. The company is installing its system in a new, 3500-home housing estate due to be built in south-west England. Rates are just 3-7kW for overnight charging, rather than rapid.

Connected Kerb's dream is wireless charging for the 40% of UK dwellings that don't have access to off-street parking.

That application is also in the mind of councillor Longford in Nottingham. "We can use plugs in lamp-posts," she said, "but ours are mainly at the back at

the pavement, which means a cable across the pavement. Pads would provide an option."

In one version of the wireless dream, EVs are charged while they're driving. A European trial called Fabric that ran between 2014 and 2017 investigated this at three test tracks and claimed partial success. Another, led by Renault and running from January this year until 2022, includes two 'dynamic' wireless charging experiments in France, one of them in Paris.

Whether static or dynamic, wireless charging is clearly the key to delivering on the promise that EVs offer a better consumer experience than the conventional alternative - something that's not at all convincing in the current world of cables, plugs and a fragmented charging network.

There's a long way to go, though, warns TRL's Kinnear. "The problem will always come down to the detail - who provides that infrastructure, who pays for the electricity and how to identify the vehicle and account holder," he said. "At the moment, no one quite knows the answer. But in the end, technology is moving to a solution that's easier than having to plug in."

NICK GIBBS

Dacia to sell LPG cars in Britain



LPG Sandero made a strong case for itself in our long-term test

DACIA IS FINALLY set to bring factory-fit LPG [liquid petroleum gas] versions of its cars to the UK after years of restricting the money-saving models to the Continent.

The so-called Eco G system will be available in the spring across its full UK range - the Sandero, Sandero Stepway, Logan MCV, Logan MCV Stepway and Duster - said a source close to parent firm Renault. The cars are set to cost about £400 more than the regular 1.0-litre three-cylinder petrol models on which they are based.

LPG is natural gas that's compressed into liquid form. Cars use more of it than petrol, but the overall CO₂ emitted is less and the cost per litre is around half.

There are currently some 1400 LPG filling stations in the UK, according to the Low Carbon Vehicle Partnership.

Dacia's models are dual-fuel, meaning they can run on both LPG and petrol. In France, the Duster Eco G is rated at 125g/km running on petrol or 111g/km on LPG.

The LPG tank is fitted in the boot but in the spare

wheel well, meaning luggage space isn't compromised.

Dacia expects the models to be a hit with both private and business buyers. They're likely to attract those looking for a low-cost alternative to diesel, which is increasingly being targeted by local authorities that need to clean up air quality.

Autocar ran a Dutch-registered, LPG-converted Sandero Stepway for six months during 2018, concluding that it was a worthy car for those who wanted low running costs.

FIRST DRIVES

NEW CARS TESTED AND RATED



TESTED 23.1.20, MIAMI, US ON SALE FEBRUARY PRICE £24,400

MINI ELECTRIC

A public test programme first kicked off in 2009 but only now is an electric-powered Mini finally here. Has it been worth the wait?



As anyone who has concluded that their next small car really ought to be a more environmentally sustainable one is about to discover, if they haven't already, this will definitely be a good year to buy an electric hatchback. A glut of slightly pricey but virtuously sustainable, all-electric hatches is about to emerge onto the UK market, as Volkswagen, Honda, Peugeot and Vauxhall all finally get around to becoming fully paid-up members of the zero-emissions club. Renault, Smart, Hyundai and Kia, meanwhile, have all busily refreshed and updated their runners and riders.

Most of these newbies are set to cost roughly the same amount of

money, of course, and most will be positioned in much the same way. Will the sudden rush in supply be met with an equivalent and lasting appetite to adopt? Suffice to say, the industry will be watching very closely. But if any one car maker in the incoming pack already has pedigree in making major commercial hay with a premium-priced small car, and might therefore be best placed to simply carry on doing it, it's probably the one we haven't mentioned yet: Mini.

BMW's most famous British export brand has proven time and again over the past two decades that it can find buyers for cars priced higher than the new Mini Electric – and that's without a public mood of social →



TESTER'S NOTE

The Mini Electric introduces a new digital instrument screen that is sure to be rolled out across the regular model range shortly. It's graphically simple but easy to read and combines well with the head-up display to give you all the crucial information you need. **MS**

“
The Mini Electric is as keen
with its handling responses
as any of its range-mates
”



Range isn't a selling point but the way this car goes, rides and handles may well be

← responsibility driving customers towards those cars in quite the same way that is about to benefit this new one. Rather than whether it will actually sell, then, the bigger question encircling the new Mini Electric might concern whether it is quite the usable modern EV you may be hoping for.

The Mini Electric is, after all, a three-door Mini. Its lithium ion drive battery does nothing more serious to impact on practicality than very marginally raising the height of the car's rear seat cushions – but you still wouldn't call this one of the more versatile or accommodating of EVs.

Under the bonnet, it adopts the same 181bhp, 199lb ft electric motor that powers the BMW i3s – except that it's powering the Mini's front axle, of course, rather than the BMW's rear one. The other mission-critical component of the car's powertrain may well be considered to be its main drive battery, which is T-shaped and fits under the back seats and along the transmission tunnel. It is as large as space allows within the Mini's chassis and has usable capacity of 28.9kWh.

That's not a particularly competitive figure, however, in a market in which both the Renault Zoe and Peugeot e-208 offer close to 50kWh. The Mini's engineers

claim that the need to meet global market homologation and safety regulations made it impossible to squeeze any more electrical storage into the car (both the Zoe and e-208 are predominantly European-market cars) but they also claim that all the market research suggests a WLTP range figure of 144 miles will meet the daily motoring needs of Mini owners with room to spare. Beneath the outward insistence, though, the acceptance that this is a key vulnerability for the Mini can perhaps be inferred from the car's

pricing. It's available from less than its opposite numbers from Peugeot, Vauxhall, Kia and Renault – an unfamiliar but not uninteresting position for any Mini to find itself in.

Away from the spec sheet and on roads around Miami, where the Mini Electric was introduced to the global press, that 144-mile range claim looked more like a real-world 125 miles on a good day, mostly in heavy and slowish traffic. On a quicker, chillier UK motorway commute, I suspect you'd be pleased to get 100 miles between charges.

And purely in light of the fact that you can have a similarly sized rival for similar money that will go 50% further between charges – and also needn't spend that much more for a genuine 250- to 300-mile electric car – this will be a problem for a certain rationally minded buyer.

Less dispassionate customers ought to be open to persuasion by the car's driving experience, though. Partly due to that relatively lightweight drive battery, the Mini Electric has a power-to-weight ratio of better than 130bhp per tonne, whereas neither the quickest Zoe nor the e-208 gets much beyond 90 and a Kia Soul EV – which is itself a pretty fleet-feeling car – doesn't top 120.

Having driven the Mini mostly in heavy congestion, where it was seldom possible to get it above 60mph, I'm not convinced it feels like a car with a strong performance selling point, at least over other comparable EVs – but it's certainly no slouch. Like all cars of its kind, it's at its most brisk from rest up to around 50mph, where it has plenty of urgent response to bigger pedal inputs, albeit not quite as much instant torque as some.

There's enough grunt available above 50mph for the car to easily mix it with quicker-moving traffic, though, and there is fun to be had in



Diehard Mini fans might spot the rear seats are slightly higher to house the battery



It still looks very much like a Mini and the driving experience feels decidedly Mini, too

digging into the accelerator pedal and feeling the car whizz away so keenly, and with such little apparent inertia. It's something of a shame that Mini hasn't engineered in some more genuinely mechanical motor noise for extra audible charm because, as it is, the only notable sound that the car makes is that generic low-speed digital whirr that all EVs sold in the EU must now emit for pedestrian safety reasons. Even that could have been more imaginatively conceived.

The additional mass that the car carries (and it's less than 150kg

compared with a Cooper S auto three-door, which could be worse) helps to lower its centre of gravity by 30mm (versus the same sibling rival), and really didn't blunt the Mini's flat, agile and immediate handling appeal – as much, regrettably, as it could be assessed on our busy city test drive.

The Mini Electric has strongish lateral grip levels and is as keen with its handling responses as any of its range-mates. On better roads than we had on which to enjoy it, I dare say it would be plenty of fun. It also clearly doesn't rely on low-rolling-

resistance tyres to boost its electric range and has that unmistakably impish Mini-brand dynamism to bolster its driving appeal. It doesn't feel particularly heavy to drive, either. If anything, the extra mass it carries seems to dampen and flatten the low-speed ride better than Mini's prevailing comfort standard, and to quite agreeable effect.

Exactly where all that leaves this desirable, energetic and engaging car, which has some equally apparent limitations on everyday, any-occasion usability, will require

closer inspection to be sure about – but my hunch is that it'll bring a bit of much-needed complexity, or light and shade, to the developing EV scene, and a bit of genuine and very welcome choice. The Mini Electric clearly won't be the most rounded, practical or usable option in what promises to be a mercurial market segment this year but, on this evidence, it will drive like a Mini – and it'll be ready to put an extra dose of fun into the zero-emissions class.

MATT SAUNDERS

@thedarkstormy1

MINI ELECTRIC

Won't break records on range or usability but has plenty of brand-typical energy and driver appeal



Price	£24,400 (after gov't grant)
Engine	Hybrid synchronous electric motor
Power	181bhp at 7000rpm
Torque	199lb ft at 100-1000rpm
Gearbox	Single speed, direct drive
Kerb weight	1365kg
0-62mph	7.3sec
Top speed	93mph (governed)
Economy	3.69-4.18mpkWh
Range	144 miles (WLTP)
RIVALS	Honda E, Renault Zoe



Hybrid synchronous motor from the BMW i3 drives those distinctive front wheels





TESTED 30.1.20, AZORES ON SALE JULY PRICE £37,000 (EST)

AUDI S3

In part-camo prototype form, this latest premium hot hatch sticks to its familiar strengths. But does it push things forward?



It's a formula as well known as $E=mc^2$: a compact car offering practicality, refinement, comfort and a healthy dose of 'premium' cachet. If you're not thinking Volkswagen Golf, the very obvious answer is the Audi A3. But despite us seeing a new Golf, and very recently a new Seat Leon (on the same Volkswagen Group platform, of course), we haven't seen much of the new A3 – until now. Unusually, our first experience of Audi's latest family hatchback is of the hot hatch variety; the latest S3, driven in prototype form in the Azores.

Now, even in the third-generation A3's old age (apparently this new car was delayed due to Audi prioritising development of its electric E-tron models), it holds its own on the battlefield of the premium hatchbacks. Versus the BMW 1 Series and Mercedes A-Class, there's been little between

them on driving merit or sales volume. Come Geneva motor show, just weeks away, the fourth-generation A3 will arrive, and Audi is hoping, where they were neck-and-neck before, the model might finally be able to accelerate away from its German rivals.

So successful is the A3 that, by 2022, 11 derivatives are expected, including the A3 saloon, perfect for young execs and the Chinese market, and a liftback variant. The handsome three-door, ditched in 2017, won't make a comeback, though. What will be returning, however, is the S3 that we're getting our first taste of here.

Few flourishing compact cars exist without performance versions for the halo effect, and the A3 is no exception. The S3 effectively kicked off a new premium hot hatch class 20 years ago, when more mainstream brands led the market →

← (Peugeot 306 GTi, Citroën Saxo VTR, Renault Clio Williams et al). Many others have followed: not only is there some serious competition within the walls of the Volkswagen Group (the Golf R, for starters) but also from the new all-wheel-drive BMW M135i, the Mercedes-AMG A35 and even from less premium but well-respected foes such as the Hyundai i30 N.

So why do we start with the S3 rather than any other variant of the A3? And why the Azores? Well, a quattro-equipped S3 prototype on an island famous for the Azores Rally just sounds like a good combination, doesn't it?

On paper at least, the S3 seems

suspiciously similar to the outgoing model. It uses the same MQB platform, shared with the Golf R, the same 2.0-litre four-cylinder petrol engine delivering the same 306bhp and 295lb ft of torque. Normally, we'd expect power to increase for such models but Audi, just like every other car maker, has been battling with the complexities of emissions regulations and the knock-on effect that has to engineering gains.

Since this is only a prototype, Audi is keeping schtum on specifications including a 0-62mph time, but it's safe to say it won't be more than the outgoing model's 4.7sec. Behind the wheel, that certainly feels the case: it's the sort of straight-line

performance that feels generous and well-placed for a hot hatch without being absolutely ridiculous – something the RS3 will no doubt cover off when it arrives...

There are four areas that Audi is keen to push during our prototype drive: quattro four-wheel drive, progressive steering, damper technology and Audi's select mode. That's because these four features are not only found on the S3 but are options across much of the upcoming A3 range.

The thing is, the S3 had all those features previously, so what's actually new? Importantly, says engineer Sebastien Straasser, the way the technology all works together.

"We now have a central dynamic control for systems including the dampers, quattro all-wheel drive and torque vectoring by braking. Now they all have the same information. For example, they will all know if the car is understeering and all act the same to counter it. When they were decentralised, one didn't know what the other was doing."

By doing this, plus a new damper system (see story below) and some other minor tweaks, Audi hopes to achieve this goal. "We wanted to improve driving dynamics to make it more agile, as well as having predictable driving behaviour. We also wanted to achieve a wider spread between comfort and dynamism.



TESTER'S NOTE

The S3's big brother, the RS3, will arrive later this year and is set to use the same 2.5-litre five-cylinder unit as its predecessor, sharing its 394bhp with the recently launched RS Q3. **RB**



Performance hits the brief, harnessed by a central dynamic control system

SPY SHOT



Previous spy shots have shown an absence of buttons

AUDI DRAWN TO TRADITIONAL APPROACH

Since the current-generation S3 was refreshed four years ago, the model has offered Magnetic Ride, a damper set-up used for Audi's more focused sports cars, the TT and R8. For this new S3, Audi has ditched Magnetic Ride, and instead further developed more traditional hydraulic dampers.

Vehicle development project manager Haiko Wetter explains: "Magnetic Ride in the last S3 was perhaps a little bit too sporty for this model. It should also be a car

for families and long journeys. We decided to do adaptive hydraulic dampers which give a wider breadth between comfort and dynamism."

The Magnetic Ride dampers do react slightly quicker than the new S3's but that's a pay-off Audi is willing to make for greater scope in the hot hatch's dynamic abilities.





“
This is a mature hot hatch, one not looking just for cheap thrills but also everyday usability
”

Prototype S3 proved well suited to winding roads of the Azores

And, finally, to improve efficiency without any impact on dynamism,” says Straasser. Some might say they want the moon on a stick...

Stepping inside the S3, it's instantly easy to become accustomed to its manner and that stays true whatever one throws at it. The charm of hot hatches, for this writer at least (and hopefully for many a wise Autocar reader), is how quickly they are your friend: fun on the road but without a supercar's intimidation.

That couldn't ring more true than with the S3, given its ability to make one feel safe and cosseted while allowing you to push the limits on windy mountain roads, as are found in the Azores. Of course, that predictability isn't for everyone. For

those who want to live life on the edge, you'd be likely to find more satisfaction in a Honda Civic Type R or Hyundai i30 N.

There's appeal, nonetheless, in the well-roundedness of this S3 prototype, which we're told is “very close” to the production car. The progressive steering – which hasn't had any dramatic makeovers from its predecessor except to improve feedback – makes inputs effortless. Turn the wheel to a slight angle to hug a tight bend, and there's rarely need for correction. Of the three steering modes, ‘Balanced’ is our favourite even on proper driving roads. ‘Dynamic’ mode veers towards the artificial whereas ‘Balanced’ is nicely weighted off centre.

The S3's ride and refinement has always been a strong point, and this new S3 doesn't let the side down. The Azores has some unexpected, long patches of cobbled streets, and in ‘Comfort’ suspension mode, the S3 positively soaked them up. Even in ‘Dynamic’, it wasn't nearly as bad as expected.

The unchanged 2.0-litre petrol powertrain, paired with a paddle-shift seven-speed dual-clutch 'box (a manual is not available) does the job nicely. And it's hard to believe the S3 will make it to the next generation without an electrified powertrain, so it's worth enjoying this pure turbo while it's possible.

For now, pictures of the interior are forbidden until the A3 is revealed at

Geneva. Spoiler: it's still as premium as you'd expect of an Audi but has fewer physical buttons. No surprises there, then. ‘S’ nods will be limited to a badge here and there and sports seats, while outside, there's a more pronounced grille, bigger front and side skirts and some rumoured bespoke headlights.

The conclusion, then, might be as predictable as the car itself. This is a mature hot hatch (as it always was), one not looking just for cheap thrills but also everyday usability and comfort. It might not excite its owners in the way more raucous rivals will, but it's still very deserving of its place at the top table.

RACHEL BURGESS

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Island cobbles didn't trouble the S3, even in ‘Dynamic’ mode



AUDI S3

Much like the outgoing S3, but better by 5%. The grown-up hot hatch option: avoid if you like a Civic Type R

Price	£37,000 (est)
Engine	4 cyls, 1984cc, turbocharged, petrol
Power	306bhp
Torque	295lb ft
Gearbox	7-spd dual-clutch automatic
Kerb weight	tbc
0-62mph	4.7sec (est)
Top speed	155mph (est)
Economy	WLTP figures tbc
CO₂, tax band	WLTP figures tbc
RIVALS	Volkswagen Golf R, BMW M135i, Mercedes-AMG A35



TESTED PORTUGAL ON SALE MARCH PRICE €37,255

BMW M235i GRAN COUPE

With a front-wheel-drive platform and four-cylinder propulsion, is this all-new four-door 2 Series worthy of its M badges?



There's an M badge on the back and a suitably weighty number next to it, yet the new M235i Gran Coupé isn't what could be termed a traditionalist's choice. Like the M135i hot hatch, it's based on BMW's natively front-driven FAAR architecture, with power coming from a four-cylinder engine in place of the sonorous straight six that still propels the M240i Coupé. That means lifting the bonnet of this four-door 2 Series reveals the incongruous sight of a short engine sitting across the bay and mounted entirely ahead of the front axle line.

This is a detail that will offend some people, possibly to the point of rage, but it'd be unfair to turn this first review into an ethical inquisition into the company's bold new direction. After all, Mercedes has been making AMG versions of its similar-deal CLA coupé-saloon since 2013, with the recently launched CLA 35 being the M235i's most obvious competitor. Both make slightly more than

300bhp from a heavily boosted 2.0-litre four-cylinder engine and send drive to each corner through a part-time four-wheel drive system. Performance is identical on paper, with both manufacturers claiming a 0-62mph time of 4.9sec and a top speed electronically limited to 155mph. But given our recent disappointment with the way the CLA 35 drives, there seems to be a poorly defended goal here.

While the M135i replaced a rear-driven model, the 2 Series Gran Coupé is entering a new area of the market – one that BMW executives admit they couldn't consider entering by building on the old platform, due to the constraints inherent in packaging an inline engine and gearbox.

Like most coupé-saloons, the 2 Series is designed to appeal more to Asian and American buyers than Europeans, a reality reflected in a chassis tune slightly softer than that of the M135i.

While styling is an especially subjective subject in this part of →



Impressive interior is largely copied from the 1 Series



TESTER'S NOTE

While most interior materials impress, the plasticky gear selector feels below par, with an insubstantial shape and too light an action. That's not really suitable for something wearing M badges. **MD**

← the market, it's fair to say that the Gran Coupé's design struggles to deliver grandeur within its compact dimensions. The 2670mm wheelbase is identical to that of the 1 Series, as is the jowly front overhang, with the 207mm increase in length going almost entirely into the boot. The result is a car that doesn't look quite long enough in the middle, an impression exacerbated by the heavily raked roofline. The rear lights also seem to have been designed for a considerably larger vehicle.

The interior is better. The Gran

Coupé shares the 1 Series' dashboard and most of its cabin architecture, and the materials feel suitably plush for this segment, with lots of switchgear and componentry familiar from higher up in the BMW range. An 8.8in infotainment touchscreen is standard, as is comprehensive talk-to-anything connectivity. The M235i also gets the Live Cockpit digital instrument pack as standard, as well as semi-bucket seats and Alcantara trim.

Front seat and steering wheel adjustment is generous, and although

the rear is short on head room, due to the low roofline, space is sufficient for children and smaller adults. It's fair to say that nobody shopping in this dinky segment is likely to be expecting more. The 430-litre boot is also respectably large, although access through the tailgate hatch is a little tight.

Starting the engine produces a promising fusillade of pops and crackles, but this turns out to be about the most exciting noise the new powerplant makes. It would have been nearly impossible to replicate the sonorous charms of the old six-cylinder M140i, and BMW hasn't really tried to: the engine makes plenty of muscular sounds, some of which are digitally synthesised. Higher revs make it louder but not more melodious.

There's no arguing with the effectiveness of this downsized engine, though. Its peak torque output of 332lb ft is fully present from just 1750rpm, with the quick-thinking automatic gearbox shifting intelligently and seamlessly to wake up the engine when required.

There is some lag below about 2000rpm, but the only way to find it is by manually selecting too high a gear in manual mode. Performance feels at least as strong as the official numbers suggest; the engine pulls cleanly to its 6600rpm limiter with

no sense of reluctance at the top end.

Rainy conditions in Portugal also gave the M235i a chance to prove its ability to generate impressive levels of traction on damp mountain roads. The four-wheel drive system uses an electromechanical clutch pack on the rear axle that can engage much quicker than a viscous coupling. It also gets an understeer-fighting ARB slip limitation system based on the one used in the i3 electric car (see panel). So although the M235i can run as a pure front-driver, and frequently does to reduce mechanical losses and boost consumption, it proved almost impossible to catch out, even on tight, slippery corners.

The xDrive system works well to find grip – a point made by just how hard a front-driven 220d diesel had to battle to put its power down on the same roads. But it can only do so much; just 50% of available effort can head backwards, and it reaches the rear wheels through an open differential incapable of torque biasing. Once the M235i has been powered to the edge of breakaway, then, it doesn't have any tricks left in the bag beyond tightening its line on a lifted throttle. So while it actually resists low-speed understeer better than its rear-driven namesakes, it lacks their ability to go and play in the hinterland between grip and slip.

The steering is a highlight, with



Design of the 2 Series Gran Coupé appears rather awkward from any angle

“
 Don't laugh too hard, but a fully switched-up M235i on a wet, twisty road had me recalling the Lancer Evo
 ”



Optional adaptive dampers yield a decent ride, even in firmer Sport mode

better weight and communication than many of BMW's punchier rear-drivers and suffering minimal corruption from the torque passing through the front axle. Responses are keen, but the M235i feels deliberately less front-led than a hot hatch would; FAAR chassis boss Bernhard van der Meer says that matching the response rates between the front and rear axles was a key objective.

The brakes are impressive, too, doing without an electric servo but getting extra-narrow four-pot calipers that allow the largest

possible discs to be squeezed behind the standard 18in alloy wheels.

While suspension settings have been softened from the M135i, the Gran Coupé still feels well lashed-down. Our test car was sitting on adaptive dampers – set to be a £500 option in the UK – that feel pliant in their Comfort mode and don't turn harsh in Sport mode. On a stretch of Portuguese motorway, there was a noticeable amount of vertical movement over ridges and expansion joints in the firmer setting, but Comfort turned everything down.

The passive damper tune is closer to Sport, according to van der Meer.

Don't laugh too hard, but a twisty wet road in a fully switched-up M235i had me recalling the Mitsubishi Lancer Evolution. The engine doesn't have the same boosty power delivery and refinement is off-the-scale better, but the way the BMW turns in and locks onto a cornering line is definitely familiar. This certainly isn't an association I was imagining making before driving the car.

Changing tastes the world over make the 2 Series Gran Coupé an

entirely rational product. BMW's assertion that the majority of buyers won't even realise it's natively front-driven, let alone care about it, is likely to grate with enthusiasts but reflects the truth that got this project signed off. Also the paradox: we might have preferred it with six-cylinder power and rear-wheel drive, but then it wouldn't have been built. With BMW planning to continue with rear-wheel drive for the next-generation 2 Series Coupé and M2 (see p6), the lesson here is probably to live and let live.

MIKE DUFF

KEIN UNTERSTEER THANKS TO ARB

BMW's near-actuator wheel slip limitation system (which emerges from German as ARB) will be fitted as standard to all 2 Series Gran Coupé variants to limit understeer and improve traction. Most cars limit wheelspin through their electronic stability control systems when excess speed is detected, with the system calculating a target engine torque and passing on this instruction to the ECU. ARB was originally developed for the i3, because the much higher reaction speed of an electric motor required a quicker-acting system. The slip controller is now integrated directly into the engine controller, removing the intermediate stages and improving response time by 300%. Although designed primarily for front-wheel-drive cars, ARB is cited as one of the reasons for the M235i's impressively disciplined front end.



The M235i uses the same 'B48A20' engine as the M135i and Mini JCW GP



BMW M235i xDRIVE GRAN COUPÉ

Behind the strange exterior design of the four-door 2 Series is a well-engineered car, if a confusing one

★★★★☆

Price	£37,255
Engine	4 cyls, 1998cc, turbocharged, petrol
Power	302bhp at 6250rpm
Torque	332lb ft at 1750-5000rpm
Gearbox	8-spd automatic
Kerb weight	1570kg
0-62mph	4.9sec
Top speed	155mph (governed)
Economy	36.2-37.2mpg
CO₂, tax band	153-162g/km, 35-37%
RIVALS	Mercedes-AMG CLA 35, Audi S3 Saloon



TESTED 1.2.20, PORTUGAL ON SALE NOW PRICE €97,280

JAGUAR F-TYPE

Thoroughly revamped two-seat sports car arrives in range-topping all-wheel-drive V8 guise with 567bhp and 516lb ft

When Jaguar launched the original F-Type in 2013, the hype that surrounded its arrival was palpable. Why wouldn't it be? Here was one of Britain's most revered sports car marques launching what was, well, its first bona fide two-seat sports car in what felt like forever.

This was no mere replacement for the long-standing XK; the F-Type signified something much bigger than that. Not only did Jaguar know that its name would explicitly mark it out as a spiritual successor to Sir William Lyons's legendary E-Type, but it was also the car with which it would very successfully, and with a healthy dose of supercharged British attitude, take the fight to the likes of Porsche and its formidable 911.

Fast forward to 2020 and it's

tricky to shake the feeling that the excitement that frames the arrival of a driver's car such as the F-Type has morphed into something a degree more cautious and reserved. This shift has nothing to do with the ability of this new, heavily facelifted model in particular, however; it's more a product of the wider context in which cars of its ilk now exist.

A few hours before I sat down to write this, news of the government's intention to bring forward the 2040 ban on the sale of new petrol, diesel and hybrid cars first broke. We could now be looking at a 2035 cut-off point – and potentially sooner if the powers that be see fit to tax the internal combustion engine so severely that it's no longer a financially viable option. →



Either way, it's becoming increasingly apparent that cars like the F-Type are on borrowed time. And while environmental concerns might mean such moves are a necessary evil, the fact remains that their demise will be a sad eventuality for petrolheads the world over. At the same time, however, it makes the process of examining this latest F-Type's technical specifications that much more of a ritual to be savoured.

Admittedly the entry-level 296bhp 2.0-litre four-pot model isn't the most exotic starting point, and the coupé's £54,060 price tag (the convertible is some £5500 more) does put it in direct competition with the excellent BMW M2 Competition, Alpine A110 and Porsche's faster 718 models. Nevertheless, the significance of the four-cylinder F-Type should not be underestimated: its immense popularity with customers and comparatively lower emissions helped Jaguar justify the continuation of its rather more unhinged eight-cylinder models – of which there are now two.

The first makes use of a 444bhp, 428lb ft version of the marque's tremendous supercharged 5.0-litre V8. This £69,990 model in effect replaces the old supercharged V6 in European line-ups, although it's worth pointing out that this is still offered in the US. Like the four-pot, the 'P450' V8 is available in both



P575 F-Type R boasts all-wheel drive and the old SVR's engine outputs

coupé and convertible guises, but where the lower-powered model is exclusively rear-driven, this V8 can be bought with all-wheel drive as an option. Talk to Jaguar's engineers, however, and they'll tell you it's the rear-driven, 444bhp coupé that's the new sweet spot of the range.

That may well be true but, until we get the chance to have a go, we'll have to take them at their word. Our test car for the duration of our time in sunny Portugal was the other V8: the range-topping all-wheel-drive-only 'P575' F-Type R. You can expect to pay £97,280 for the coupé and £102,370 for the rag-top.

Admittedly that's quite a lot of

money, but you get the sense that Jaguar has really gone to town on this car's development. In addition to the 567bhp and 516lb ft you get from its engine (the same as the old F-Type SVR), Jaguar has completely recalibrated its electronically assisted power steering, while its eight-speed ZF transmission has been tweaked using lessons learned during the development of the XE SV Project 8. Its suspension has also been overhauled (see separate story, right), while its 265/35 front and 305/30 rear Pirelli P Zeros are specially developed and are now 10mm wider than before.

The upshot of all this is an



F-Type with explosive straight-line performance and sports car-like handling and stability, but with a smaller dose of long-legged GT usability thrown in for good measure. It rides impressively well, too, at once feeling more pliant and more forgiving than a similarly priced 992 Carrera 4S.

That said, a few corners are all that are required to learn that the Jaguar lacks the abundant balance and handling purity of the Porsche. But so intoxicating is the F-Type's demeanour that you hardly feel like you're missing out.

Its steering is beautifully weighted and impressively intuitive, with



TESTER'S NOTE

The F-Type R can be optioned with beefier 'Carbon-Ceramic Matrix' brakes, but you'll have to pick the £7705 Carbon Ceramic Brake Pack to get 'em. They make for a 21kg reduction in unsprung mass. **SD**

“
The result is a huge amount of confidence during hard charges up and down mountain roads
”



Revised suspension has tamed the F-Type R's rear-end liveliness to some degree



Seats are supportive but the infotainment interface leaves something to be desired

a quickened off-centre response prompting suitably agile movements from the front end. With the adaptive dampers firmed up there is admittedly some body roll as you guide its 1743kg mass through corners, but the rate at which this arrives feels entirely natural and impressively controlled. Coupled with its immense all-paw traction, the result for the driver is simply a huge amount of confidence during hard charges up and down technical mountain roads. That's not to say it comes over all sterile, mind. You can feel the rear end eagerly twitching and shimmying as you lean on the power on the way out of bends.

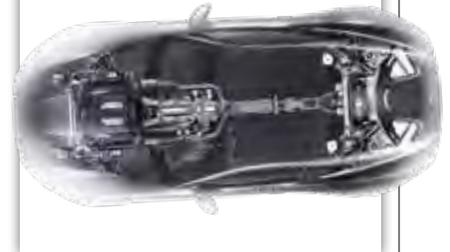
Which you will be doing rather a lot, given what's under the bonnet.

The performance and thunderous character of that 5.0-litre supercharged V8 is what defines a drive in the F-Type – although not to such an extent that it casts an uncomfortably long shadow over the way it rides and handles. Throttle response is immediate and, although it doesn't start pulling in earnest until about 3000rpm, the linearity of its acceleration and the volcanic soundtrack combine to make the F-Type R feel every bit as fast as its 3.7sec 0-62mph time suggests.

Full-throttle upshifts deliver a forceful kick to the base of your

spine, while the transmission's gearing is well judged for quick road driving: you'll be doing roughly 65mph by the time you hit the top of second. Adopt a more relaxed driving style and it swaps ratios with impressive efficiency.

The general layout of the cabin hasn't changed a great deal but ergonomically it still works a treat. The leather upholstery is nice and the seats are supportive, but it's a little way off the new 911 for outright sophistication. Meanwhile, the new 12.3in digital instrument binnacle is clear and easy to read if a little visually underwhelming, while the updated 10in touchscreen



infotainment system now features Apple CarPlay and Android Auto as standard. You'll use this a lot, as Jag's operating system is, comparatively speaking, still a bit rubbish.

Nevertheless, the F-Type R remains a thoroughly likeable, deeply exciting car – even if it doesn't look quite as good as it did before. And while it might not be as technically capable or as pure in its responses as the 992, so potent is its thuggish but charming sense of V8 character that it'd be the car I'd have. Call me a philistine, but they won't be making them like this for much longer.

SIMON DAVIS

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



It's agile and has great traction, but the thunderous V8 dominates the drive



JAGUAR F-TYPE P575 AWD R COUPE

Loud, raucous and hugely endearing. Not quite as sharp as a 911, but arguably more enjoyable to live with



Price	£97,280
Engine	V8, 5000cc, supercharged, petrol
Power	567bhp at 6500rpm
Torque	516lb ft at 3500-5000rpm
Gearbox	8-spd automatic
Kerb weight	1743kg
0-62mph	3.7sec
Top speed	186mph
Economy	26.4mpg
CO₂, tax band	WLTP figures tbc, 37%
RIVALS	Porsche 911 Carrera 4S, Aston Martin Vantage



TESTER'S NOTE

The two-seat rear bench folds but not in a split. Boot space increases to 861 litres, measured to the roof, when it's down. **MP**



TESTED 20.1.20, SPAIN ON SALE JUNE

HONDA E

Cute little electric car has been designed with tech-savvy urbanites in mind

A theme common to many electric cars is that their weight and architecture lead to them feeling lead-footed and brittle.

The Honda E has circumnavigated that issue. So, whatever else comes of this sub-supermini hatchback, attractive but not quite as pretty as the concept that preceded it, one of its plus points will be the way it drives.

Its new platform provides all-round independent suspension with a MacPherson strut at each corner; dynamically, Honda has targeted much larger cars. For rolling comfort, smoothness and refinement, the E succeeds where others have not.

There is a catch, of course. This is a compact car – 3.9m long – that can be so only because it has a small energy store. While almost every manufacturer strives to fit a capacity of 60kWh or more (the Nissan Leaf e+ has 62kWh), the E has a liquid-cooled battery pack of just 35.5kWh between its axles. Resulting range, in 151bhp form, is a WLTP-certified

125 miles on 17in wheels or 137 miles on 16in wheels. And on our cold test day, it managed even less than that.

The E comes in two flavours: the regular 134bhp model and the 151bhp Advance tested here, which respectively cost a not-insignificant £26,160 and £28,660 after the plug-in grant. Both can be slow-charged

at a rate of up to 6.6kW or DC rapid-charged at up to 100kW, although a 50kW fill will be almost as quick – 31 minutes from 0-80%, rather than 30. It's like flying from Birmingham to Newcastle: no sooner than you're up to speed, it's time to wind down again.

The E's motor is at its rear, beneath

a high boot floor, but any space that might have remained under the bonnet is taken up by an inverter and associated gubbins. This leaves the car short on space inside. Boot capacity is just 171 litres with the rear bench in place, while the back seats themselves don't give much leg room (there will be some leg-splaying for



Trio of camera-fed digital monitors supplant traditional mirrors





The E leads the way among small electric cars in terms of ride comfort and rolling refinement



“
It's not sporty
but sophisticated,
controlled and relaxed
”

All-round visibility is hard to fault, while the steering is perfect for urban driving

adult passengers) and the pair in the front are short of squab.

On the upside, all four seats, along with the rest of the trim, are really nicely finished. I'd happily have a waistcoat made from the tweedy-looking seat fabric, while there's some wood trim across a relatively flat dashboard that features a mix of retro-styled flatness and a broad array of digital screens.

Connectivity is one of the E's strong suits, says Honda. The thing is, how much do you need? There are two 12in screens in the centre and it's possible to 'pass' displays between them – if the driver wants to throw the sat-nav across for the front passenger to type in an address, say. But the resolution is fuzzy around the edges and there's smartphone mirroring, which is the most likely thing anyone will use anyway.

You can hook up a games console to the HDMI input if you want, plus there's a 240V power socket. You can even have a virtual aquarium to stare at while you're parked – which would probably have been more useful in

the 1970s, when leaving kids outside the pub with a packet of crisps and a bottle of Coke was a thing.

Bordering these twin touchscreens and the digital instrument display are monitors in place of door mirrors. The small external cameras create less drag than mirror housings and the siting of the monitors is sensible. Finally, it's a mirrorless system that works properly; the lenses didn't attract any grime during our day of lousy weather and the view was always clear, even in dim conditions.

Once you're used to these monitors, they contribute to an easy driving experience. Visibility is great and the progression of the controls, throttle and brakes is extremely smooth. Plus, the push of a button activates a one-pedal driving mode, wherein throttle-off retardation is increased.

Combined with slick medium-speed steering and a tight turning circle of 8.6 metres between kerbs, these qualities make the E a very good city car. On more open roads, its kerb weight of 1514kg (loads for a petrol small car but not for an EV)

allows it to be gently sprung while retaining good body control. With 50/50 weight distribution, too, it's a really pleasingly balanced small car – not sporty but sophisticated, controlled and relaxed. Performance is moderate (0-62mph takes 8.3sec) but, with 232lb ft of torque available from rest, take-off feels, as is the EV way, much brisker than that.

Places where you stop and start frequently are where Honda reckons the E will find buyers: it's not for you if you want to go far, it admits. Most of the 200 UK deposits it has taken are from Greater London, where the ambitious asking price and limited range are presumably less of an issue.

Think of it as a smartphone rather than a tablet, says Honda, seemingly acknowledging that this is a car bought more with the heart than head. That's understandable, but it is a niche groove – easy to like but harder to recommend. If it had been made easier to recommend, though, maybe it would be harder to like.

MATT PRIOR
@matty_prior



HONDA E ADVANCE

An eminently likeable and capable small car with good dynamics but a limited range and an ambitious price

★★★★☆

Price	£28,660 (after gov't grant)
Engine	Electric motor
Power	151bhp
Torque	232lb ft
Gearbox	Single-speed automatic
Kerb weight	1514kg
0-62mph	8.3sec
Top speed	90mph
Range	137 miles (WLTP)
CO₂, tax band	0g/km, 0%
RIVALS	Nissan Leaf, Renault Zoe



TESTER'S NOTE

Initially, all cars will be manual, but the optional seven-speed PDK automatic is expected to arrive in late 2020. **JD**



TESTED 7.1.20, ESTORIL, PORTUGAL ON SALE APRIL

PORSCHE 718 BOXSTER GTS

Volume-produced roadster gets six of the best - and without a turbocharger in sight

Ah, that's better. Simply turning the key in the ignition is all it takes to confirm that the new Porsche 718 Boxster GTS is already on the right track. In place of a chuntering, sub-Subaru soundtrack, there's now real mechanical musicality, the engine sited just over your shoulder once again emitting a familiar hollow bark as it fires into life. That's right: a naturally aspirated flat six has returned to mainstream versions of the firm's mid-engined roadster.

Porsche won't admit that its four-cylinder philosophy has failed (turbocharged fours remain in the standard, S and T versions) but, having developed a bespoke flat-six engine for the Motorsport division's Boxster Spyder and Cayman GT4, it seemed, well, a shame to restrict its use. So now we have that 4.0-litre in the Boxster GTS and Cayman GTS, the models that have traditionally straddled the line between hardcore driving fun and everyday usability to brilliant effect. We drove a

Boxster on the road and the results were pretty special.

But first, that engine. This isn't some diminished version of the Motorsport engine but exactly the same unit. The rev limit has been lowered to 7800rpm and maximum power of 395bhp (19bhp less than the GT4) is delivered 800rpm earlier, but that's about it. It delivers an identical 310lb ft at 5000rpm and exhales through the same twin-exit exhaust system. Even the six-speed manual gearbox is the unchanged.

On the move, it's an absolute joy. Not only does it sound fantastic as it yelps and howls its way energetically to 7000rpm, but it also punches hard, with much of the torque available from just above idle. And the throttle response is spot on, each twitch of your toe resulting in a precisely proportional increase in acceleration. The gearshift is beautifully weighted and precise, too. In the real world, the GTS feels every bit as quick as the Spyder, as evidenced by a 0-62mph time that's just a tenth slower.

There's less carried over in the chassis. The GTS goes without rose joints and some stiffening components and its less steamroller-section rubber (235 front and 265 rear) results in a fractionally narrower track. It also has smaller brakes: 350mm front discs versus 380mm for the Motorsport car. What remains are the active engine mounts, adaptive dampers and torque-vectoring limited-slip diff.

With less aggressive damping, the GTS breathes more easily with the road than a GT4 and the subtle increase in softness means that what you lose in ultimate sharpness you gain in an ability to more confidently work up to and over the limit of grip and exploit that perfect natural balance. And because all-out adhesion is a little lower, you can more frequently use that glorious motor's muscle to subtly alter your line with the throttle.

The steering is excellent, too. It's not scalpel sharp, but it allows you to load up the suspension precisely

and it's chatty enough to let you know what's going on without becoming a distraction. Even the smaller brakes are exceptional. And like all Boxster models, the shell is stiff, pretty much matching the Cayman for rigidity.

However, what the GTS does really well is to combine this near-Spyder performance and handling virtuosity with an easy-going everyday mien. The more rounded damping means a more forgiving ride, while the narrower tyres and softer bushing eradicate the Spyder's occasional games of hunt the camber. The interior is more comfortable, too. But the real kicker is that the GTS versions of the Cayman and Boxster cost a healthy £10,000 less than their hardcore siblings.

JAMES DISDALE
@jamesdisdale

PORSCHE 718 BOXSTER GTS

Its flat six and blend of thrills with daily habitability mean this could be the sports car bargain of the decade



Price	£65,949
Engine	6 cyls, 3995cc, petrol
Power	395bhp at 7000rpm
Torque	310lb ft at 5000-6000rpm
Gearbox	6-spd manual
Kerb weight	1405kg
0-62mph	4.5sec
Top speed	182mph
Economy	25.9mpg
CO ₂ , tax band	246g/km, 37%
RIVALS	Alpine A110 S, Jaguar F-Type P300, Lotus Exige Sport 350



Seats and long roster of standard kit enhance cabin comfort but the driving experience leaves the biggest impression

**TESTER'S NOTE**

Go for the optional air suspension package and the drop in ride height over other Macans is reduced to 10mm. **JD**



TESTED 4.2.20, ESTORIL, PORTUGAL ON SALE NOW

PORSCHE MACAN GTS

Sharper than a regular Macan, cheaper than the Turbo: is this the ideal model?

Porsche's GTS models have arguably represented the sweet spot in the range for quite some time now. Infusing a little of the Motorsport-themed GT cars' hard edge with a generous smothering of everyday usability, these machines are compromised, but in a good way. So it's fair to expect that the new Macan GTS will be the pick of the sporty SUV bunch.

As with its predecessor (and all GTS models, frankly), the formula is fairly simple: the Macan gets a more focused suspension set-up, a bit more power and some natty visual additions. And as ever with these models, the changes add up to a little more than the sum of their parts.

As before, the chassis is treated to a 15mm drop over the standard car, making the GTS the lowest model in the Macan range. This reduced ride height is combined with recalibrated adaptive dampers, tuned and tweaked for even greater control when pressing on. There are also bespoke RS Spyder Design 20in wheels, which cover brakes now clamped by bright red calipers. In

addition, our test car was sprinkled with a few choice dynamic options, such as the trick PTV torque-vectoring rear differential.

The biggest change is reserved for the engine, with the old car's 3.0-litre V6 being ditched in favour of the latest 2.9-litre. A detuned Turbo unit rather than an uprated S engine, it gets 'hot vee' twin turbos to deliver 376bhp (up 20bhp on the previous model) and a thumping 384lb ft, which works out as an extra 16lb ft. Impressively, this torque is available from just 1750rpm all the way to 5000rpm. Furthermore, the engine is located on stiffer mounts that aim to improve steering accuracy, plus it breathes through a fruitier sports exhaust.

Some dabbling with the seven-speed PDK's brain helps sharpen the shifts and the gearbox is mated to the latest four-wheel drive system with Porsche Traction Management, which aims to deliver a more rear-wheel-drive handling balance.

On the move, the Macan's performance gains feel greater than the relatively modest increases in

power and torque would suggest. The combination of that Table Mountain torque curve and crisper-acting gearbox catapults the GTS down the road with real intent, making it feel just as quick as the pricier Turbo. It's at its best in Sport or Sport+ modes (accessed by a handy wheel-mounted dial), where throttle response is nicely sharpened and that exhaust crackles away on the overrun.

Combine this straight-line energy with the car's assured handling and the GTS is a devastating point-to-point weapon. The steering is quick and nicely weighted and turn-in bite is remarkable, this PTV-equipped Macan resisting understeer even when carrying daredevil levels of speed into corners. There's fine mid-corner balance and getting on the throttle early has the rear squirming ever so slightly before the computers send the torque forward for a slingshot exit. Changes of direction are remarkably quick and composed, too – the GTS doing a fine impression of a smaller and lighter hot hatch.

Even on the standard cast iron discs, the Macan sheds speed with

greater violence and resistance to fade than anything weighing 1910kg has any right to do and the pedal feel and response are spot on.

If there's a criticism, it's that the ride isn't as cossetting as you'd expect. Sport and Sport+ deliver absolute body control, but mid-corner bumps can make the car hop and skip a little. Normal mode gives a little more compliance, the GTS breathing more easily with the surface, but there's some lumpiness at low speeds.

The rest of the car is pure Macan, which means the Alcantara-peppered interior is impeccably finished and just roomy enough for family duty, while, ride aside, the GTS is quiet and comfortable. Few cars with a Porsche badge are as easy to live with.

JAMES DISDALE

[@jamesdisdale](#)

PORSCHE MACAN GTS

As a driving tool, the Macan is unrivalled in this sector and the GTS might just be the pick of the bunch



Price	£58,816
Engine	V6, 2894cc, twin-turbocharged, petrol
Power	376bhp at 5200-6700rpm
Torque	384lb ft at 1750-5000rpm
Gearbox	7-spd dual-clutch automatic
Kerb weight	1910kg
0-62mph	4.9sec
Top speed	162mph
Economy	29.4mpg
CO₂, tax band	218g/km, 37%
RIVALS	Audi SQ5, BMW X3 M40i, Mercedes-AMG GLC 43



It feels as quick as a Macan Turbo in real-world use and the interior is plush



TESTER'S NOTE

For anyone who has a motorsport background, the idea of a supermini with a dog-clutch gearbox is almost irresistible, even if it is robotised. Renault will have to work hard to improve its manners before launch, though. **AE**



TESTED 2.12.19, FRANCE ON SALE AUTUMN

RENAULT CLIO E-TECH

Unconventional and complex hybrid supermini sampled in prototype form

Downsizing is no longer enough when it comes to reducing CO₂. Small cars are harshly treated in the stiff new EU emissions legislation, so superminis will have to be electrified. As for going the whole hog, Renault's EV product planning director points out: "There's a lot of resistance from buyers to the idea of a £30,000 battery-electric hatchback."

So, the new Clio needs a hybrid drivetrain. There have been only two hybrids in this class so far: the Honda Jazz and Toyota Yaris, which have proven that money can (just) be made on such a model. Renault aims to do the same with its £25k Clio E-Tech.

Its system borrows from Formula 1 energy recovery practice, with two electric motors and a simple four-speed dog-clutch gearbox. This is augmented by a two-speed transaxle that offers up to eight proper gear ratios – although as both transmissions have a geared neutral, up to 15 ratios can be juggled.

The main motor makes 48bhp and the secondary one 20bhp. Both can

drive and recharge on overrun, but the smaller assumes the duties of starting the engine, spinning up the 'box to synchronise the shifting and maintaining battery charge above a minimum level to restart the engine.

A naturally aspirated 1.6-litre four-cylinder unit developed from a Nissan creation, this has not one belt-driven ancillary; the water pump, engine and transmission oil pumps, air-con compressor, power steering and brake servo are all electrically driven.

With the exception of the 1.2kWh lithium ion battery beneath the boot floor, the entire driveline fits under the bonnet. And with its smaller fuel tank, the E-Tech is only about 10kg heavier than the usual 1.3 petrol auto.

Unless it's really cold, the E-Tech starts using its main electric motor up to about 10mph, shifting through the two available gears in the 'box and the transaxle as it accelerates. Then the engine takes over, while the second motor rapidly switches from starting to gear synchronising mode.

There are several driving modes:

Eco, which prioritises electric driving up to about 44mph; Hybrid, which blends power sources for maximum economy; and Sport, which prioritises performance. There's also a 'B' mode that increases regenerative braking and a kickdown throttle function that brings every power source into play.

Like the F1 driveline, none of it is very intuitive. For a start, the second smaller motor may, at sustained maximum output, switch from power to charging mode to keep the battery supplying the main motor. And since there's a minimum charge level (else the second motor couldn't start the engine), the engine will occasionally start and rev higher than road speed would dictate to act as a generator.

Despite all this complexity, the Clio E-Tech is reasonably positive to drive, avoiding the 'rubber-band' sensation that dogs Toyota's set-up. Yet there are idiosyncrasies: aside from the engine running to charge, it 'hangs' at high revs for a few seconds when you lift off and there's the odd grating noise as gears scrape into engagement.

With only badges and EV power and range readouts to distinguish it, you'd find it hard to tell that this is a hybrid unless you were driving it – or filling it up. Renault claims that 80% of urban driving will be done in EV mode, cutting consumption by 40%. We saw around 50mpg.

The car rides across cobbles with aplomb and remains upright through tight bends. The steering is well weighted and direct, if a bit lifeless, and the drivetrain is willing and fairly quick to pick up, although a bit gutless.

However, with so much going on, buyers must understand the whys and wherefores of the drivetrain so that its foibles and noises don't alarm. As undoubtedly promising as this car is, Renault's sales staff may well be in for some difficult conversations.

ANDREW ENGLISH

RENAULT CLIO E-TECH 140

A refreshing new take on the small hybrid car, but its refinement needs improvement and it will be expensive

Price	£25,000 (est)
Engine	4 cyls, 1.6 litres, petrol, plus two electric motors
Power	138bhp (total system output)
Torque	155lb ft (total system output)
Gearbox	15-spd automatic
Kerb weight	1258kg
0-62mph	tbc
Top speed	tbc
Economy	WLTP figures tbc
CO₂, tax band	WLTP figures tbc

RIVALS Toyota Yaris Hybrid, Honda Jazz e:HEV



Unlike with most rivals, the hybrid system doesn't affect the ride or handling



TESTED 30.1.20, OXFORDSHIRE ON SALE NOW

PEUGEOT 2008

Yet another Juke rival - but one that's unusually interesting



They say that good things come in small packages. They also say that too much of a good thing can, well, sort of be a bad thing. So does that mean that a large collection of small packages might be something we should be mildly concerned about?

They (whoever they might be) don't seem to have any pearls of wisdom on the subject, which is probably a good thing if you're in the compact SUV-making game. Peugeot's latest creation is the second-generation 2008 and, based on interior and exterior style appeal alone, it could well be one of the most desirable of its type yet.

The 129bhp Puretech GT Line is expected to be the best-selling model. It's priced from £26,100, placing it

in the same ballpark as the similarly well-specced, 148bhp Volkswagen T-Roc 1.5 TSI SEL but quite a way above the top-flight 1.0-litre Nissan Juke - prominent players both in this ever-expanding segment.

To drive, the 2008 is really rather pleasant. It changes direction with a pleasing amount of energy, grips well and keeps its body smartly in check. While you wouldn't call it enthusiastic, it doesn't feel devoid of character either.

There's perhaps a slight edge to its ride at everyday speeds but, for the most part, it manages Britain's roads with reasonable confidence, only really feeling brittle over particularly cratered stretches of asphalt.

It's certainly better-riding than its DS 3 Crossback relation, in any

case, and it settles down nicely on the motorway to become a usefully comfortable long-distance cruiser.

Meanwhile, the 1.2-litre three-cylinder turbo petrol engine is a willing workhorse whose 170lb ft of torque endows the 2008 with enough muscle to make it an extremely easy car to drive. It doesn't have the zing or effervescence of Ford's 1.0-litre Ecoboost units, but its isolation and refinement is nonetheless very impressive.

While it remains difficult to get excited about the concept of a compact crossover, Peugeot is to be commended for its efforts to make a car that backs up its style appeal with meaningful substance.

SIMON DAVIS

[@simondavisnz](#)

PEUGEOT 2008 PURETECH 130 GT LINE

Refined engines and energetic handling help mark this out as one of the better compact SUVs to drive

★★★★★☆☆

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	8.9sec
Top speed	122mph
Economy	43.7-50.6mpg
CO ₂ , tax band	WLTP figures tbc
RIVALS	Nissan Juke, Volkswagen T-Roc, Citroën C3 Aircross



Interior looks appealing and is of impressively high perceived quality



AUDI RS6 AVANT

Price £92,750 On sale Now

What's new? Fastest and most sophisticated RS6 yet is driven in the UK for the first time

THE AUDI RS6 has always been popular with well-heeled enthusiasts who like to travel fast yet discreetly. This aggressively penned new estate model doesn't fly as low under the radar as its predecessors, but it's even more effortlessly athletic.

Scorching pace from the 591bhp 4.0-litre V8 is a given; less expected is the comfortable ride on optional coil-sprung RS Plus suspension, or the extra agility afforded by standard four-wheel steering - although the car still feels big for British roads.

Either way, for shattering all-weather pace, refinement, luxury and practicality, the beautifully executed RS6 remains unrivalled. **JD** ★★★★★☆☆



BMW M340i TOURING

Price £50,245 On sale Now

What's new? Munich's baby estate gets six-pot petrol power and more focused handling courtesy of M Performance

BOOTLID BADGE ASIDE, not much distinguishes the M340i from a regular 3 Series. Adaptive suspension delivers a largely comfortable ride, and the 3.0-litre turbocharged petrol engine (the only six-pot in the range) is refined at slow speeds.

Stretched out to its 6800rpm limit, though, it delivers an intoxicating level of acceleration. This is accompanied by an enthusiastic tone which, while not as angry as that of a true M car, comes alive as you explore the upper end of the rev range.

Comfortably more dynamic than the Audi S4 Avant (although perhaps not as economical) and better equipped inside than the Mercedes-AMG C43 Estate, few junior wagons can claim to be quite so entertaining. **TM**

★★★★★☆☆

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TESTER'S NOTE

There's no flashy infotainment system here; the best Fiat will do is a dash-top smartphone cradle with a USB port. This set-up actually works rather well. **SD**



TESTED 16.1.20, TURIN, ITALY ON SALE MARCH

FIAT PANDA MILD HYBRID

Nine-year-old city car marches on with an electrified 1.0-litre petrol engine

Wouldn't you know it, Fiat has gone and made an electrified version of the Panda City Cross: the boxy, loveable small Italian hatchback that seems set on trying to convince anyone who claps eyes on it that it really, really is a proper, mud-plugging SUV.

Only it isn't, actually. It may have plenty of black plastic cladding and a slightly raised ride height, but beneath that lies a front-driven, slightly puffed-up city car. You probably knew that already; of real interest is the fact that this new Mild Hybrid version, along with its 500 Mild Hybrid sibling, represents the first stage of Fiat's quest to redefine itself as a maker of electrified city cars.

This Panda makes use of the same three-cylinder 1.0-litre petrol engine and 12V belt-integrated starter generator and 11Ah lithium battery as its even more diminutive sibling. All up, the new powertrain develops a relatively humble 69bhp and 68lb ft.

Like any mild-hybrid system, it's able to harvest kinetic energy during braking and deceleration,

which can then be used to power the car's ancillaries when the engine shuts down as you're coasting or at a standstill. The result is modest fuel consumption savings, slightly reduced CO₂ emissions and a bit of extra electrical assistance when you're accelerating away from rest.

In more sedate town driving, the Panda is easy enough to operate, with its electrical architecture providing a faintly discernible, useful portion of extra poke to get you going smoothly.

Past this point, though, the power deficit becomes a bit more conspicuous. There's a need to really keep your right foot in it to get the car up to speed, so much so that you often find yourself driving about with the accelerator completely flattened for extended periods. This, of course, is really quite fun – mainly because the engine seems up for a thrashing, but also because you'll never really be in any great danger of grossly exceeding the speed limit.

Driving in such a manner isn't likely to do your fuel consumption any favours, however. We saw around 35mpg at the conclusion of our time

with the car, which isn't exactly outstanding for a compact hatchback. It's also way off the WLTP-certified combined figure of 49.6mpg.

The Panda's tall sides, raised ride height and higher centre of gravity are very apparent through corners. It bounces its way over undulating surfaces and, even if you tip it into a bend at relatively relaxed speeds, it responds with a significant amount of body roll.

Meanwhile, its eco-friendly tyres struggle to maintain their purchase even on dry roads and will push you into understeer with relatively little provocation. The electronic stability systems then promptly step in to shut things down with a fairly heavy hand.

Not that you'll be able to feel any of this through the wheel, mind, because the steering is completely mute and not particularly intuitive. Still, even with the slightly wayward body control and overly light steering, the Panda remains a fun, characterful car to drive.

The interior is harder to appreciate, largely because it now really looks and feels its age. It lacks a good deal

of the style appeal that's inherent to the 500, while its rear seats aren't particularly accommodating. With the front pair set for adults of average height, head space and knee room behind are very much in short supply.

Despite these flaws, £13,885 for the entry-level Panda Mild Hybrid is very good value. Our Launch Edition model, with its exclusive paint scheme, pushes this up to a still-reasonable £14,385, while the range-topping Trussardi is £14,485.

Granted, the Panda won just three stars in its most recent Euro NCAP safety test and its standard kit is relatively sparse. But the fact remains that, even with its sometimes rather apparent shortcomings, the Fiat's bubbling, fizzing personality makes it an incredibly difficult car to dislike.

SIMON DAVIS
@simondavisnz

FIAT PANDA CITY CROSS 1.0 MILD HYBRID LAUNCH EDITION

The Panda remains as endearing as ever, despite some rather obvious flaws, and is decent value for money



Price	£14,385
Engine	3 cys, 999cc, petrol
Power	69bhp at 6000rpm
Torque	68lb ft at 3500rpm
Gearbox	6-spd manual
Kerb weight	1055kg
0-62mph	14.7sec
Top speed	96mph
Economy	49.6mpg
CO₂, tax band	127g/km, 29%
RIVALS	Kia Picanto, Volkswagen Up



Ride and handling aren't very composed, while the interior feels decidedly dated

TESTED 21.1.20, VALENCIA, SPAIN ON SALE EARLY 2020

SMART EQ FORTWO

Pocket-sized electric-only city car is 'refreshed'. Only it isn't



Not that you'd know from the look of the new Fortwo, but the scene at Smart is changing. Daimler recently sold half of the brand to Chinese giant Geely – parent company of Volvo and Lotus – with the aim of moving production to China for the next-generation models, due in 2022. The corporate management team has also been shaken up and the brand is now an all-electric one, even though zero-emission Smarts accounted only for 18,000 of 118,000 global sales in 2019.

Yet beyond the backstage bustle, the 'Smart car' itself will exist in something of a holding pattern from now until 2022, with largely unchanged Fortwo coupé and cabrio models offered alongside the four-door Forfour. The three-cylinder petrol engines have gone but, aside from the LED headlights and larger grille, there's little different about how these cars look and all will use

the same reasonably perky 80bhp electric motor and 17.6kWh battery previously fitted to all electric Smarts.

The problem is that 17.6kWh classes as unusually small today so even the Fortwo's NEDC-derived range (considered an optimistic figure) fails to make it into triple digits. Given Smart's unambiguously city-centric proposition and the state of the competition, such limited autonomy may have once been forgivable, but it now looks feeble, not least compared with the WLTP-calculated 161 miles offered by the new electric Skoda Citigo. The Smart remains the most nimble and compact option in this category, but which prospective buyer isn't going to be tempted by the still usefully mini Skoda's four seats, realistic inter-city range and 40kW charging speeds (versus the Smart's 22kW, for around 65 replenished miles of range in 40 minutes), all for only £150 more?

For urbanite devotees, the Fortwo still packs character and has the same Eurofighter-grade turning circle. On the larger 16in wheels, it rides firmly in downtown Valencia but not offensively so (and I'd wager most British city streets are kinder) and the light steering is alert and intuitive. Our test car's panoramic roof makes for a breezy ambience, and beyond the over-servoed brakes, owners will mostly be served carefree drivability. There's also a tad more cabin storage, but the infotainment is truly woeful and Apple CarPlay won't be offered until at least April.

None of which is enough to save the Fortwo. Smart is devoting its energy to medium-term strategy and the development of prescient mobility technologies (car pooling etc) and that could well pay off, but its existing product is flirting with relic status.

RICHARD LANE

[@_rlane_](#)



Storage is a little better now but the infotainment is dreadful

SMART EQ FORTWO

Retains the same compromises and capabilities as before, which leaves it adrift as rivals become ever better

★★★★☆

Price	£16,850 (after government grant)
Engine	Synchronous electric motor
Power	80bhp
Torque	118lb ft
Gearbox	Single speed
Kerb weight	1095kg
0-62mph	11.6sec
Top speed	81mph
Range	91-98 miles (NEDC)
CO ₂ , tax band	0g/km, 16%
RIVALS	Skoda Citigo-e iV, Volkswagen e-Up



PEUGEOT 208 PURETECH 130 GT-LINE EAT8

Price £23,350 On sale Now

What's new? Radically designed, brand-new supermini is driven in the UK for the first time

THERE'S A CLEAR family link between this new 208 and the 508 – and not only because they share Peugeot's i-Cockpit interior, which looks and feels fantastic, even if the tiny, oblong wheel will put some off.

It's also present in the direct but numb steering, which dissuades you from indulging in the sort of B-road antics you might in a Ford Fiesta. The 208 has a looser, softer suspension set-up, too, but this enables it to cruise sublimely and smooth out low-speed intrusions with surprising finesse. In general, refinement is also superb.

Peugeot's 1.2-litre triple should be praised as well; it sends the 208 on its way sharpish and makes a cute couple with the auto 'box, although they do have the odd misunderstanding. **KC**

★★★★☆



MAZDA MX-5 BBR GTI SUPER 220

Price £3828 (kit, fitted) On sale Now

What's new? Brackley tuner releases 221bhp from Mazda's 2.0-litre Skyactiv-G engine

WE SECURED AN afternoon in BBR GTI's Super 220 MX-5 in the nick of time: the next day, it was to begin life as the development mule for a turbo conversion that's expected to make about 260bhp. As ever, things move fast at BBR, but the turbo car really will need to be exceptional if it's to be more enjoyable than this. Aided by custom camshafts and a freer-flowing exhaust manifold, the remap liberates torque and power and hikes the redline to near enough 8000rpm.

Character and responsiveness are conspicuously improved, and when paired with BBR's suspension upgrades (not part of the Super 220 kit), you'll struggle to find a more rewarding experience at any price. **RL**

★★★★☆

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BMW M8

Munich enters new territory to go Bentley hunting with this flagship M car

MODEL TESTED COMPETITION CONVERTIBLE

Price £130,435 • Power 617bhp • Torque 553lb ft • 0-60mph 3.3sec • 30-70mph in fourth 4.1sec • Fuel economy 19.0mpg • CO₂ emissions 246g/km • 70-0mph 44.0m

The BMW M division claims not to have played, until now, in what it calls the 'performance luxury' segment. Allowing for the existence of cars such as the old M6 Coupé and M6 Convertible, of course, and for several generations of the X5 M performance SUV, the truth of the matter is a bit less clear cut than that statement would suggest – but you can see why they'd make it.

Until now, it has clearly suited BMW M's purposes to define itself in opposition to rivals Mercedes-AMG, Porsche and Audi Sport predominantly as a maker of more credible hardcore super-saloons and sports coupés than of bigger, more expensive and more lavish six-figure 'luxury express' machines. And perhaps, because there has never been an M7 or X7 M, some believe that more development attention has been poured into every M2, M3, M4 and M5.

The launch, with this new second generation of the BMW 8 Series, of a full-fat M version – the M8 – is a bit of a landmark, then. Available initially in both two-door coupé and two-door convertible bodystyles, and with a four-door Gran Coupé coming later in 2020, the M8 becomes arguably BMW's first proper modern super-GT. And, with prices from just over £123,000, you might even think of it as the first car that BMW would offer up on level terms as an alternative to the blue-blooded Bentleys, Aston Martins, high-end Maseratis and low-end Ferraris of the automotive landscape.

With the discontinuation of production of the i8 recently confirmed, this becomes BMW's out-and-out performance flagship. But does it offer a technical make-up and driving experience sufficiently different from those of its various M-car relations to bring anything genuinely new to the Motorsport division product range?

DESIGN AND ENGINEERING



Don't for a second think that BMW M's first foray into the world of the luxurious super-GT means that it has suddenly come over all soft. On first acquaintance, the M8 Competition's sharp creases, chiselled edges and gaping intakes lend it a look that's as aggressive as any other M car you care to name – even when its shorn of its roof.

BMW hasn't pulled any punches in terms of its technical specification, either. The 4.4-litre twin-turbocharged petrol V8 that lies behind the M8's large, high-gloss black kidney grille is the same heavy-hitting unit that powers the M5 Competition, here developing 617bhp at 6000rpm and 553lb ft at 1800-5800rpm. This considerable firepower is deployed to the road via an eight-speed gearbox, BMW's active M differential and a fully configurable, rear-axle-biased

Range at a glance

ENGINES	POWER	FROM
M8 Competition	617bhp	£123,435

TRANSMISSIONS

8-spd automatic

Although BMW has made a standard variant of the M8, the only version of BMW's new super-GT available in the UK is the considerably more hardcore M8 Competition. Like its non-UK sibling, the M8 Competition is available in coupé, convertible and four-door Gran Coupé bodystyles, with the four-door model representing the entry point to the range in terms of price.

xDrive four-wheel drive system – and, just as in the M5, the xDrive system can send all of that power and torque rearwards, all of the time, if you want it to.

Meanwhile, a greater level of torsional rigidity, courtesy of an even stiffer M-specific CLAR platform, should help lift the M8's appetite for quick direction changes over and above that of the standard 8 Series. Competition models also benefit from stiffer engine mounts and a greater wheel camber at the front axle than is found on the standard M8 to sharpen handling responses even further; and while the story is different in other markets, BMW UK will offer the M8 for sale in Competition guise only.

That's not to say the chassis doesn't have its work cut out for it, though. BMW claims a kerb weight of 1885kg for the coupé (5kg more than a four-door M5) and 2010kg for the drop-top, with its folding fabric roof. On Millbrook's test scales, our test car came in at 2020kg, with that mass being split 53:47 front to rear.

Such heft understandably requires suitably heavy-duty brakes, so M Compound brakes come fitted as standard, with carbon-ceramics optionally available and fitted to our test car. The M8 Competition is the first BMW to feature a new by-wire braking system, the response and behaviour of which can – just as with the adaptive dampers, electromechanical steering, four-wheel drive, gearbox and throttle mapping – be tweaked and customised to suit the driver's preferences at the press of a button. In theory, the new electromechanical brake booster should make for a more consistent rate of pedal response as →



M6 Convertible paved the way for the M8



• Each of the quad tailpipes measures 100mm in diameter, making them notably more cannon-like than those fitted to the regular M5. An M Sport exhaust system is standard.



• Electronically folding fabric roof can be fully collapsed in 15 seconds at car speeds of up to 31mph. So a Mazda MX-5's manual roof is far quicker, but the BMW's is infinitely more dignified.



• Ultimate pack (£20,000) fitted to our test car included this rather opulent carbonfibre engine cover. As a stand-alone option, it costs £1025, which seems like quite a lot of money for something you'll rarely see.



• Wind deflector lives in the boot when not in use and can be fitted in a matter of seconds – and with no broken fingers. It renders the back seats useless for anything but extra cargo stowage.

We like

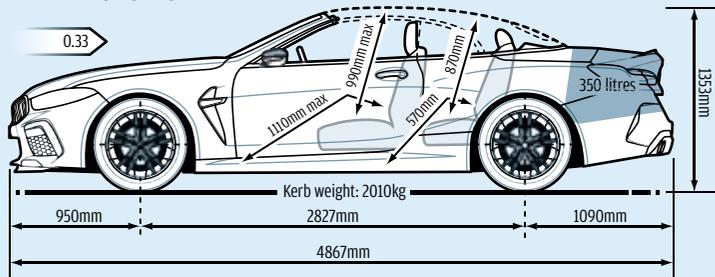
- Titanic performance outstrips even that of the genuine exotics
- Clever four-wheel drive system allows truly configurable handling
- First-rate infotainment and driver assistance technology

We don't like

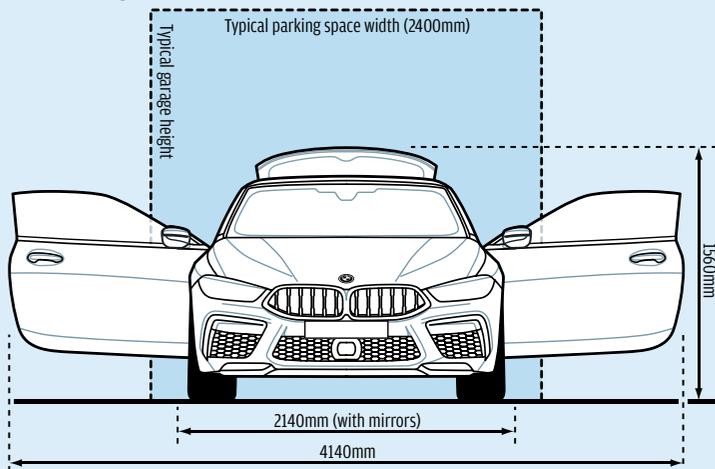
- Firm-riding, slightly highly strung ride and handling dynamic isn't perfect for a fast GT
- A bit short on static desirability and lavish luxury cabin ambience

Weights and measures

DIMENSIONS



PARKING

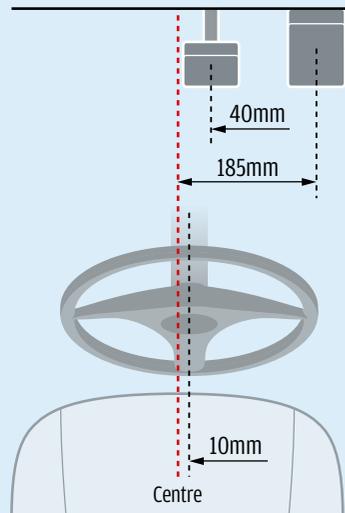


WHEEL AND PEDAL ALIGNMENT

Slight right-hand offset in the steering column isn't pronounced enough to mar an otherwise thoughtfully laid-out and comfortable driving position.

HEADLIGHTS

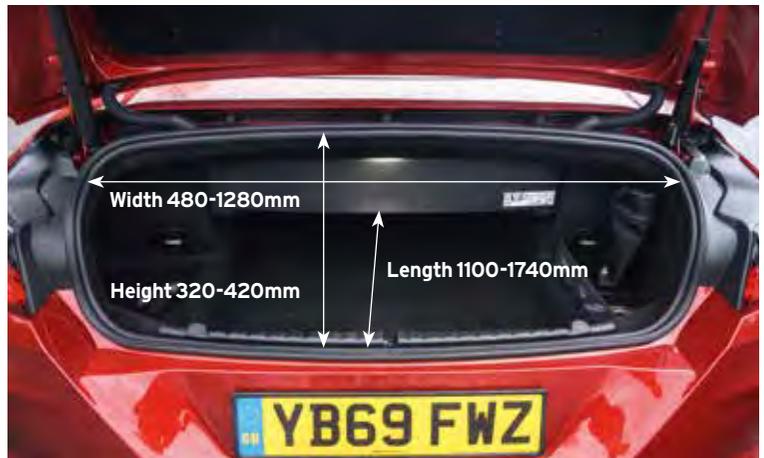
Optional Laserlight headlights impress more for their range and spread than outright brightness but are generally excellent overall.



● Heavily bolstered sports seats are comfortable and supportive. Five upholstery colours are available as standard: black, beige, orange, light grey and brown.



● Adult passengers won't appreciate being sat back here too much. These are best left for children only or used as additional storage space.



● You'd probably squeeze a golf bag in here with the roof down but not much else. At its shortest point, the boot is just 320mm tall - not great for hard-shelled suitcases.

← temperature builds into the system on track. We'll see whether this proves to be true.

Suspension, meanwhile, is by way of steel coils all round, with a mix of wishbones and multiple links lying underneath. So unlike many fast GT cars of a similar ilk, the M8 Competition goes without air springs.

INTERIOR



BMW's effort to lift the material and visual appeal of the M8 Competition's cabin over and above that of the standard 8 Series can be considered a qualified success. The quilted Merino leather that comes as standard is soft to the touch, kind on the eyes and generously applied. Elsewhere, sections of carbonfibre sit tastefully alongside the brushed

metal and gloss black trim pieces to provide a telling reminder of the car's underlying performance intent.

The cabin architecture, meanwhile, is BMW to a tee and the seating position is suitably fast but not so recumbent as to deprive you of any visibility. Adjustability is generous, allowing you to sit low in the cabin, enveloped by the tall window lines, considerable transmission tunnel and driver-focused dashboard fascia. There was a very slight right-hand offset in the steering column of our test car but not one nearly significant enough as to become a source of complaint. For the most part, the driving position and general ergonomics are excellent - just as you'd expect them to be.

The result is that those familiar with BMW's contemporary model

offering will no doubt feel right at home in this new performance flagship. But therein lies the rub: next to more effortlessly opulent, visually appealing and materially rich rivals from Mercedes-AMG, Bentley or Aston Martin, the BMW's overriding familiarity and BMW-typical sense of understatement do conspire to dampen its sense of occasion somewhat. Anyone stepping out of the more lavishly appointed confines of an S63 Coupé, Continental GT or DB11 might be a shade underwhelmed by the BMW's comparative lack of exotic visual and tangible wow factor.

On practicality grounds, the M8 Competition Convertible claws back some points. There are numerous storage cubbies dotted around the cabin and the rear seats will

accommodate small children or a pair of weekend bags, but only smaller adults with much comfort. But as the boot effectively doubles as storage space for the folding fabric roof, luggage capacity isn't as great as it would otherwise be. Where the Coupé offers 420 litres of storage space, the Convertible has just 350.

PERFORMANCE



The process of engaging the M8 Competition's launch control system is a relatively convoluted undertaking, but the pay-off - provided you're in a suitable environment - is worth witnessing at least once.

Even on a relatively dry track, the M8's getaway isn't particularly clean, but once up and running, the rate →



● 'Setup' button lets you pick preferred settings for engine, gearbox, steering, braking and 4WD systems so they can be stored in shortcut buttons on the wheel.



● Air collar and heated seats come as standard on the convertible. Backlit M8 logo looks particularly snazzy in the dark as well.



● Whoever designed the speaker covers for the Bowers & Wilkins stereo must have watched Signs. We like the way they look a lot, particularly when lit up at night.



Multimedia system ★★★★★

The M8 Competition comes as standard with BMW's latest 10.25in Live Cockpit Professional infotainment suite. It's a system we're very fond of and the slickness of its graphics and general ease of use are as welcome in the M8 as in BMW's humbler model offerings.

The standard specification is unsurprisingly strong, with DAB radio, satellite navigation, Bluetooth connectivity, Apple CarPlay and a wi-fi hotspot all included right out of the box.

The hexagonal digital instrument binnacles that BMW seems intent on fitting to all of its new models are typically clear and easy enough to read, but our testers still agree that their design remains a touch awkward in appearance.

The Bowers & Wilkins Diamond surround sound system that comes as part of the £20,000 Ultimate pack provides truly excellent sound quality, even when the roof is down.



“
Its pace to 100mph very nearly lands
it in bona fide supercar territory
”

← at which it accrues pace is quite something. Initially, there's a discernible shuffling off the line as the car attempts to deploy its massive power and torque reserves to the road without breaking traction, but almost immediately afterwards it squats down dramatically on its haunches and rockets away. Upshifts relay a faintly aggressive shunt to the base of your spine, with the transmission allowing the engine to spin close to its 7200rpm redline before swiftly snatching the next gear.

The accompanying soundtrack isn't quite as raucous or characterful as the best AMG V8s, but the numbers vouch for the effectiveness of BMW M's most powerful production engine. With the fabric roof firmly in place, our timing gear clocked the M8 Competition's 0-60mph run at 3.3sec, with 100mph arriving in just 7.4sec. That's notably quicker than 12-cylinder versions of both the Continental GT (3.6sec and

8.1sec respectively) and DB11 (4.0sec, 8.4sec) and very nearly quick enough to land the M8 Competition in bona fide supercar territory. In-gear performance is no less impressive, with the BMW accelerating from 30mph to 70mph while locked in fourth gear in just 4.1sec.

For all of the M8 Competition's effectiveness in a straight line, though, its powertrain isn't without fault. Even in calmer environments, there remains an underlying aggression that mars its effectiveness as a more laid-back, relaxing GT car. The transmission can at times be overeager to engage, making for a step-off that can feel unnecessarily urgent and hurried.

The M8's carbon brakes provide suitably immense stopping power, bringing the drop-top BMW to a halt from 70mph over a distance of just 44.0m. However, the new by-wire braking system isn't quite as intuitive as we'd hoped. In Comfort mode,

there's quite a sudden bite at the top of the pedal, which is then amplified in Sport mode to such an extent that you often find yourself braking too early and too suddenly for a corner, while close control over stopping power never feels truly effortless. Our testers agreed that they'd be willing to swap some of the BMW's stopping power for a more intuitive pedal progression.

HANDLING AND STABILITY

★★★★★

If you thought this M8 Competition might feel, to drive, like an M5 with two fewer doors and quite a lot less roof, you may be more surprised by how differently the car rides and handles from its saloon sibling than by its rapacious pace. Although an M5 is already a fairly firm-riding, agile-feeling saloon car, the M8 seems unmistakably lower and a little wider set on the road and it feels slightly more firmly sprung still.

It also steers quite a bit more directly, its off-centre handling response in particular exhibiting a keenness you don't often find in cars this size. The more comfort-oriented driving modes take the edge off this initially quite alarming appetite for an apex, as does familiarity, so that, over time and in one way or another, you get used to the way the car darts around roundabouts and junctions. But for a big GT car, the M8 certainly pushes the boundaries of what constitutes entirely natural- and intuitive-feeling handling.

For that reason, it takes a little while to be able to place the car on the road exactly as you'd like. The confidence needed to explore the car's handling at speed also takes its time to build. A steering set-up about which there is just a hint of elasticity of feel, and that doesn't telegraph building cornering load as clearly as you might like, doesn't speed the process up much.



● It feels surprisingly eager to dart towards the apex, given the car's heft, but there's fine composure once you learn to trust it and, when desired, tail-out entertainment

Track notes

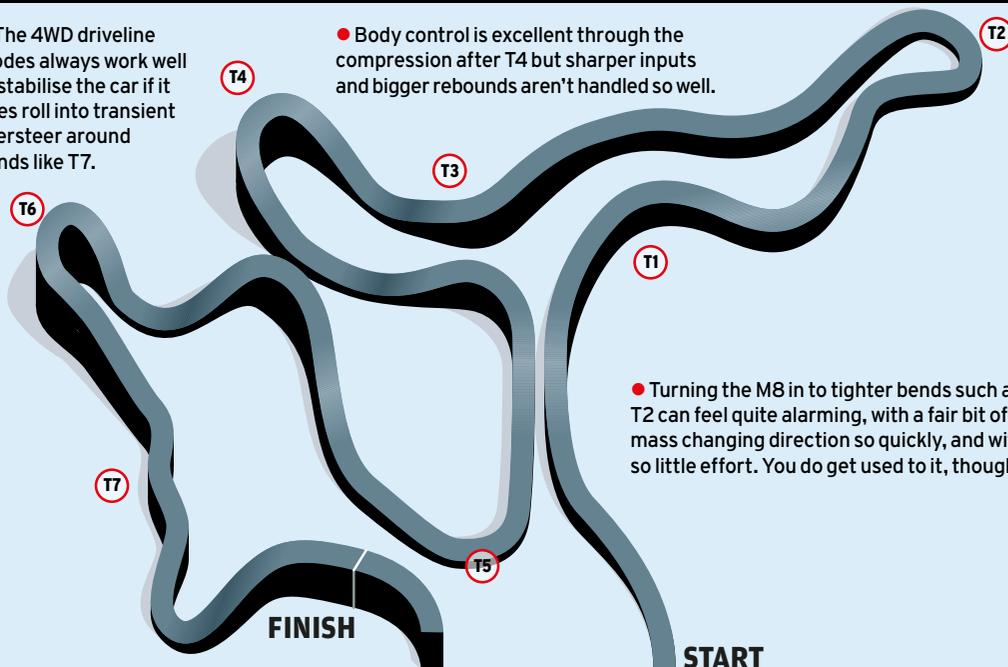
With all of its various systems set to their firmest, angriest Sport and Sport+ settings, the M8 Competition has quite remarkable levels of grip and agility. Lateral body control is very tightly checked; handling response builds very quickly off centre; balance is more neutral than is the norm for a big GT; and the steering is quite lightly weighted. For all of those reasons, you end up hitting apexes a lot more easily and quickly than you might expect to.

BMW's 4WD Sport driveline setting and its M Dynamic stability control mode allow you to animate the chassis under bigger helpings of throttle, and with a reassuring ultimate safety net in place. But it's a safety blanket you're quite welcome of because the M8's quietly feisty demeanour doesn't make it the most benign of cars when it - sometimes quite suddenly - begins to slide.

• The 4WD driveline modes always work well to stabilise the car if it does roll into transient oversteer around bends like T7.

• Body control is excellent through the compression after T4 but sharper inputs and bigger rebounds aren't handled so well.

• Turning the M8 in to tighter bends such as T2 can feel quite alarming, with a fair bit of mass changing direction so quickly, and with so little effort. You do get used to it, though.



However, there is bountiful handling stability and dynamic composure to discover once you feel comfortable enough to discover it. Just like the M5, the M8 offers '4WD', '4WD Sport' and '2WD' driveline configurations, each of which allows progressively more in the way of throttle-on cornering balance and rear-driven handling adjustability; but even in the first of them, the chassis develops neutral handling manners and resists power-on understeer very robustly.

The car's blend of grip, handling composure and incisiveness is certainly compelling, then. It's quite a bit more convincing on smooth, widely marked roads than it is on more uneven ones, though, and on the latter, when it has bigger vertical inputs to deal with, it can struggle to harness its mass with that ideal meeting of supple compliance and progressive control that the very best fast GTs strike.

COMFORT AND ISOLATION

★★★★☆

This section remains a pretty big hurdle for any big, heavy, luxury cabriolet to negotiate, even in 2020. The M8 Competition is a car with respectable touring manners that, with its roof down and its windows and wind deflector up, shields its occupants from the elements as well as any soft-top you might compare it with; not so well, however, that you'll be inclined to drive it too far at fast motorway speeds in that configuration, even on the warmest and stillest of days.

With the roof up, it filters out wind noise quite well and doesn't let too much of the hum and roar of nearby traffic penetrate into the cabin, although a good folding hard-top option would do better, and by a margin big enough to notice it. Considering the other compromises a folding metal roof might have

imposed, though, you'd be very happy to take the cloth-top execution, warts and all. And roof-up cabin refinement is anything but objectionable: we recorded 67dB at a 70mph cruise, which is probably only a decibel or two higher than coupé noise level.

The car's body structure appears to have laudable integrity, declining to shake its A-pillars at all over rougher terrain, although the firmish ride does leave the chassis given to the odd thump and the slightest shudder over sharper edges and craggy potholes. Ride isolation is, overall, a shade below what is typical of a big sporting GT.

BUYING AND OWNING

★★★★☆

Make no mistake: we've seen circa-£130k BMWs before. But whereas the likes of the M760Li represent the pinnacle of what Munich can achieve with a luxury limousine, the M8's GT car aspirations land it in territory

occupied by an even more exclusive class of vehicle.

Next to the likes of the Continental GTC V8 or DB11 Volante, the drop-top M8 Competition's comparatively affordable £130,435 asking price might see it win favour with those who aren't quite willing to make the jump up to those properly blue-blooded alternatives. But for those who can, that saving might not be quite enough to make up for the comparable lack of prestige attached to the BMW's propeller roundel - regardless of how many options you then attach to the car.

Speaking of which, our test car was equipped with the £20,000 Ultimate pack, which adds practically every option you'd care to include. Extensive carbonfibre exterior details, carbon brake, ventilated seats, an uprated stereo system and far more besides are all added to the M8 Competition's already generous level of standard equipment. →

ACCELERATION

BMW M8 Competition Convertible (6deg C, damp)

Standing quarter mile 11.5sec at 125.1mph, standing km na, 30-70mph 2.7sec, 30-70mph in fourth 4.1sec



Bentley Continental GT W12 (2018, 12deg C, dry)

Standing quarter mile 11.8sec at 122.8mph, standing km 21.2sec at 158.9mph, 30-70mph 2.9sec, 30-70mph in fourth 5.0sec



BRAKING 60-0mph: 2.71sec

BMW M8 Competition Convertible (6deg C, damp)



Bentley Continental GT W12 (2018, 12deg C, dry)



BMW M8 COMPETITION CONVERTIBLE

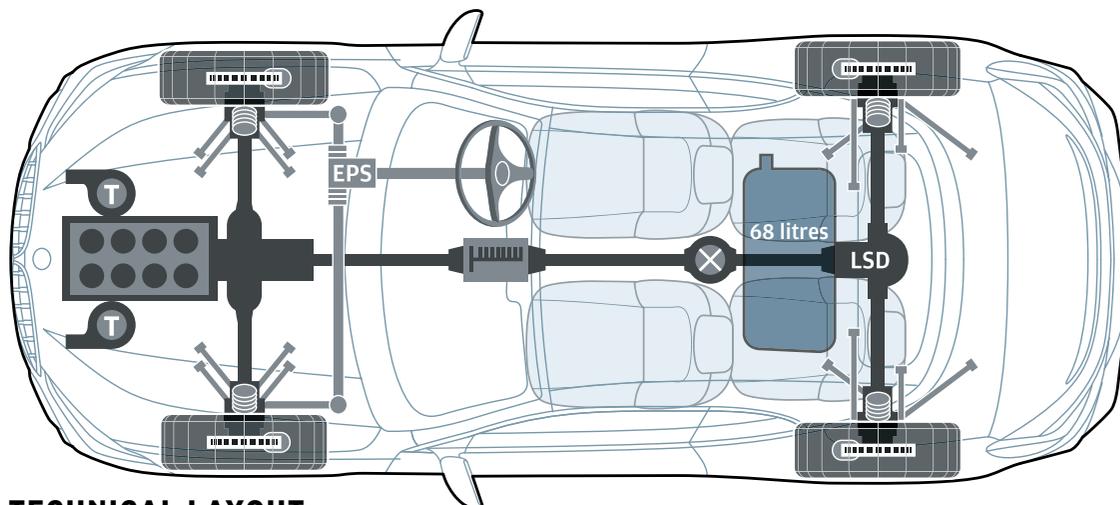
On-the-road price	£130,435
Price as tested	£150,435
Value after 3yrs/36k miles	£53,550
Contract hire pcm	£1579.82
Cost per mile	na
Insurance	50/£1195

TYPICAL PCP QUOTE

Three years/30,000 miles £1654.07
 A £12,404.95 deposit will put an M8 Competition Convertible on your drive on the above terms for just over £1650 per month. A final optional payment of £63,878.95 will stand at the end of the contract. APR is 3.9%.

EQUIPMENT CHECKLIST

20in alloy wheels	■
Adaptive M suspension	■
Air collar	■
Connected Package Professional	■
Merino leather Alcantara upholstery	■
Carbonfibre interior trim	■
M head-up display	■
M leather steering wheel	■
M seats	■
M Servotronic	■
M Sport differential	■
M Sport exhaust	■
M xDrive	■
Dynamic Damper Control	■
Rear parking camera	■
Parking assistant	■
Wind deflector	■
Rollover protection	■
BMW Live Cockpit Professional with 10.25in infotainment suite	■
Ultimate pack	£20,000
Options in bold fitted to test car	
■ = Standard na = not available	



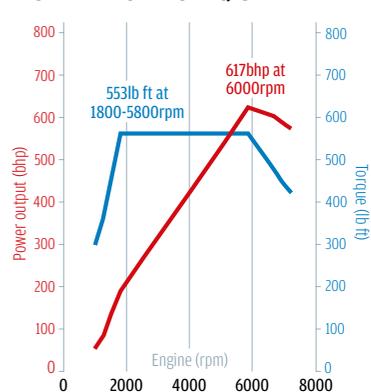
TECHNICAL LAYOUT

The M8 Competition Convertible sits on a stiffened, M-specific version of the BMW's CLAR platform. A longways V8 sits at its nose, with its twin turbos positioned in the 'hot vee' of its cylinder bank. Drive is sent to all four wheels via a rear-biased xDrive system, although a centre differential can lock off the front axle to make the M8 rear driven. Suspension is by way of double wishbones and multiple links.

ENGINE

Installation	Front, longitudinal, four-wheel drive
Type	V8, 4395cc, twin-turbocharged, petrol
Made of	Aluminium block and head
Bore/stroke	89.0mm/88.3mm
Compression ratio	10.0:1
Valve gear	4 per cyl
Power	617bhp at 6000rpm
Torque	553lb ft at 1800-5800rpm
Redline	7200rpm
Power to weight	307bhp per tonne
Torque to weight	275lb ft per tonne
Specific output	140bhp per litre

POWER & TORQUE



ECONOMY

TEST MPG	Track	9.6mpg
	Touring	31.6mpg
	Average	19.0mpg
CLAIMED	Low	16.2-16.3mpg
	Mid	25.0-25.2mpg
	High	30.1mpg
	Extra high	27.2mpg
	Combined	25.2mpg
	Tank size	68 litres
	Test range	284 miles

EMISSIONS & TAX

CO₂ emissions	246g/km (NEDC eq)
Tax at 20/40% pcm	£793/£1586

CHASSIS & BODY

Construction	Aluminium and steel monocoque
Weight /as tested	2010kg/2020kg
Drag coefficient	0.33
Wheels	9.5Jx20in (f), 10.5Jx20in (r)
Tyres	275/35 ZR20 102Y (f), 285/35 ZR20 104Y (r), Michelin Pilot Sport 4S
Spare	Inflation kit

TRANSMISSION

Type	8-spd automatic
Ratios/mph per 1000rpm	1st 5.00/5.2 2nd 3.20/8.2 3rd 2.14/12.2 4th 1.72/15.2 5th 1.31/19.9 6th 1.00/26.1 7th 0.82/31.7 8th 0.64/40.8
Final drive ratio	3.145:1

SUSPENSION

Front	Double wishbones, coil springs, adaptive dampers
Rear	Multi-link, coil springs, adaptive dampers

BRAKES

Front	400mm carbon-ceramic discs
Rear	380mm carbon-ceramic discs
Anti-lock	Standard, with brake assist
Handbrake type	Switch
Handbrake location	Centre console

STEERING

Type	Electromechanical, rack and pinion
Turns lock to lock	2.25
Turning circle	12.2m

SAFETY

ABS, DSC, DTC, PDC, LKAS, rollover protection
Euro NCAP crash rating Not tested

CABIN NOISE

Idle 48dB Max rpm in 4th gear 77dB
30mph 62dB **50mph** 65dB **70mph** 67dB

ACCELERATION

MPH	TIME (sec)
0-30	1.4
0-40	1.9
0-50	2.6
0-60	3.3
0-70	4.1
0-80	5.0
0-90	6.2
0-100	7.4
0-110	8.9
0-120	10.6
0-130	12.5
0-140	-
0-150	-
0-160	-

ACCELERATION IN GEAR

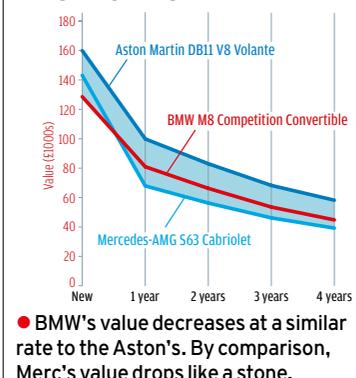
mph	2nd	3rd	4th	5th	6th	7th	8th
20-40	1.2	2.0	2.7	-	-	-	-
30-50	1.3	1.7	2.1	2.9	4.9	-	-
40-60	-	1.7	2.0	2.6	3.8	5.3	-
50-70	-	1.7	2.0	2.6	3.6	4.5	8.2
60-80	-	1.8	2.1	2.7	3.7	4.6	6.6
70-90	-	-	2.2	2.7	3.7	4.7	6.6
80-100	-	-	2.3	2.9	3.8	5.0	7.1
90-110	-	-	-	3.0	3.9	5.2	7.6
100-120	-	-	-	3.0	4.1	5.4	8.2
120-140	-	-	-	4.3	-	-	-
140-160	-	-	-	-	-	-	-
160-180	-	-	-	-	-	-	-
180-200	-	-	-	-	-	-	-

MAX SPEEDS IN GEAR

1	38mph 7200rpm
2	59mph 7200rpm
3	88mph 7200rpm
4	109mph 7200rpm
5	143mph 7200rpm
6	155mph 5982rpm
7	155mph 4923rpm
8	155mph* 3828rpm

* claimed
 RPM in 8th at 70/80mph = 1718/1963

RESIDUALS



THE SMALL PRINT Power-to-weight and torque-to-weight figures are calculated using manufacturer's claimed kerb weight. © 2020, Haymarket Media Group Ltd. Test results may not be reproduced without editor's written permission. For information on the M8 Competition Convertible, contact BMW Customer Services, Summit One, Summit Avenue, Farnborough, Hampshire, GU14 0FB (0370 505 0160, customer.service@bmw.co.uk). Cost-per-mile figures calculated over three years/36,000 miles, including depreciation and maintenance but not insurance; Lex Autolease (0800 389 3690). Insurance quote covers 35-year-old professional male with clean licence and full no-claims bonus living in Swindon; quote from Liverpool Victoria (0800 066 5161, lv.com). Contract hire figure based on a three-year lease/36,000-mile contract including maintenance; Wesssex Fleet Solutions (01722 322888).

Testers' notes

MATT SAUNDERS

I like the way BMW integrates assisted driving tech. It prefers visible driver alerts rather than audible ones, because the former don't spook passengers, and always offers plenty of configurability (and an 'off' button). Thumbs up.



SIMON DAVIS

I appreciate what BMW is trying to do with the M8 Competition, but its constantly alert, more overtly aggressive disposition doesn't really work for me in the context of a fast GT car. It could do with being a bit more laid-back.



VERDICT



It has attitude to spare but isn't the complete super-GT

If we accept BMW's argument that this is the M division's first proper swing at a fast, modern, performance GT car, we'd have to admit that it's a pretty good swing. The M8 Competition doesn't want for outright pace or handling dynamism, or for capacity to thrill. Even if you bought one as an alternative to a big-hitting, purpose-built sports car, you'd be unlikely to feel short-changed in so many ways.

But the brief of a great luxury performance GT car must be broader than such a mission statement, of course; and it's with the delivery of GT-appropriate richness of experience – in the material feel of its interior and in the refinement, tactile sophistication and subjective appeal of its drive – that the M8 Competition falls a little short.

BMW will have known that it had it all to do to present a viable rival for Bentleys, Aston Martins and upper-end Mercedes-AMGs here on desirability, and that the rest of the M8's package would need to be word perfect to make the car's wider case clear; which it isn't – although it's not without strengths. As big, fast GT cars go, this will be a polarising one open to both criticism and praise in equally serious terms.

Spec advice

We'd cherry-pick the best bits of our test car's £20,000 Ultimate pack. Lose the carbon brakes and carbon exterior details and leave in the Bowers & Wilkins stereo (£4675) and Driving Assistant Professional safety systems (£1650).

Jobs for the facelift

- Soften the suspension of the Competition version or add the standard M8 to the UK order book to better suit craggy UK road surfaces.
- Add more richness and luxury feel to the interior.
- A bit less filtering and more natural feel from the steering would be welcome.

ROAD TEST RIVALS

Verdicts on every new car, p82

Price
Power, torque
0-62mph, top speed
CO₂, economy



1 ASTON MARTIN DB11 VOLANTE
AMG-sourced V8 fits the DB11 Volante's character to a tee. It's one of the sharper-handling cars in its class, but its cabin lacks some of the Bentley's pizzazz.

★★★★★

£159,900

503bhp, 513lb ft

4.1sec, 187mph

230-265g/km, 28.3mpg



2 BENTLEY CONTINENTAL GTC
The new Conti GTC V8 would be a better fit than the W12, but we've yet to drive it. This is by far the most opulent car here but the M8 betters it for straight-line pace.

★★★★★

£175,100

626bhp, 664lb ft

3.7sec, 207mph

317g/km, 20.2mpg



3 MERCEDES-AMG S63 CABRIOLET
Despite its age, the S63 Cabriolet is as impressive as ever. More luxurious than the M8 and a more capable GT. Magnificent.

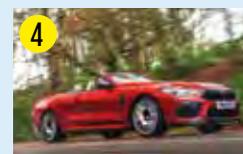
★★★★☆

£145,005

604bhp, 664lb ft

4.2sec, 155mph

250g/km, 23.5-23.9mpg



4 BMW M8 COMPETITION CONVERTIBLE
M8 Competition has straight-line performance to spare, but its more focused set-up hampers its suitability as a super-GT car.

★★★★☆

£130,435

617bhp, 553lb ft

3.4sec, 155mph

246g/km, 25.2mpg



5 FERRARI PORTOFINO
Entry-level Ferrari is quick, loud and exciting but, like the M8, its more hardcore set-up feels at odds with its positioning as a luxurious GT.

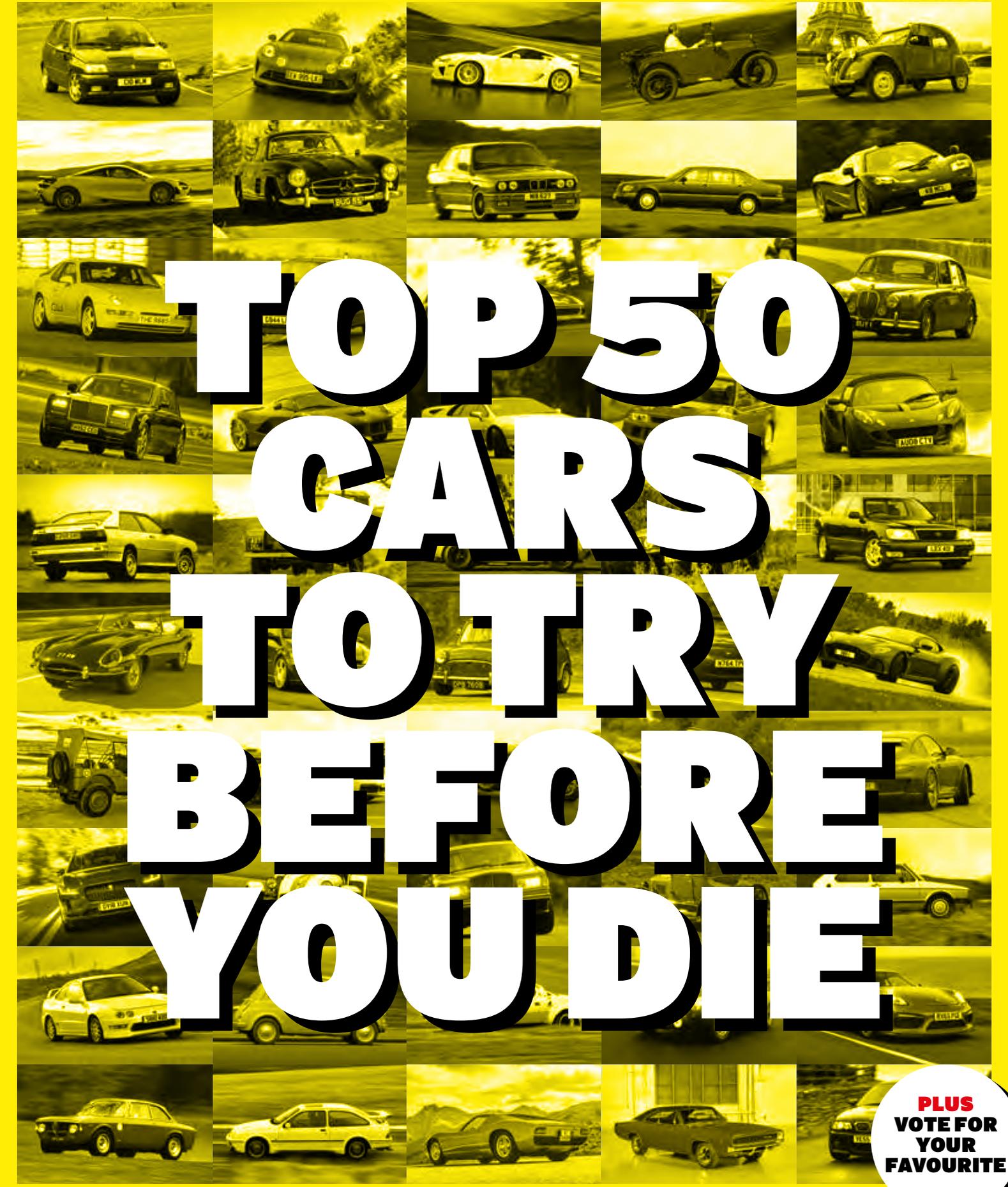
★★★★☆

£166,551

592bhp, 561lb ft

3.5sec, 199mph

245g/km, 26.4mpg



TOP 50 CARS TO TRY BEFORE YOU DIE

**PLUS
VOTE FOR
YOUR
FAVOURITE**

Andrew Frankel picks 50 legendary cars, from the humble to the exotic, he thinks you simply must drive at least once. Let the countdown begin...

50



BMW M3 (E46)

Not quite the best M car perhaps, but almost certainly the best M car bargain out there. The last such car to be powered by a normally aspirated straight-six motor, many might argue the sound of the 3.2-litre engine was grounds enough to make it onto this list, but it also came with one of the best balanced chassis in the business.

49



Ford Model T

Here not because it's fast or brilliant to drive (in fact, it's a nightmare), but because it's almost certainly the most important car ever produced, bringing motoring to the masses like none before it, changing the way the world thought about cars.

48



Bentley Turbo R

Technically not exactly brilliant, but what does that matter in a car as charming and characterful as this? Once described as 'a tidal wave on wheels', the Turbo R gave self-respect back to Bentley and set it on course for its high-flying position today.

47

Renault Clio Williams

Not the fastest of hot hatches, even in its day, but even now still one of the most entertaining ways of getting from one place to the next within the format. Light, poised and superbly communicative, it's probably the best hot hatch from probably the world's greatest creator of hot hatches.



46

Audi Quattro

To those who weren't around at the time, it's hard to explain the impact of this car – not least because it came from Audi, a company with no track record of producing seminal driving machines. But it was: permanent four-wheel drive and a 200bhp five-pot motor provided one of the most memorable driving experiences of the 1980s.



MY DREAM DRIVE ALFA ROMEO MONTREAL

Brief stints in both a Ford Escort Cosworth and Porsche 959 have made me wary of driving those childhood bedroom wall cars; they can never possibly live up to your idealised notions. Think I'll pick something I've come to understand and worship in later years, and would hope desperately not to be disappointed by: an Alfa Romeo Montreal. Incredible looks; do you reckon the drive could ever measure up? **MS**



FIVE CARS TO STEER CLEAR OF



1989 Ferrari 348 TB

One of the prettiest but, beneath the skin, least lovely of all Ferraris. Transverse gearbox was awkward but it was the handling balance that really spoiled it. Facelifted into F355, which showed how good it could and should have been.



1980 Renault 5 Turbo 2

The mid-engined Renault 5 is a legend, largely down to its insane appearance. But it was a disappointment to drive: it wasn't very fast, the pushrod 1.4-litre motor was a lag-prone nail and if the back went on a wet surface it would stay gone.



1992 Ford Escort Cosworth

Treading on hallowed ground here but the truth is it was not a patch on the brilliant Sierra it replaced. The Sierra was beautifully balanced, the Escort just gripped. And understeered. I've rarely felt more let down by a new car.



1982 Lamborghini Countach LP500S

I understand from someone who knows that later 48-valve cars were brilliant, but the LP500S I drove was cramped, uncomfortable and not even that quick. The bark was great, the bite was missing.



1993 Porsche 911 Turbo 3.6 (964 generation)

Has there ever been a bad 911? You bet: this one was a monster. Extreme understeer followed by terminal oversteer and an unresponsive engine off boost. A novelty that wore off very soon.



45

Alfa Romeo GTA

Only 500 were built as pure homologation specials, with jewel-like twin-plug, twin-cam 1.6-litre engines, alloy bodies and a dry mass of less than 750kg. Utterly dominant in racing, but simply exquisite in 'Stradale' road trim, this is the best Alfa Romeo of the post-war generation.



44

Ford Focus RS (Mk 1)

The original Focus RS was an astonishingly well-judged synthesis of necessary practicality, strong power and simply epic handling. As rapid across country as any number of purpose-built supercars and, if you can find a good one, perhaps the best-value fast Ford you can buy today.



43

Jaguar MkII

People associate these with Inspector Morse bumbling around Oxford, but they deserve so much more. The 3.8-litre version offered exceptional power and poise for 60 years ago, one reason they were the weapon au choix of everyone from saloon car racers to getaway drivers.



42

Willys MB

Better known as the Jeep, it famously won the war alongside the Dakota and the landing craft, at least from Eisenhower's perhaps somewhat partial perspective. Even so, if you ever wondered how your SUV got that way, it all started here with a name whose origins are argued about to this day. Slow, uncomfortable, indestructible.



41

Lexus LS400

We couldn't believe it. A Toyota that rode (much) better than a Rolls-Royce, with an engine so quiet at idle you needed to look at the rev counter to know it was turning. The most remarkable luxury car of its era and still, in a way, the standout Lexus.



40

Honda Integra Type R

It is incredible to see the cult following this little coupé has earned itself. But this was Honda at the height of its engineering powers and the Integra was the greatest expression of its talent for producing brilliant driver's cars. Some even say it's the best front-drive machine of them all.



39

Austin 7

Our answer to the Ford Model T, the car that more than any put Britain on the road. Simple but beautifully realised, slow but still fun to drive, look at one today and see how hard it is not to smile. Drive one and your grin will stretch from ear to ear.



38

Jaguar I-Pace

Not just included here for what it is, which is a damn fine electric car but for what it represents: Jaguar doing things its way. For too long, Jaguar has followed the lead of (mainly German) others. Yet it was always at its best setting the trend, not following it, and you only have to look at the XK120, E-Type and original XJ6 to know it. The I-Pace is a return to that mindset. Long may it last.



37

Land Rover Series I

No, it's not the first SUV but it is undoubtedly the most influential. How funny for a car designed with straight edges and built from scrap aluminium left over from the war because it was intended as a stopgap and that was the cheapest way of making them.

Porsche Cayman GT4
 Either generation will do, but in this case we mean the first. Much of the power deficit to the vaunted GT3 was offset by better weight distribution and lower overall mass. An outstanding driver's car for a fraction of the price of the 911 equivalent.



36



35

Mitsubishi Evo VI Tommi Mäkinen

It's a shame cars like this are no longer fashionable – few made their driver feel more of a hero. Immense power just set the scene: it was the balance and agility that made you feel like a WRC winner. Any Evo is good, but this was the best.



34

Porsche 968 Clubsport

In pure handling terms, probably still the best balanced Porsche. The lightweight Clubbie came from a time when Porsche actually charged less and not more for removing equipment, making this 968 not just a superlative driving machine but a surprisingly affordable one too.



**MY DREAM DRIVE
 AUSTIN-HEALEY
 100**

This crude but beautiful sports car narrowly wins my private contest over the Jaguar XK120, another emblem of post-war British optimism and engineering prowess.

I find this car's styling downright remarkable, given the simplistic way cars were created back then, and its driving position, magnificent long nose and meaty Austin four also made it very special on road and track. **SC**



FIVE CARS THAT JUST MISSED THE CUT



1978 Aston Martin V8 Vantage Oscar India

When I think of what I want an Aston Martin to be, this pretty much is it. A near-400bhp earth-shaking V8 installed in the nose of a gorgeous car, supplying just a little too much power to the rear wheels through a manual gearbox.



2014 BMW i8

A car whose only crime was to be years ahead of its time. In years to come, we'll look back and goggle at the fact this carbon-tubbed, three-cylinder plug-in hybrid with such gorgeous looks failed at the box office. One for the collectors, for sure.



1954 Citroën DS

Instinctively I think it should be in the list for its looks and groundbreaking technology; I just couldn't think what I'd rather lose to make space for it. If the driving experience came close to meeting the promise of its appearance, it would have made it.



1988 Lancia Integrale

By contrast I have no qualms about omitting the Integrale. It's a fine car, quite fun and got ever better in successive generations, but I never quite understood what all the fuss was about. A good car certainly – really good, in fact – but not a great.



2013 Ford Fiesta ST

The spiritual successor to the Peugeot 205 GTI, a car that first makes sure it has enough of what you need, then dedicates all its efforts to the provision of the purest fun. Worked then, works now. Inspired. All applies equally to its 2018 successor.

33

Mercedes-Benz S-Class (W140)

The S-Class of S-Classes, the most massively constructed, locked-in-vault Benz of them all, dating from a time when Mercedes wilfully over-engineered its cars, just because it could. The S500 with its punchy V8 was the best, and was an implausibly effective driving machine too.



32

Mazda MX-5

Thirty years. That's how long it's been since Mazda launched its gorgeous little roadster on the road and that's how long we've spent waiting for someone, anyone, to manage to better it. Some have tried, all have failed. Drive it and you'll see why.



31

Lotus Elise Sport 300

The Elise is a far more important car, but this is the best Lotus road car I've driven, with real power from its old 2.2-litre engine making the most of the best chassis then in the business. Perhaps the most lucid and vice-less mid-engined supercar that has been created.



28

Aston Martin DBS Superleggera

All that a modern Aston Martin should be: gorgeous, stupendously fast, superb to drive and with just a hint of cad about it. A modern-day DB5, and praise comes little higher than that.



30

Dodge Charger 440R/T

There's a good reason they chose this for The Dukes of Hazzard TV show in the 1980s, for it symbolises all that was good about America's greatest muscle car era. The 1968 spec cars look best, and the enormous 440-cubic-inch motor is a legend in its own right.



29

Bentley 4 1/2 Litre

The epitome of the vintage Bentley, all bonnet straps, Union flags and a cockpit that looks like that of a WW1 biplane. Difficult to drive owing to reversed pedals and a non-synco 'box, but get it right and there are still few more pleasurable driving experiences out there today.



27

Lotus Elise

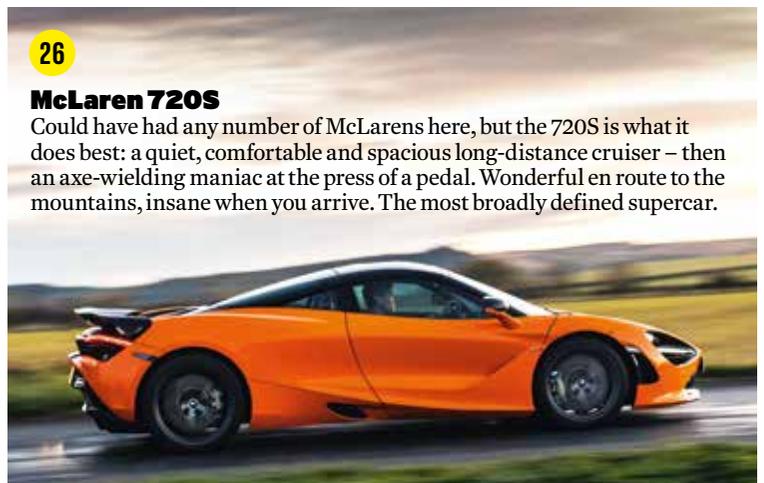
The car that saved the company. By going back to its roots and building something advanced but simple, fast but affordable, Lotus found its sweet spot and has been cashing in on it ever since. A landmark in the history of one of the most important and enigmatic brands.



26

McLaren 720S

Could have had any number of McLarens here, but the 720S is what it does best: a quiet, comfortable and spacious long-distance cruiser – then an axe-wielding maniac at the press of a pedal. Wonderful en route to the mountains, insane when you arrive. The most broadly defined supercar.





25

Mercedes-Benz 300SL

It's not just about the doors, though those gullwings are quite some calling card. What it is, in fact, is the first car with a credible claim to the title 'supercar' and one whose combination of performance and civility in 1954 made everything else on the road seem instantly obsolete.



24

Citroën 2CV 'AZ'

An AZ is an early car from the 1950s, with a ripple bonnet and a 425cc engine, close to the inspired original and pre-war vision for the car. One of the slowest cars on the road owing to just 12bhp, but one of the most charming too. Being unhappy and on board at the same time is not possible.



23

Ariel Atom

Any will do, though the later the better. The slowest will stir your soul, the quicker will fry your brain. The most intense driving experience a five-figure sum will buy. Our choice: the 3.5R with its sorted handling and maniac supercharged engine.



22

AC Cobra

Originals have strange steering and primitive chassis, even for their age, and far too much power for their own good. Occasionally frustrating and frequently frightening, but these Anglo-American icons are also always heart-stoppingly exciting.



21

Porsche 911 (992)

Someone considerably richer than me once said your motoring education was incomplete until you'd driven a 911 hard. But he was right, and it's the same today. For 55 years others have tried to better it and for 55 years they have failed. Now as then it is the default choice for anyone looking to drive a true sports car every day.



**MY DREAM DRIVE
FERRARI 250
GT SWB**

Sometimes it's a Lamborghini Miura or Countach, sometimes a Bizzarrini. But when I'm in the hills above Nice, likely driving another compact crossover, and I ask myself what I'd rather be driving instead, more often than not the answer's a Ferrari 250 GT SWB. **MP**



20

Original Range Rover

Not the first luxury SUV (Jeep Grand Wagoneer, take a bow) but the genre-defining best. Look at all those new SUVs from Bentley, Lamborghini, Rolls-Royce, Maserati and, shortly, both Aston Martin and Ferrari. Their journeys all started here.

Ford Sierra Cosworth

A rear-drive Sapphire Cosworth is actually a fraction nicer to drive but loses the cartoonish presence of the big-winged Sierra hatch. A racing car for the road in the truest sense, and as good to drive as such billing suggests.



19

“
For 55 years others have
tried to better the 911, and
for 55 years they have failed
”



16



BMW M3 (E30)

If a Martian fell to earth and asked the meaning of the phrase ‘it ain’t what you do, it’s the way that you do it’, you could do no better than strap him, her or it into an original M3 to explain. Superb motor, perfect balance, sublime experience.

15



Fiat 500

Everyone raves about the Mini and rightly so. But Dante Giacosa’s Nuova Cinquecento also sat four, was far more manoeuvrable around town and was already on sale when the Mini was launched. More fun than you could possibly imagine from just 18bhp.

Lexus LFA

It was late in appearing and fiendishly expensive, but my goodness it was fun while it lasted. An incredible chassis powered by a V10 engine that still has a good claim to being the best used in a road car. Such a shame, then, that it never spawned the successor it so deserved.

14



18



Aston Martin DB4 GT

A posher homologation special than the Sierra and the last Aston road car built specifically with racing in mind. With the James Bond looks came monster power, little weight and cornering to remind you what your side windows are for.

13



Caterham Seven

As viscerally thrilling as an Ariel Atom? Perhaps not quite, but close, and it comes with a hood and even a heater if you want, so it can be used all year round. And no car is any fun parked in the garage.

17



Lancia Stratos

You’d probably hate the Stratos the first time you try it. Other cars just don’t drive like this. Sat on a vanishingly small wheelbase and designed to change direction in an instant, it is an acquired taste. But once you have it, it never leaves you.



12
Rolls-Royce Phantom
 Having seen the complete Horlicks it made of Rover, many of us worried what BMW might do with Rolls-Royce. The answer was to create the finest luxury carriage of its era and a car as worthy of the name as any other.



11
Volkswagen Golf GTI (Mk1)
 Not the first hot hatch, but the car that perfected the art and set the template for others to follow. Simple, strong, fast and fun, it seems staggering that no one had thought of it before. An absolute icon of pragmatic car design.



9
Alpine A110
 For once a sequel that improves on the original and, in the meantime, changes the way a complacent world thinks about sports car design. One of very few true icons of our age and one of the finest driver's cars yet conceived.



MY DREAM DRIVE
JENSEN FF
INTERCEPTOR
 I've never driven an Interceptor but have always loved its looks. The FF combines four-wheel drive and anti-lock brakes and I'd love to know how sophisticated these systems feel and find out how advanced they were at the time. I'd love to drive my 94-year-old mum to a pub in one. It's her favourite car of all time, yet like me she's never been in one. **CG**



10
Lamborghini Miura
 I know, Miuras are meant to be rubbish to drive. But there's not a petrolhead who's seen the film who has not dreamed of slipping down into that unimprovable shape and making like the man in the opening credits of *The Italian Job*. Just without the bulldozer bit.

“
 There's not a petrolhead who has not dreamed of making like the man in *The Italian Job*
 ”



THE BEST FROM THE MAKERS WHO MISSED OUT



2011 Morgan 3 Wheeler
 A genius bit of marketing and a cracking good car too. Slower and more affordable than any other Morgan but far more fun, which is what matters. Not for long distances but there's no better 'pub car' in production today.



1990 Vauxhall Lotus Carlton
 When there are hatchbacks today with more power, it's hard to remember what the 377bhp Carlton felt like 30 years ago. It felt absolutely nuts. In a straight line it blew away the E34 BMW M5 but lacked the handling balance.



2011 Toyota GT86
 Still one of the world's best-handling cars, despite the paucity of power from its little flat-four Subaru motor. The fact that it is set up to slide and fitted with tyres designed not to grip tells you all you need to know. A car for drivers, not posers.



1991 TVR Griffith
 Griffs feel old today, but with all the stuff poorly fitted at the factory long since fallen off. Properly sorted, they feel solid and the looks, noise and power create a unique charm. Best is the rare 4.3-litre pre-catalyst car.



1982 Rover Vitesse
 With Ferrari Daytona-inspired looks, engineering by Spen King and a Car of the Year award to its name, the SD1 was a good start. But it was the 190bhp Vitesse that we remember today. The fastest, funniest big hatch of its age.



Mini (original)

Became both a fashion accessory and a Monte Carlo rally winner, a film star and a runabout for millions. Simple, spacious, affordable and fun, it was also the first to perfect front-wheel drive. Few cars of any size have been more important.



7

Peugeot 205 GTI

Enough people have done enough tests over the years for it surely now to be unarguable that the 205 GTI is the defining hot hatch not just of its era but of any era. A dizzying blend of performance, practicality and outrageous handling, wrapped up in landmark styling for an affordable price. And there's not much better than that.



6

Ferrari LaFerrari

I'd rather drive a P1 around a track and I'd rather use a 918 Spyder every day but, as a thing just to get in and drive, the LaFerrari was and remains the most engaging and accessible of all the hypercars.



5

Lotus Elan (original)

At least within the confines of the road car design, there is no greater expression of Colin Chapman's genius than his original Elan. Beautiful, tiny, ultra-light and fast, it was handling from which lessons can still be learned today that set it apart.



Porsche 911 GT3 RS (997 Gen 2)

The best version of the best sports car. This is a car you can use, with performance whose full range can be enjoyed, with exceptional handling and also a fine ride. As exciting as you'd want or need a road car to be.



3

Jaguar E-Type

A design landmark: one became a permanent resident of the New York Museum of Modern Art, alongside the works of Picasso, Monet, Cézanne and Degas. And it delivered on those looks. At least as fast as an Aston DB4, and less than half the price.



2

McLaren F1

The greatest supercar this country has produced. Moved the global boundaries of road car performance further and faster than any other. Commercially unsuccessful when new, its speed, scarcity and race record meant it would in time acquire the status of true automotive legend.



1

Ferrari F40

There have been times – rare ones, I concede – where briefly the Ferrari F40 is superseded in my mind as the greatest road car I've driven. It happened a few years back with the LaFerrari, and many years before with the McLaren F1. But once time is allowed for true perspective, there it always is. The F40. Enzo's last car.

Ferrari's thoughts on the car were much like the man: ribald and forthright. "This car is so fast," he was reported as saying, "you'll shit yourself." And in 1987 perhaps that was a risk. But we acclimatise: you don't expect any longer to run screaming from the room when Psycho comes on the telly, or vomit in your lap when The Exorcist is being shown, as did people originally, so I'm expecting the upholstery of Paul Winkelmann's F40 to remain out of harm's way. But that's not why I've borrowed it from Bob Houghton's Cotswolds Ferrari emporium. I don't really care how fast it is, I just want to see, hear and, above all, feel it working one last time.

Paul's is the perfect F40 – because it is far from perfect. It's a totally original car, well used and fitted with neither catalytic converters nor adjustable suspension, which BH Ferrari's F40 guru Russell Smith tells me is the most desirable spec to have. Bodily there is the odd blemish. Mechanically, it is bang on, completely standard but maintained in the peak of physical fitness. And as ever with these guys, there are no rules: here are the keys, bring it back when you're done.

Damn, it's exciting, and that's just walking up to it. It looks mean. The door opens to reveal an interior shorn of all frills. You sit in a race seat, feet in a carbonfibre tunnel on carpetless footwells. The door pull is a cable, the dials simple white on black clocks. The dash is covered in a felt material to minimise windscreen reflections. And save some primitive ventilation controls, that's all you have. And all you need.

Twist the key and press the little rubber button. Mayhem breaks out behind you. Anyone who says a turbo engine can't sound good has →



Beating heart twin-turbo V8 is too special to hide

“
The Ferrari F40 is about
the sense of occasion,
the totally immersive
driving experience
”



← never listened to one of these. It's growling and gurgling, spitting and popping, and that's just at idle. If its looks don't intimidate you, the noise will.

The F40 is wide, left-hand drive and has rubbish visibility. Driving it in town is horrible. But you need to go slowly to warm the engine and gearbox oil before letting it off the leash. The iconic steel spindle slots with increasingly satisfying precision around that exposed five-speed, dog-leg gate.

At medium speeds the F40 is hilarious. It doesn't shut up, and I don't just mean the whoops and gunfire from the engine, but the constant commentary from the steering, too. It tracks like a kart because it's light, lighter even than a McLaren F1. A LaFerrari is at least 50% heavier than this.

And then all the conditions become right. Second gear is fine because on 335-section Pirellis traction is not an issue. Then wait until 3500rpm before the boost gauge flicks hard right. There's a howl and a shriek, and you have to be quick. This is old-school, low-compression, massive-boost turbocharging: more revs bring more boost brings more revs. The needle accelerates around the dial, the Ferrari thrusts forward with barks from its exhausts and gasps from your lips. Pull straight back into third at 7000rpm and let it happen all over again. And again.

This engine is an animal but if you keep it busy it can be, if not exactly tamed, then at least controlled. Which is when, if conditions are right, you hit the sweet spot. You have to work far harder than in any modern supercar, but that's probably the single biggest reason the F40 tops this list. Many today are quicker, but none is so involving.

You need to respect this machine, but also to trust it. Unlike other Ferraris made around that time, 288 GTO included, the F40 is remarkably faithful on the limit, so if the boost arrives a

“
There's a howl and
a shriek, and you
have to be quick
”



VOTE FOR YOUR FAVOURITE

So Andrew Frankel thinks the Ferrari F40 is the ultimate car to try before you die. Now we want to know what you think. You can vote for your favourite from our top 50, and the winner will be named the Readers' Champion at this year's Autocar Awards. For details and to vote, visit www.autocar.co.uk/awardsvote2020



In his happy place: Frankel soaks up every moment in the no-frills interior. And with a cacophonous, ever-changing soundtrack like this, who needs touchscreen infotainment?



Simplicity in engineering and design is key to F40's alchemy

trifle suddenly at the exit of a corner, you can be reassured that, first, the chassis will tell you the moment traction is about to break and, second, the steering will round up any movement at the back without even the need to lift.

Does that explain why it's number one? No? Okay, then try this. It's number one because of all the thousands of cars I've driven doing this job, it's the one I think of most. It's the one I most miss being in, the one I most don't want to get out of. Speed and grip? They're incidentals. It's about the sense of occasion, the totally immersive driving experience; it's every crackle from the engine, every scrape from the gearshift, every snatched breath and every tick of the bodywork as you sit at journey's end, unable to take in what just happened.

And yes, it is also that this is Enzo's last car. I know he was difficult, know too he cared little for his road cars and even less for those who drove them. But I don't care. The F40 has his defiance, his iconoclasm and, though I never met him, what I imagine to be his spirit, too. It is, to me, still the most exciting road car in the world, if now far from being the fastest. I don't know how you get to drive one before you die, but believe me, it's the one you should covet above all the rest. **A**



Even at a standstill, the last Ferrari of Enzo Ferrari's lifetime holds you in its spell. Forget numbers: it's still the best

HIGH-RISE DEV



ELOPMENT

Has Volkswagen ended the long wait for a sporting crossover that's worth considering over a hot hatchback?

Richard Lane lines up the T-Roc R next to the latest BMW M135i to find out

PHOTOGRAPHY OLGUN KORDAL



Pearl-clutching purists won't appreciate the amusing synthesised growls these cars make in their aggressive driving modes, but it'll be a welcome bit of theatre for most owners. The T-Roc puts on the bigger show, popping away loudly on downshifts, and that's even without its optional Akrapovic exhaust.

Have a go at listing all the go-faster crossovers you could buy and get change from, say, 45 grand. And please take your time.

The choice is vast, so I'll help out. You'll already know the Cupra Ateca, but if you're prepared to spend a bit more, you can have the much larger, twin-turbo diesel Skoda Kodiaq vRS. There there's the Audi SQ2 and BMW X2 M35i; these are the ones for those who like it premium, and they'll soon be joined by the GLA 35, which will enter a Mercedes-AMG line-up that today includes the same number of crossovers as saloons. That's vaguely sacrilegious when you think about it.

Also expect a Ford Puma ST and for Nismo to breathe on the new Nissan Juke, allowing both models to compete with the Mini Countryman JCW, whose 302bhp output is about as mini as its footprint on the road.

And these are merely some of those that will ever sit on a showroom floor. Abarth once built a prototype 500X with the engine from an Alfa Romeo 4C, while Peugeot has toyed with the idea of a reverse-homologated 2008 GTi loosely inspired by its Dakar Rally-winning namesake. Industry insiders must have stories of countless similar projects, many of which may one day still result in a model that you can go out and buy.

Put simply, the scope of this class has become bewildering and will surely become more so with rising demand. Whether it should be another matter – and that's why we're currently standing in a Welsh lay-by in mid-January, enduring a deluge. We have the keys to Volkswagen's new T-Roc R, which we suspect may be the finest 'affordable' hot crossover to date. That leads us to the second reason we're doing this. If the T-Roc R does turn out to be truly, unusually good, could it be the first to make a stronger head-and-heart case for itself than a comparable hot hatch – that is, one of outstanding stock and four-wheel-drive security? Because up to now, the answer to that has always been: "Not on your life." →



M135i rides on handsome 18in alloy wheels



T-Roc R goes an inch larger with its rims

M135i gets half the exhaust tip count of its rival but produces more power

“
Each features on-demand four-wheel drive that heavily favours the front
”

Until three weeks ago, that hot hatch would, quite inconveniently, have been the Golf R. But as you can no longer buy a new one (almost as though it made way for the T-Roc R, but actually a new Golf R is coming soon), we've settled for the next best thing: a BMW M135i xDrive, which Autocar testers would take over an AMG A35 more days than not.

At the top of their respective line-ups, the T-Roc and 1 Series are remarkably similar. Each uses an in-house-developed four-cylinder 2.0-litre turbo engine, hits 62mph in 4.8sec and features on-demand four-wheel drive that – to the eternal angst of many BMW diehards – heavily favours the front axle. They will also take up comparable space on your drive, although the crossover is taller,



M135i looks less purposeful than its forebear and has sacrificed two cylinders

wider and shorter. It therefore looks conspicuously cuboid next to the low-slung BMW. Everyone in attendance feels the T-Roc R's contoured arches look the business and that this new-gen 1 Series is far from BMW's finest visual achievement, with rear wheels that look a bit puny and a slightly piggish grille. But for sheer sporting pretension, there's still only one



winner – and it ain't the crossover.

The T-Roc R doesn't cover itself in glory for unbridled spirit once you're inside, either. This is an issue that puts many of us off crossovers straight away. The raised seating position and high ceiling make for a breezy ambience and better back-seat ergonomics than most hot hatches could ever muster,



VW Group's EA888 engine is a familiar sight

but these characteristics don't imbue the place with much intent. You get a clearer, longer view of the road ahead but in doing so sacrifice a good portion of your relation with it. Happily, you can drop the seat so low that you'll wonder how much deeper the hip point really is in the BMW, but then the cabin feels oddly incoherent with so much metal above your eyeline.

The M135i can feel cramped and chaotic, but you wear it much more naturally and, while we're at it, perceived quality befits the £36,430 asking price, which can't be said of the £38,450 T-Roc R on account of so many elements and surfaces seemingly borrowed from the Polo. So, the traditional hot hatch is the more desirable of the pair in look and feel, both inside and out. But you might say 'twas ever thus.

The T-Roc R finally starts to live up to the hype once you get those 19in Pretoria alloys rolling. After all, this is essentially a Golf R in an overcoat: the two use the same MQB platform, although the newcomer's wheelbase is fractionally shorter, which if anything might even improve agility. The well-known EA888 engine is carried over in the same 296bhp tune and retains an uncanny ability to →

HOT HATCH ALTERNATIVES OVER THE AGES

1990



RENAULT 19 CHAMADE 16V

Based on a hot hatch that some say is even better to drive than its Golf GTI and Escort RS2000 contemporaries, this saloon packed 142bhp with only 1070kg of pleasingly thuggish executive body to haul along. It handled decently and later received a sprinkling of BTCC stardust but was never as popular as the hatchback.

2005



VAUXHALL ZAFIRA VXR

"Is the Zafira VXR the most pointless car since the automatic Lancer Evo?" So began our test of Vauxhall's original hot MPV, which with 237bhp and a six-speed gearbox could've been a pleasant surprise. It wasn't, with a brutal ride direct from the age of the horse-drawn carriage but little to suggest the chassis could cope with the potency on offer.

2014



PEUGEOT RCZ R

Here's a hot French car that's rather more desirable than the Chamade. Making 266bhp, the RCZ R was the most powerful Peugeot there had been, and it had envy-inducing looks topped off by a double-bubble glass roof. Firm-riding but precise with an LSD-enabled playful side, it also had two small but useful back seats.

Both develop immense traction - even in weather like this



←slap you with meaningful torque pretty much anywhere in the rev range, even if it isn't quite as responsive as the new - deep breath - B48A20T1 twin-scroll in the BMW.

Power is metered out using an electronically operated coupling that can send up to half the available torque rearwards and Volkswagen's XDS electronic differential at the front. The latter simulates a limited-slip differential by braking a slipping wheel and forcing drive to the other side. It's also the reason why the Golf R can feel nicely rear-balanced at times. Even though only half the total torque can go to the back axle, you can be left with an overall rear bias if the XDS system cuts in to limit drive at the front - which is quite neat.

What's more, the T-Roc R is only 50kg heavier than the M135i. That's mass anybody would rather not have, of course, but it's not all that much in the context of 1575kg. Perhaps that's partly why the T-Roc R moves so much more fluidly than expected on its optional (£695) Dynamic Chassis Control suspension. In drier moments, it permits you to fly across the ground, leveraging generous wheel travel but pairing with it an

exemplary degree of control for freakishly smooth progress.

This ability to simultaneously react to but also mollify the road is easily best-in-class and the best in this test. In this respect, the T-Roc R moves like an old Lancia Delta Integrale, seemingly impervious to ruts and bobbles, only with, you know, actual body control. Picture a top-drawer mogul skier and you've got the idea.

You can therefore arrive at corners very fast indeed, which is where the T-Roc R performs arguably its most impressive trick - but probably also loses this contest. The aluminium front subframe and new engine mounts have clearly had some positive effect, because the car gets its nose into corners wonderfully well. Moreover, it achieves this without making any misguided attempt to do so purely by way of psychotic off-centre steering response (the steering, incidentally, has also been revised from the Golf R, and this variable rack never feels anything less than beautifully geared). There's so little roll, even in the suspension's default setting, and then you're met with Volkswagen's trademark neutrality. Zap: into and

2nd

Sublime in parts and versatile but never shakes its veneer of inauthenticity and offers neither the interior nor the dynamics to justify its steep price.



Disappointingly, the T-Roc's interior isn't up to Golf standards

out of corners it goes, dispassionate but highly effective and, frankly, difficult to find much fault with.

And then you climb down into the M135i. High scuttle, low roofline, wheel securely at chest height: in short, much more enveloping. The ride is authentically hot hatch taut, but it isn't brittle. And although the steering is considerably more vulnerable to deflection than that of the T-Roc R, and the quick elasticity of its action isn't so immediately easy to get along with, there's an earthy connection you get from having less metal, rubber and plastic between your anatomy and the treadblocks.



Hatchback's snug cockpit feels a lot sportier

1st

Gives more in driver involvement than it gives away to the T-Roc R in space and comfort. Not the finest hot hatch but good enough to beat the best comparable crossover.



This is quite a pertinent test, because BMW has never before built a 4WD hot hatch and R GmbH hasn't developed any form of crossover since the Touareg R50 of 2008, whose 5.0-litre diesel V10 gave it 627lb ft. That probably wouldn't find too many buyers today...

Within the space of two committed corners, you're aware of the latency in the taller car between your input and its reactions. It's harder to read the road ahead, because you don't have height on your side, but equally you're given more confidence to properly attack.

The T-Roc R is the more compliant long-distance car, especially with its dampers set to their syrupy softest. It's also easier to climb aboard and your back-row passengers will feel more relaxed and comfortable than they would in the M135i at all times. Actually, perhaps not when you approach the ultra-high limits of grip and traction, because it wouldn't be a surprise if the T-Roc R were even quicker than the M135i in terms of point-to-point pace.

Luggage capacity isn't the strolling crossover victory you might expect, though. There are just 12 litres in it, and the hatchback's boot is deeper. Economy? Predictably, less mass and a smaller frontal area mean the

crossover comes off worse, with a combined 32.5mpg versus 35.3mpg for its old-fashioned rival.

There's no doubt the T-Roc R would slip into your life with barely a ripple, which makes its B-road ability all the more impressive. But let's not pretend the M135i wouldn't be supremely easy to live with also.

And what about those who do want a ripple or two from their performance car, even one with a daily brief? Well, they're better served by the BMW. Its steering has more life, its chassis has more natural agility and, although we haven't touched much on it here, its driveline is simply more finessed when you ask it difficult questions. The hot hatch formula seems so simple, yet it doesn't necessarily translate perfectly to other automotive realms. To the casual driver, there may be no discernible difference between the T-Roc R and M135i. But to the rest of us, with the crossover's extra height and weight, the magic is lost. **A**

The crossover would probably be the winner of a point-to-point race



	BMW M135i xDRIVE	VOLKSWAGEN T-ROC R 4MOTION
Price	£36,430	£38,450
Engine	4 cyls in line, 1998cc, turbocharged, petrol	4 cyls in line, 1984cc, turbocharged, petrol
Power	302bhp at 4500-6250rpm	296bhp at 5300-6500rpm
Torque	332lb ft at 1750-5000rpm	295lb ft at 2000-5200rpm
Gearbox	8-spd automatic	7-spd dual-clutch automatic
Kerb weight	1525kg	1575kg
Top speed	155mph (governed)	155mph (governed)
0-62mph	4.8sec	4.8sec
Economy	34.4-35.3mpg (WLTP)	32.5mpg (WLTP)
CO₂, tax band	182g/km (WLTP), 35%	176g/km (NEDC eq), 37%

Lose the £5000 Performance Pack and £3500 by way of the government grant and the price falls to £41,400. An entry-level front-drive model will eventually drop the price further.



AND THEN THERE WAS 2

After Polestar's limited-run, debutant 1 comes, logically, the 2 – its mass-market, make or break EV. Richard Lane drives it

Hällered proving ground sits an hour's drive east of Gothenburg and seems an exemplary place to experience a Polestar 2 for the very first time. Sets of quiet, remote test tracks wind among the forest and chime with the car's environmental brief. Unlike the plug-in hybrid Polestar 1, the 2 is entirely electric, with a WLTP range of 311 miles and nothing less than the Tesla Model 3 in its sights. This place also has space enough to properly exploit the performance on offer. Which is lucky because, with a dedicated electric motor for each axle, the 2 makes 487lb ft – more even than the Nissan GT-R on p42 – and does so almost instantly.

But Hällered also feels an odd place to become better acquainted with the 2, which at £49,900 will cut the cost of entry to the Polestar owners club by almost two-thirds and will exist as a big-volume model next to the hand-built, 1500-off £139,000 Polestar 1 grand tourer. These smaller cars will be assembled in the Luqiao facility of Polestar parent company Geely in China and the battery modules are from LG Chem in South Korea. Siemens in Germany builds the motors and the brand recently opened a 120-strong R&D facility in Coventry. It's an amazingly global product whose muscularly attractive design will ensure that it draws eyeballs and graces the streets in fashionable

places around the world. Yet here we are, standing in the Swedish bush.

But this is where the magic happens. "The first thing the driver gets from the chassis is how the steering feels," says Joakim Rydholm, the lead chassis engineer and someone not only with a clear mission sense but also softly voiced but nevertheless Italianate levels of passion. "Then the rest of the suspension should work in harmony with the steering," he says, revealing that the chassis is set up for slight oversteer. He says the manually adjustable Ohlins dampers alone were iterated through 120 different tunes, with removal and hardware changes required each time: "There are no shortcuts: it's hard work



Olle Fast (right) talks powertrain with Lane

“
With a dedicated motor for each axle, the Polestar 2 makes 487lb ft
”

WHAT'S IT LIKE TO DRIVE?

No point beating around the bush: the Polestar 2 is good to drive. It may never set your synapses on fire but the natural steering response is well matched to what the suspension is doing, and on Hällered's quick, flowing handling course, the Ohlins dampers - hydraulically textured in their movements - only ever need one bite of the cherry to get the body under control.

Given the powertrain layout, it is no surprise that the car's balance is good and one can't fail to notice how high the limits of grip are

compared with, say, an XC40. It can be teased into neatly rotating on the brakes, but snow and ice are required to get the car expressing itself under power.

On the more challenging rough-road tracks (there are surfaces resembling LA freeways and Perthshire B-roads), the ride is on the firm side but remains genuinely compliant. Gut feel says this car ought to cope well with UK surfaces, although the softer set-up of non-Performance-Pack versions might be best for daily driving.



It's well balanced and grippy, with good body control

Given that Polestar's owner Volvo is in the midst of an almighty product offensive, these are not exactly slow days at Hällered and so our time here is short. Olle Fast (powertrain expert, naturally) joins the discussion and reveals more. We know the 2 sits on the same CMA platform as the XC40, but it also features a unique front subframe for crash protection (combustion engines being more absorbent than electric motors), has modifications at the rear and supports a battery whose shape leaves good rear footwell space, which is rare in an electric car.

In fact, barring the small boot and poor rearward visibility, the 2's cabin is superbly conceived. Where the Model 3 goes for an expansive, minimalist ambience, this is more classically enveloping. The window line is high and the glasshouse vaguely pillbox, and the standard panoramic roof is a game-changer because, without it, the high 'transmission' tunnel, abrupt 11.0in display and blade-shaped dashboard might have made the place feel too confined. As it is, the cockpit feels safe, secure and involving, and even in this early-stage verification

prototype, the fabric and wood trims hit high notes for perceived quality. Soft but supportive seats - a modern Volvo speciality - complete the surprisingly lavish picture.

Back with the not-so-oily bits, Fast explains that the torque split is variable between 60:40 and 40:60 and Rydholm adds that steering angle is used to inform the split and help the car rotate. Drive smoothly and it looks for grip; get punchy and it will begin to favour the rear. Fast also says that for more power, they'd need a better-flowing battery rather than stronger motors, although so rapid is the pace of development that improvements are being made "more or less on a daily basis". For now, it's 402bhp whether or not you go for the Performance Pack, which brings 20in wheels with Continental SportContact 6 tyres, the Ohlins dampers and gold-caliper Brembo brakes.

For an electric mass-market family car, the Performance Pack is overkill. And, in truth, so is the surging performance of the 2. But there's appeal in the way this machine concurrently feels both highly rational and slightly illogical, and at a time when so many automotive pleasures come with guilt attached, that's exciting. That the people behind this electric car are what we might still describe as 'petrolheads' is even more so. **A**

With its broad rear-light signature and deadpan face, the Polestar 2 looks bigger on the road than it really is. Its footprint sits comfortably with that of both the BMW 3 Series and Tesla Model 3, although it's taller than both. The hip point feels somewhere between the S60's and XC40's.

behind the steering wheel to get a good car. The human is sensitive and you cannot calculate that."

All of which should be music to our ears because, as always, it comes down to priorities. Polestar will not operate dealerships but chic 'spaces'; the cars can be ordered online only; it will make a splash among the general public, with cutting-edge looks and zero-emission powertrains; and it is a subsidiary of a marque that recently announced an intention to limit its cars to 112mph and, bluntly, has never given us a world-class driver's car. It would have been so very easy for driver appeal to descend so far down the 2 to-do list as to become irrelevant, but that has not at all been the case (see separate story, above).



Polestar 2 is an eye-catcher with plenty of road presence

POLESTAR 2

Price	£49,900
Motor	Two, AC synchronous, permanent magnet
Power	402bhp (total output)
Torque	487lb ft (total output)
Gearbox	1-spd (dual)
Kerb weight	2020kg (approx)
Top speed	140mph (est)
0-62mph	4.7sec
Range	311 miles (WLTP)
Battery	78kWh, lithium ion

“
At its heart, handling is not
measured by a car’s ability to
powerslide until its tyres melt
”



CAN YOU HANDLE IT?

What defines bad, good or even truly great handling? Veteran road tester **Andrew Frankel** gets to the bottom of what makes the perfect driver’s car

PHOTOGRAPHY OLGUN KORDAL

The white Porsche 911 angles into the turn. It’s a quick corner, top end of third gear, but instead of gently coaxing it into the apex, managing its mass and keeping the loaded tyres within the circle of adhesion where longitudinal and lateral forces haggle eternally for grip, the driver sharply lifts and then flattens the throttle. Instantly the car is sideways. It wants

to spin, but the driver catches the fast-moving tail with the steering. But no attempt at recovery is made. Instead the foot stays down, the tail stays out, now towing a ball of super-heated, atomised rubber particles. Yet it still finds the apex and still finds the exit before snapping straight and howling away up the straight beyond. A few minutes later its driver brakes the car to a halt in the pit lane, lowers the window and says to anyone listening:

“That is what I call handling.”

And I suspect neither you nor I would have much truck with that. But just because it’s true doesn’t mean that’s the whole truth or, as I shall seek to show, even very much of it. What follows is my attempt to describe what handling actually is – and for the most part it has very little to do with the terrible twins of oversteer and understeer – and what qualities need to be engineered

into a car in order to provide it.

At its heart, handling is not measured by a car’s ability to powerslide until its tyres melt but by something far more simple and precious: the ability of a car to execute the instructions of its driver.

If that sounds like a statement of the obvious, then you are one up on those chassis engineers the world over whose efforts fail in this simplest regard. To see what I mean,



GREAT-HANDLING CARS



CITROËN 2CV6

Genius interactive independent suspension and low centre of gravity courtesy of flat formation engine made for implausibly good if visually dramatic handling.



FERRARI DINO 246GT

Not the first mid-engined car but the first to keep proper control of its back end when it ran out of grip, helped by superb steering and not much adhesion.



PANTHER SOLO

Mired by myriad other issues, the first car to marry four-wheel drive with a mid-engine layout offered miraculous balance and superb steering – while it lasted.



CATERHAM SEVEN

For more than 60 years, Caterhams and their Lotus 7 predecessors have been proving that when it comes to handling, there's no substitute for keeping the weight off.



PORSCHE 911

Even the early ones, which gained a bad rep because people had not yet learned how to drive them. With a slow in, fast out approach, a 911 has stunning handling.

take your car to a quiet roundabout, apply what you judge to be the requisite steering lock to negotiate it and don't move your hands. Normal road speed is fine. Does it go where you thought you'd pointed it? If so, can you continue to lap said constant-radius roundabout without moving the steering wheel? If the answer to either question is 'no' then your car is not going where you want it to. It is not executing your instructions.

You'd be amazed by how many cars cannot perform this apparently simplest of tasks. When I first started doing this job more than 30 years ago, I was tutored in precisely this phenomenon by none other than former Formula 1 driver, Jim Clark team-mate and Autocar columnist John Miles; I was staggered by how imprecise and inaccurate most normal road cars were. Over the years that followed cars did get a lot

better as chassis structures gained rigidity, suspension became more sophisticated and tyre sidewalls flexed less, but in this modern era of electric steering systems, where traditional 'feel' has been largely eradicated, combined with variable-ratio racks that give varying outputs to the same input according not only to steering angle but also and often to road speed, knowing exactly where you're pointing a tonne-and-a-bit of

fast-moving metal is in fact becoming harder once again.

But there are elements of handling more basic even than that, and just as often still got wrong. Take the humble steering wheel. Just think, for a moment, what it has to do. It must interact with other components mentioned above (structure, suspension, wheels and tyre) and, if a car is to handle predictably, be as linear in its actions as possible. But →

← it must also be correctly geared: too slow and you'll be whirling your arms uncomfortably and, should the car slide, it'll take longer to catch. But too fast and the car will feel horribly nervous, even in a straight line, and when it slides you will need greater accuracy in order to catch it. It must also be correctly weighted for reasons I don't think I need to explain, and both on- and off-centre.

Is that it? Not even close. The wheel must be positioned such that even quite unconventionally proportioned drivers can place it where it is comfortable, where it does not obscure the instruments and in a way that allows the car to be driven by the wrists and elbows and not from the shoulders with straight arms. It must

also be angled correctly. Yes, it is true that Stirling Moss used straight arms to drive circles around the opposition and that old Minis have steering wheels mounted at London bus angles, but even the best rules have their exceptions.

What about the size of the wheel? Smaller is more sporting, surely? Perhaps, but it also makes controlling the car more difficult, which is why Porsche and McLaren use quite large wheels. Then there's the rim itself, its thickness, its squidgyness (if there is even such a word), the material with which it is covered... So a steering wheel is not just a wheel: it is the primary interface between driver and machine, and if any of these elements are wrong it hurts the handling of the

car to which it is attached.

We can boil things down further still. Forget the way a car steers, its grip or on-limit balance and simply ask yourself this: can you see out of the bloody thing? One of the legacies left over from Gordon Murray's McLaren F1 is that all McLarens made today have glasshouses like goldfish bowls. And when you're in a car that wide, low and fast, just having the vision to place it accurately on the road is not just reassuring and relaxing, in the most real sense, but it also makes for a better-handling car. Last year I drove a Lamborghini Aventador SVJ straight after a McLaren 720S and I found the Lambo immeasurably harder and more intimidating to

drive – not because it was faster, because it wasn't, but because by comparison you peep out at the world through a letter box.

There are other crucial details. What is the pedal placement like? If the car is manual, can you heel and toe under both light and heavy braking? How do the brakes feel? If you find yourself thinking about your car's brakes, there's almost certainly something wrong with them. Are the pedals directly in line with the seat? If manual, where's the gearlever? Ideally no more than a splayed hand's width from the steering wheel.

What about those safety systems? How intrusive are they, is there an intermediate Sport setting and does it actually make a difference?



Steering wheel connects man to machine, so they need to be just right

NOT SO GREAT HANDLING CARS



CHEVROLET CORVAIR

A rear engine and primitive swing axle suspension gave such unusual handling that Ralph Nader wrote a book about it. It was called Unsafe At Any Speed.



FERRARI 348

Probably the car with the most evil back end I have encountered. Would slide quite nicely at first, but more than a few degrees of slip and it was gone. And stayed gone.



ROVER 213

A more slavish devotee to headlong nose plough I cannot recall, although perhaps because I'm not old enough to have tested a Morris Marina. Utterly dismal to drive.



FORD SIERRA COSWORTH

Surprised? You'd not be if you'd driven one in the wet on its Dunlop D40s. No car I tested had a greater disparity between dry and wet grip.



FAST AUDI SALOONS AND ESTATES

Some have been better than others, but all have spent too long immersed in 50 Shades of Understeer. A bit more balance would be brilliant.



Handling characteristics should remain broadly unaltered at all speeds

Can you separate out traction and stability control, can you actually switch everything off when the time comes and does it come back on again if, say, it detects a certain degree of slip with full ABS actuation?

A car's handling should also not fundamentally change through speed or load, although it almost always does, even in these days of computer controlled damping. You don't want a car flopping around all over the place the moment you try to corner fast or load your family and luggage, but the amount of body roll, pitch or heave a car can exhibit matters little so long as that movement is properly controlled. On the other hand, a car that is so tied down on its springs that it doesn't move at all is likely to be deflected by lumps, bumps and changes in road surface, which does nothing for the confidence either.

Which, finally, brings us to the limit stuff. To me the amount of raw grip a road car can generate is not terribly interesting. Actually and often it gets in the way, because

there's not much point giving a car great limit balance if that limit is so far away that no one is ever going to reach it. Also, the faster you're going, the quicker things tend to happen, which can create problems all of its own. That's why cars such as the Alpine A110 and Toyota GT86 have been as praised for the easy access they provide to their limits as they have for their behaviour once you have arrived there.

So how should a car perform on and over the limit? Of course, different characteristics apply to different configurations – a front-wheel-drive car will never power oversteer in normal conditions – but it doesn't matter whether you're sideways at 100mph or negotiating a tricky multi-storey, the car should always do what you expect.

Which means that, within reasonable boundaries, the speed at which a car slides is nothing like as important as the rate of that slide. To wit, if a car slides quickly but in an entirely linear fashion, it will be far easier to catch, exploit and

enjoy than one whose rate of slide changes according to slip angle. A mid-engined car will tend to slide more quickly than a front-engined car but, so long as the rate of slide is managed, this is not problematic. In the 30 years of our Britain's Best Driver's Car contest, mid-engined cars have won more than front- and rear-engined cars combined.

Once a slide is caught (and presuming this is all done on track), the car should then allow the driver to decide whether to recover, maintain or extend said slide. And if the choice is to recover, the steering, tyres and suspension should work together to ensure the chances of over-correction are minimised.

So that's my little snapshot of what matters, at least to me, about the way road cars handle. But I'll end as I started by restating the only rule that really matters: regardless of price, power, size or intended use, if a car behaves as its driver wishes and expects, it is prima facie a good-handling car. If it doesn't, it isn't. Simple as that. **A**

GREAT-HANDLING CARS FOR UNDER £10,000



TOYOTA GT86

From £9000

Stiff at the back and soft at the front and fitted with tyres from a Prius mean not much grip and a bucketload of the most easily controlled oversteer imaginable.



BMW M3 (E46)

From £8000

With a howling straight six at one end and a brilliantly controlled axle at the other, this is one of BMW's best-balanced cars ever, and an utter bargain today.



HONDA INTEGRA TYPE R (DC2)

From £8000

Imported officially from 1997-2001, many say this is the greatest-handling front-wheel-drive car of all. And they're still a bargain.



MAZDA MX-5

From £2500

Any MX-5 will do, so long as it's been looked after, but I prefer the originals and the Mk3 to the Mk2. Condition is all, so be prepared to pay more for the right car.



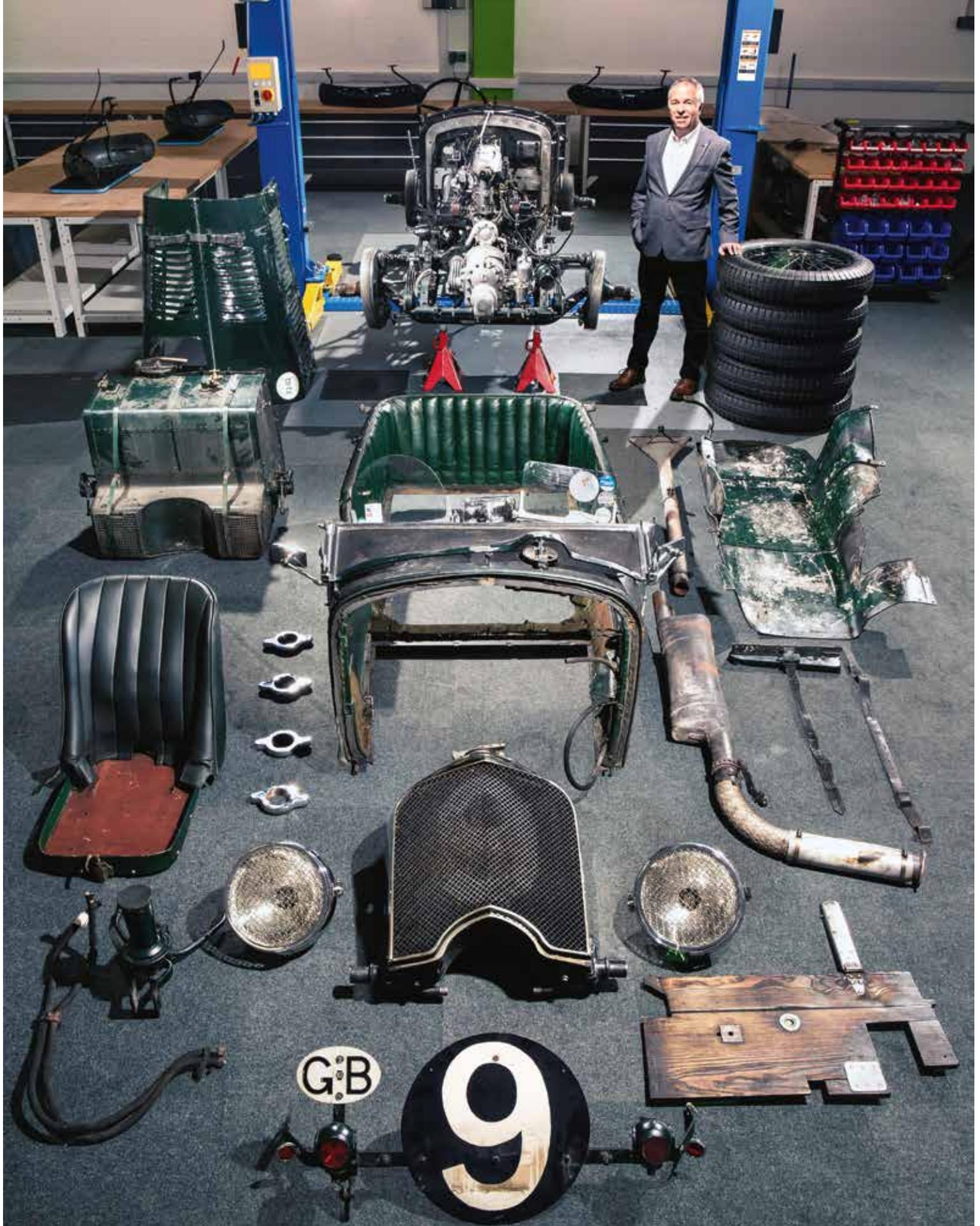
PEUGEOT 205 GTI

From £4000 (1.6)

Widely regarded as the greatest hot hatch of all time and one of the most entertaining-handling cars you can buy. Many have been modded, so history is critical.

“The speed at which a car slides is not as important as the rate of that slide”





TO BE CONTINUED...

Bentley is in the process of recreating 12 of its legendary 4.5-litre Blowers, the most famous of Crewe's creations. Steve Cropley meets the man in charge

I imagine you're one of 12 people who've already laid down £1.5 million-plus to own one of Bentley's magnificent 'continuation series' 1929-style 4.5-litre Blowers.

You've already bought your car, but it's just four months into a two-year gestation and very little of it yet exists. But later this year Bentley Motors' bespoke car operation, Mulliner, will ask you to decide some vital details of your car's specification – and one in particular will entail a bizarre but crucial choice.

Your car is going to be a perfect, reverse-engineered replica of one of the four special racing Blowers built by Sir Henry 'Tim' Birkin, greatest of the pre-war Bentley Boys, chosen to make a racing team from a homologation batch of 50. Bentley has already begun dismantling 'Team Blower' No2 to provide data for this exotic exercise. Pretty soon they'll be assembling hardware.

Then the key question: do you want your car's floorboards to show wear marks from the racing boots of Birkin and Co who drove these cars in period? Or do you want them flat and pristine? Either option is available: so microscopically accurate is the digital measuring process used to create the 12 new customer cars that you can have an authentic, Birkin-heel-sized depression in the wood beside the base of the accelerator, created 90 years ago by exuberant use of the pedal. It's one of a number of tiny choices you'll make as your car's build proceeds, but perhaps the one that puts you closest to history.

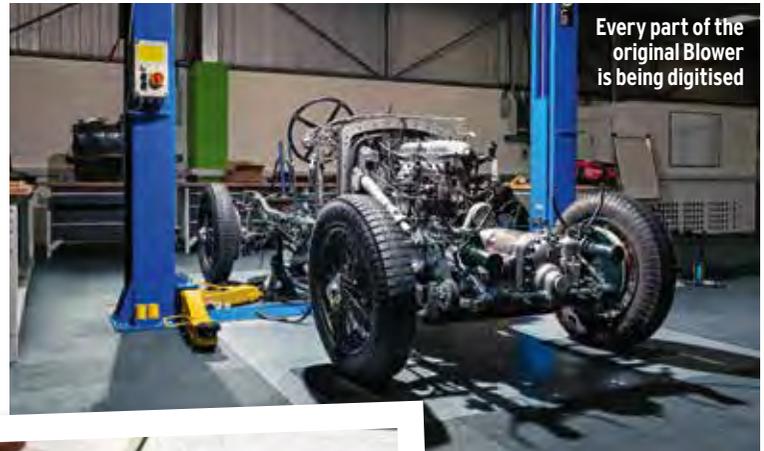
Although generally agreed to be the most famous Bentley of all, the 4.5-litre Blower was a model the company's famous founder couldn't abide. WO Bentley's theory was that to make the car go faster you gave it a bigger engine – a theory proved by the fact that the 6.5-litre Speed Six did much better in competition than the Blower. But Birkin, who moved in

the same circle as the supercharger designer Amherst Villiers, was keener on the Blower concept (which boosted power from 175bhp to 240bhp). He won the approval of the ailing company's chairman and backer, Woolf Barnato, against WO's opinion. The company built 50 Blowers, plus four for Birkin to modify and race, one of which was the No2 Team car in our pictures, still owned by Bentley Motors.

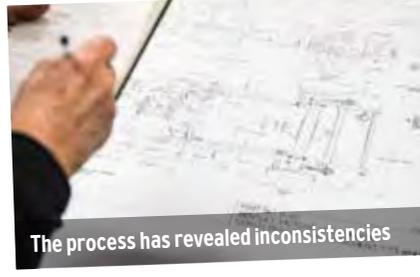
The Blower never won a race in its heyday and only entered 12 events (hence the continuation batch's size), but Bentley folklore credits the Blower with a key role in a Speed Six's win at Le Mans in 1930. The tale was that Birkin's Blower ran so hard from the start that it "exhausted" Rudolf Caracciola's solitary 7.0-litre Mercedes SSK, the biggest threat to a Bentley victory. Barnato's Speed Six then took the win. But it's likely that Birkin so badly wanted to beat Caracciola that he drove his Blower past the limit of reliability. Bentley benefited in any case, taking its fourth successive Le Mans victory.

The Blower continuation project has been based since September at Envisage, the high-tech car creation consultancy on the outskirts of Coventry. The project's leader is a hugely experienced Mulliner engineer, Glyn Davies, who is using a mystical combination of 2020s digital measuring equipment and his own experienced eye for old cars to decide exactly what the continuation

“
I assumed the
Blowers were all
the same but
they're not
”



Every part of the original Blower is being digitised



The process has revealed inconsistencies

models

will be like. Once all digital information has been garnered from No2, operations will return to Mulliner HQ at Crewe, where the 12 new Blowers will be built.

Davies is a Mulliner 'lifer' who started as a sheet metal apprentice in the 1970s, working in Crewe's experimental department where prototypes were made by hand. He later trained as a mechanical engineer and became a Mulliner project leader, usually deployed on difficult, secret and low-volume projects. Until this gig, his greatest achievement was the successful recreation of a one-off 1939 Bentley Corniche saloon concept destroyed during the war, and the rebuilt car played a large part in Bentley's recent centenary celebrations. Retirement was supposed to follow, but then the Blower project came along.

In theory, producing 12 matching replicas of a pre-war racing car from an authentic original sounds straightforward if you have the skills.

Equipped with modern software, you digitise everything using the dismantled original car to decide authentic components. You decide whether existing restoration parts can help (there's already a lively Bentley restoration industry) and then you start building. But it's turning out to be much tougher than that.

"I assumed the Blowers were all the same," he says. "All built on the same standard chassis. But they're not. The Birkin cars were built separately, and they use 5.3mm steel for chassis members, not the standard 4.2mm. And whereas original cars used hot rivets to hold their chassis together, the Birkin cars had bolts. Our lab has confirmed that even the steel grades are different. Luckily we've identified a modern steel with very similar tensile strength and hardness, but it's the kind of problem we didn't expect, and there are others."

Davies and his handful of helpers ("a small team is the beauty of this project") have almost finished scanning and are now well into choosing materials while fussing over tolerances and deciding weird issues such as whether to replicate engine louvre mods made hurriedly in a race paddock 90 years ago. And then there's which supercharger to use. "Every time we see a picture, it looks different," Davies says.

Aside from such decisions there's the job of sourcing non-existent materials, such as No2's dashboard lap counter 'liberated' from a Paris billiard room or the cockpit's array of Victorian light switches. There are sets of imperial bolts and nuts to be found and magnesium alloy bulkheads (each car has two) to be recreated in the correct material. Rexine, the body covering and trim material, isn't the problem it might have been: a far-sighted Bentley enthusiast acquired rights to it when ICI stopped making it years ago.

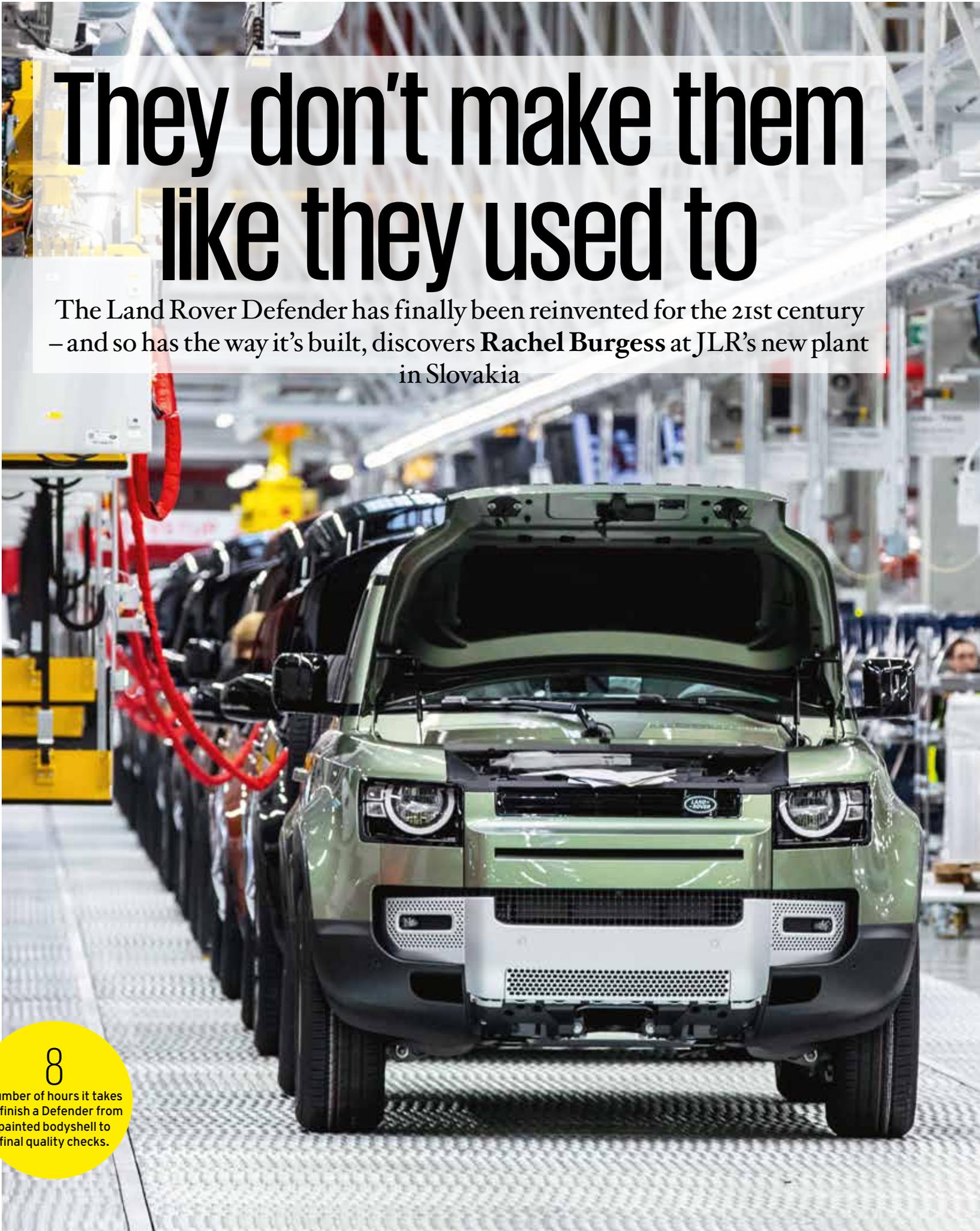
Suddenly this programme's two years seem no time at all. And you see why it's so vital such a task could only fall to one of the world's proven experts. Whisper this, but even the £1.5 million-plus price tag on these new-age Blower Bentleys looks like a bit of a bargain. **A**



The devil is in the detail: nut, bolt and grommet recreation requires a part-by-part dismantling of 'No2' to get everything just right

They don't make them like they used to

The Land Rover Defender has finally been reinvented for the 21st century – and so has the way it's built, discovers **Rachel Burgess** at JLR's new plant in Slovakia



8

Number of hours it takes to finish a Defender from painted bodyshell to final quality checks.



When production of the Defender ended in 2016, it felt like the end of an era. Never before had such an impressive send-off been organised, as the world's press gathered at Jaguar Land Rover's Solihull plant to watch the last example roll off the line after 68 years of production.

Four years later and following much hype, the all-new Defender is here, billed to be as tough as ever but with on-road comfort too. And it's being built at a new plant in another country: Slovakia.

The factory in Nitra has been up and running since October 2018, when it began building the Discovery, which also relocated from Solihull. A bit like Nitra's operations director, in fact: Russell Leslie is a friendly Brummie who moved to Slovakia after 26 years working around the world for JLR, including managing the Defender line. He explains that getting production moving at Nitra was easier than usual, because the Discovery already had an established engineering process, but now the real challenge begins: "The eyes of the world are on us. We're hugely proud to be building the Defender."

Of course, some purists cried foul that the new model isn't being built in Britain. Leslie comments: "We're on a global expansion journey. We're committed to the UK as our design and engineering base. We needed to find space in the factories in the UK for future products and therefore there was a need to move. And actually this [plant] gives us access to markets we didn't have before, and it helps with currency fluctuations."

At two million square feet, the purpose-built facility is almost twice the size of the Solihull plant and has clearly been a boon for the area; miles of perfectly smooth new roads lead here, passing a host of supplier factories. The figures back it up: local unemployment has fallen drastically. JLR employs 2800 people, more than a third of them women – unusually high for a vehicle plant. Its processes were ergonomically designed, it says, so 97% of people can do the job. →

There are 642 robots employed in the bodyshop alone



Nitra has an annual capacity of 150,000 cars; last year, around 38,000 Discoverys came off the line, plus up to 2000 Defenders. JLR won't comment on volume predictions, but the fact the site is at just a quarter of its capacity suggests there's an awful lot resting on the new Defender.

Leslie says: "We always build facilities with a three-shift capacity [there are two shifts at present]. You have to design a facility to enable a certain jobs-per-hour rate. We have what we believe we need for both today and tomorrow."

As well as the Discovery, Nitra is set up for the 90 and 110 wheelbases alone, but a family of Defenders is coming. Due in the next

few years is a Mercedes-AMG G63-rivalling luxury model, the 130. This will be crucial in creating a cost-effective and profitable model line – a feat the previous generation failed to achieve.

The Discovery and Defender run on the same line, back to back, and there's total flexibility on how many of each is built. Leslie explains: "There are nuances of the cars being slightly different. For example, we

purchase the Discovery's tailgate and make the Defender's tailgate. But in general, we drive for a standard process in order to drive efficiency on the manufacturing lines. We put the seats in both cars in the same station, for example."

This high-tech site is a world away from the line in the West Midlands, but what are the main differences in producing the old and new Defender?

"The technology is significantly different," explains Leslie. "We build both Defender and Discovery

in a bodyshop with 642 robots. I don't know how many we had in the Defender bodyshop back in the day, but it was probably single figures.

"There's a highly technical paintshop now with environmentally friendly kit and the trim hall is worlds apart from the one I used to run back in Solihull. All in all, [the old and new production lines] are almost like chalk and cheese."

Among a number of firsts for JLR in Nitra is an innovative conveyor belt, running through the bodyshop, that's most easily explained as using similar technology to a maglev train. This marks the first European use of the Kuka Pulse, which is claimed to move parts 30% faster than traditional set-ups, able as it is



Nitra is run by Birmingham boy Russell Leslie



JLR's other factories are all a fair way away...

10,000

Tons of steel make up the bodyshop building at Nitra - the same weight as the Eiffel Tower.



The new Defender's bodysell comprises some 400 parts

to run at a hasty 3.7m per second.

The system helps to transport 400 parts that together form the shell of the car. The first major step is assembling the underbody, bodysides and roof header, creating a box that's instantly recognisable as the Defender. Bodyshop director Christian Classon says: "Everything here has to be perfect to half a millimetre of accuracy. It takes two minutes to put a bodyshell together."

To achieve the required stiffness in the aluminium structure (and this Defender is claimed to comfortably be the stiffest Land Rover yet), 3600 rivets are used, plus 170 metres of glue. Classon comments: "The beauty of building an aluminium structure is that it's cleaner and quieter than welding shops. But



Nitra is able to build 150,000 Defenders and Discoverys per year



THE AUTOMOTIVE IMPACT ON SLOVAKIA

What comes to mind when Slovakia is mentioned? Maybe beer or castles, but probably not the car industry. Yet, remarkably, since 2007, this central European country has been the world's biggest producer of cars per capita. Last year, 202 cars were produced per 1000 inhabitants, with a total of 1.1 million vehicles built.

Alongside Jaguar Land Rover, other big players include Kia, the PSA Group and the Volkswagen Group, which builds the Volkswagen Up and luxury SUVs including the Audi Q7 and Porsche Cayenne there.

The car industry is estimated to generate around 275,000 jobs. In

Nitra, an area eligible for regional state aid, the unemployment rate has dropped from 11.2% in December 2015 to 2.1% in December 2019, making it the lowest in the land.

Once an agricultural country, Slovakia can now thank vehicle makers for half of its total industry.



The overwhelming majority of workers at Nitra are Slovak

riveting is very sensitive; it's not as forgiving as the welding process."

The only human-led part of the bodyshop is the cladding line, on which the doors, fenders, bonnet and boot door are applied. Finally, the car goes to be checked. "There are three stations to rectify any issues," says Classon. "In the UK, the line is much longer, so we're proud because we have to get it right first time."

Bypassing the paintshop, it's time to head to the trim and final hall – easily the largest, at 134,000 square metres. The first job here is removing the vehicle's doors so that workers can easily fit the interior. But far more mesmerising is a glass-fitting robot that lifts, glues and places a sunroof in less than a minute.

Trim and final director Ulas Bagci walks us through the major stages, including where the engine and radiator are fitted. "This is where the body finds its soul," he says.

At each of the 250 stations in his hall, there's a subtle yellow cord. Pull it once if you need help from your team leader, twice to stop the

line. "Stopping a line when you have two minutes per job is very serious," warns Bagci. But the biggest challenge of the build process, he says, is "bottlenecks in electronics because of its complexity. Everything is electronic."

Leslie concludes: "Launching a new car is always an experience. Launching it in a new country with a new team? It's a bumpy road. You learn lessons as you go. The Defender was designed and engineered in the UK, but this is the first time we've put a new car into a new factory. But we're on target; we're on the ramp-up curve exactly where we should be."

As our tour ends, hundreds of workers arrive for the shift change, fresh off seven buses paid for by JLR. There's not yet public transport to get workers to the site. Conversations are ongoing with the local council to rectify that, but having witnessed how perfectly choreographed the whole production process must be, you'd hope Slovakian public transport is more punctual than our own... 

Global overall vehicle sales by country*

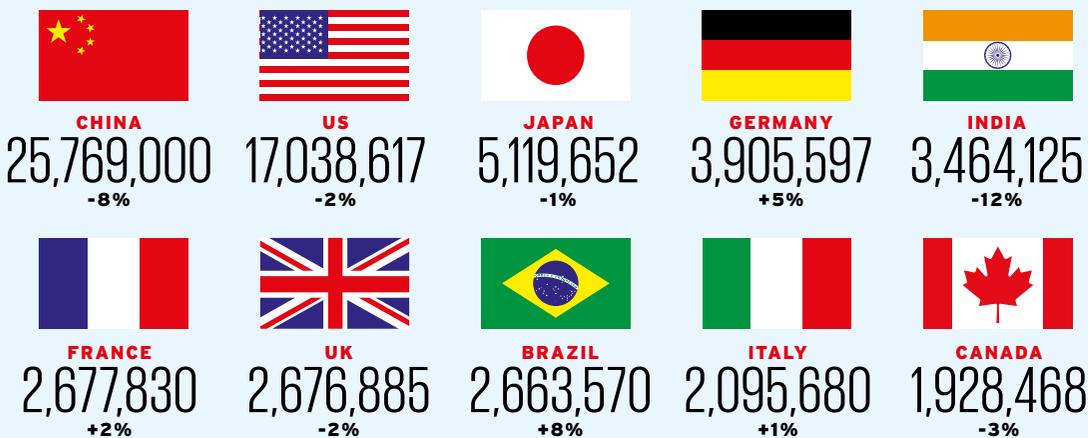
China's drop is the biggest recorded for more than 20 years, a seismic reduction of nearly two million new cars. Given the reliance of most Western OEMs on China for sales and profits, a turnaround is much needed to boost balance sheets in 2020.

"China needs a return to consumer confidence and lower household debt to boost sales in 2020," says Felipe Munoz, Jato Dynamics' global analyst.

The US decline was less concerning given overall sales remain near the historic high of above 17 million. "That's a very good number historically," adds Munoz.

Of all the global markets, India suffered the biggest reverse, while the anticipation in 2018 of overtaking Germany subsided. "India suffered a lot from new regulations on safety and emissions, plus taxation, which forced many consumers to postpone or cancel purchases," says Munoz.

Europe's slight recovery was linked to booming December registrations as higher-CO₂ models were sold off ahead of 2020's fleet average 95g/km regulations.



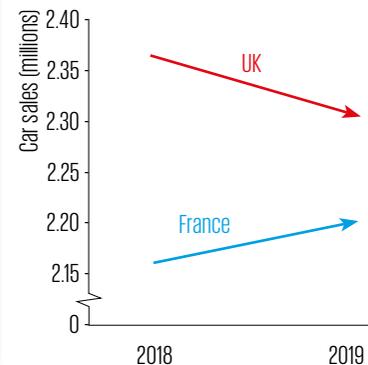
*Includes cars and light commercial vehicles

France vs the UK

Jato's global sales figures for both cars and light vans show France jumping slightly ahead of the UK in the world rankings to sixth position.

Two factors in 2019 explain this: UK new-car sales declined by 56,000 (due to uncertainty related to Brexit and lower diesel sales), while the French market grew by 38,000. French van sales also grew by a bigger margin than the UK's.

The end result was still a bigger car-only market in the UK – with the UK in its customary sixth position globally. But with vans included, the French overtook the UK.



GLOBAL CAR SALES 2019

The numbers are in on global new-car sales for the year just gone. Julian Rendell sifts through the data to pick out the major trends from another tough 12 months

Last year was another hugely turbulent one for the global car industry. China, the biggest market for new cars, suffered its second successive yearly drop, while the US, Japan, the UK and India all experienced declines. These markets accounted for nearly 3.2 million fewer new vehicles sold. But there was growth in Germany, France and Brazil.

China's decline looks likely to continue this year, especially with the growing business disruption from the coronavirus taken into account.

Meanwhile, Volkswagen continued to defy the Dieseltgate scandal to beat Toyota for the global number one spot, SUVs maintained their grip on global consumers' wallets and GM continued to outsell Ford in the US.

Porsche retained its crown as the sports car champion with the 911 beating all comers. The Ford Mustang was the top coupé, while the Tesla Model 3 bossed the global electric vehicle segment.

■ All figures supplied by Jato Dynamics from preliminary data for 53 markets (with December estimates for some) that account for 85% of the global total.

Electric cars: Tesla Model 3 vs low-cost Chinese models

The Tesla Model 3 has a strong lead as the world's best-selling electric car, outselling its nearest rival nearly three to one. Last year it was the best-seller in both the US and EU, and it should make inroads in the Chinese market in 2020 as local production starts in Shanghai.

The second-best-seller is the BAIC BJEV EU, a Volkswagen Golf-sized saloon with a 41kWh battery and a £15,000 post-subsidy price tag.

Nissan's Leaf maintains a solid position as global number three, but didn't lift sales as much as might have been expected for a new model.

GLOBAL TOP 5



TESLA MODEL 3
296,815



BAIC BJEV EU
100,312



NISSAN LEAF
68,822



BYD YUAN
61,900



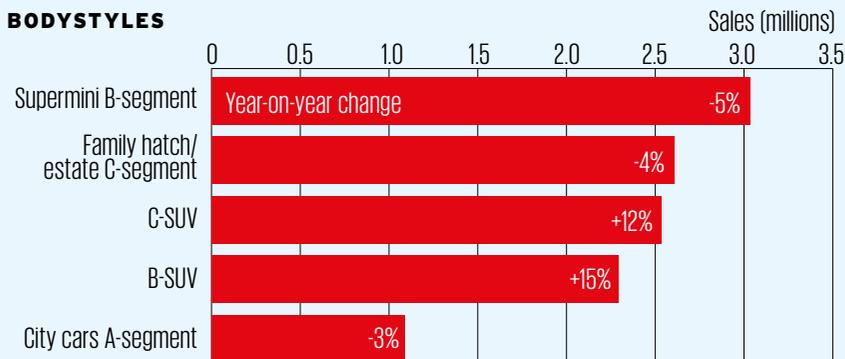
BAOJUN E100
60,050

What Europe is buying

There was talk last year that mid-size SUVs such as the Nissan Qashqai, Volkswagen Tiguan and Ford Kuga might outsell C-segment hatchbacks and estates for the first time. But they fell just short.

“If they keep posting big annual sales growth, they might do it next year,” says Munoz, “but they are still behind if all bodystyles are included.”

Superminis continue to be Europeans’ favourite bodystyle and they may get a boost in the next few years as city cars (A-segment) come under pressure owing to the incoming 95g/km fleet average regulations.



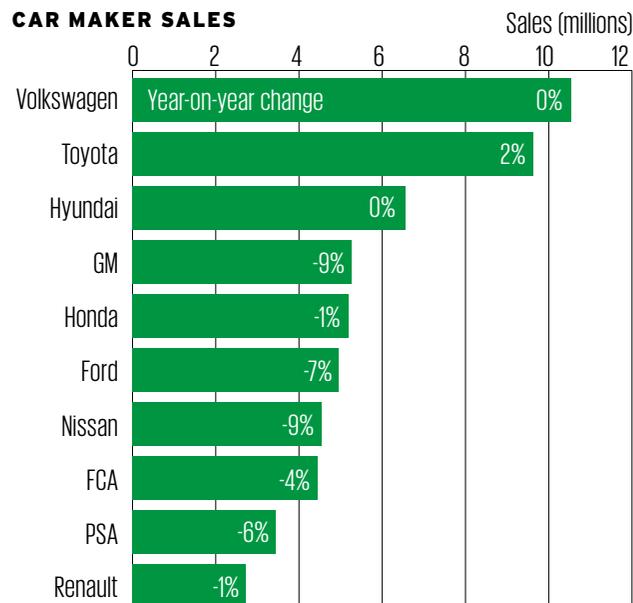
MID-SIZE SUVs



Global groups: Which was the biggest of them all?

The Volkswagen Group’s launch of multiple new SUV models from all brands helped it remain the top car maker in 2019.

It faced strong competition from Toyota, whose 20-year investment in hybrid technology is paying off: it was the only top-10 car maker to grow sales in 2019. “Toyota improved thanks to the latest-generation Corolla and RAV4 and its continuous hybrid car sales growth,” says Munoz.



Merc beats BMW and Audi in luxury scrap

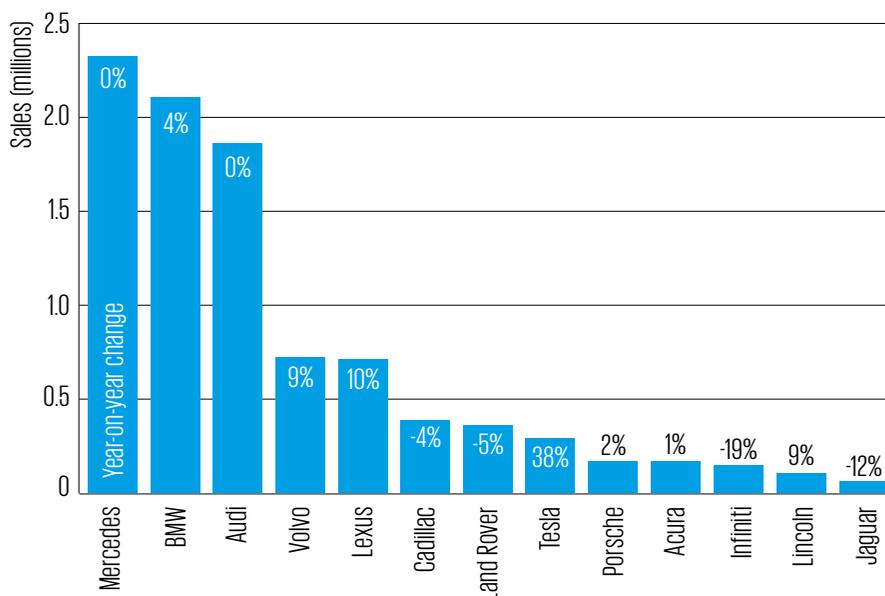
In the battle of the luxury nameplates, Mercedes saw off a strong surge from BMW to retain its global crown with 2.32 million sales in 2019.

The top five brands all improved their sales or stayed static, with Lexus and Volvo recording the biggest percentage increases. Last year was good for Lincoln, too.

BMW’s strength was its renewed range of SUVs, a new 3 Series and strong sales in China, where Mercedes suffered a decline. “But the negatives are further down the field,” says Munoz, “with Infiniti and Jaguar struggling.”

Infiniti quit the European market, while Jaguar’s core saloon line-up struggled. Tesla might overtake Land Rover in 2020 to become the seventh-biggest global luxury brand, which would be a significant achievement.

LUXURY CAR SALES



Tesla’s big year

Tesla controlled 23% of global electric vehicle sales in 2019. The US accounted for 52% of its total sales volume, followed by Europe and China.

“Looking forward, it will be interesting to see if the Model 3 maintains its strong position when more electric SUVs hit the markets,” says Munoz. “The Model 3 is a saloon, which are losing ground to

GLOBAL EV SHARE
23%

BEST MARKET
US 52%

BEST-SELLER
Model 3 82%
(of Tesla sales)

Sports cars: 911 remains the favourite

Porsche's evergreen 911, entering its eighth generation, maintained its position as the world's best-selling sports car. While sales did drop slightly, that was largely because of the changeover from 991 to new 992.

Its closest rival was the Chevrolet Corvette, which also stuttered due to a new model.

BMW will be very pleased that its new flagship performance two-door (Gran Coupé four-door sales are excluded from these figures) has made an immediate impact. Due to the arrival of the 8 Series, the Mercedes-AMG GT dropped to fourth place.



PORSCHE 911
32,612
-5%



CHEVROLET CORVETTE
21,014
-3%



BMW 8 SERIES
11,365
NA



MERCEDES-AMG GT
4516
-26%



Europe's winners and losers

Tesla was the biggest winner in Europe, outselling other key brands such as Porsche, Jaguar, Alfa Romeo and getting very close to Smart. The reason: the Model 3.

Value brand Dacia also did well, despite a limited model range of two ageing small cars plus the new Duster. The Sandero is among the top sellers in Spain and France, while the Duster became Italy's best-selling SUV.

Nissan was the biggest market-share loser due to an ageing SUV line-up, which lost traction to more modern competitors. The Juke should have been replaced earlier and the Qashqai also faces tough new competition.



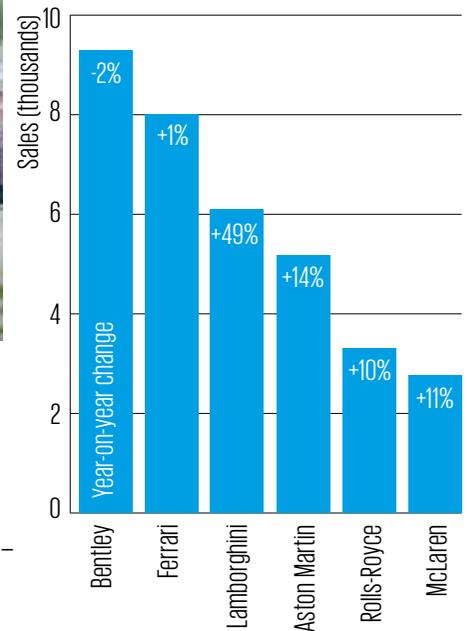
Super-luxury: Rolls on a roll

The seven top ultra-luxury brands combined for 35,454 sales – and at transaction prices conservatively averaging £250,000, that's £8.8 billion worth of cars.

Lamborghini and Rolls-Royce benefited from their new SUVs, while two new Aston Martins – the Vantage and DBS Superleggera – helped lift sales above 5000 a year.

Bentley bucked the trend because its saloons fell back. The new Flying Spur might arrest that decline this year.

SUPER-LUXURY SALES

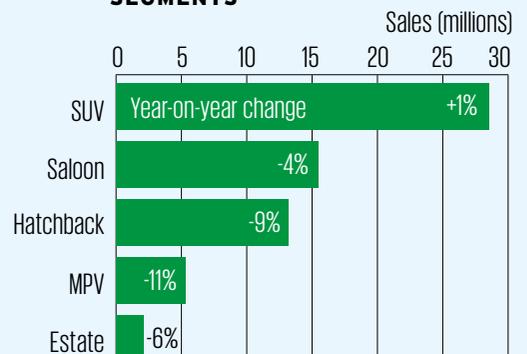


The continued rise of the SUV

An astonishing 28 million SUVs were sold globally last year, although their sales growth dipped to just 1%, compared with 6% in 2018.

"SUVs are like a drug for car makers. They increase sales and profits but at the same time have a negative effect on average emissions," says Munoz.

SEGMENTS



Luxury electric SUVs: I-Pace vs E-tron vs EQC vs Model X

Tesla's Model X is just ahead of the new Audi E-tron but, as the Audi ramps up and the Model X ages, there is a strong chance the E-tron could grab the market lead in 2020.



TESLA MODEL X
32,886
-29%



AUDI E-TRON
27,435
NA



JAGUAR I-PACE
16,236
+135%



MERCEDES-BENZ EQC
1783
NA

Mustang dominant, Boxster slides

Ford's Mustang continues to dominate the performance car market. But the real story in the segment is the decline in Porsche 718 Boxster and Cayman sales, which dropped 20% last year.

No wonder Porsche is bringing back flat-six powerplants, three years after the 718 switched to turbocharged four-cylinder units, to much unhappiness from Porsche aficionados.

Mazda's lovable MX-5 took a slight dip, but continues to sell well for a four-year-old design in a fashion-led market. BMW's new Z4 made a strong market entry and closed the gap on the well-established 718, a result that will please Munich.

Alpine's fabulous A110 hit just under 5000 units – but there are concerns in some quarters that its sales do not reflect the quality of the product or its glowing road test reviews. Munoz notes that two-thirds of A110 sales were in France.



GM stays on top in the US

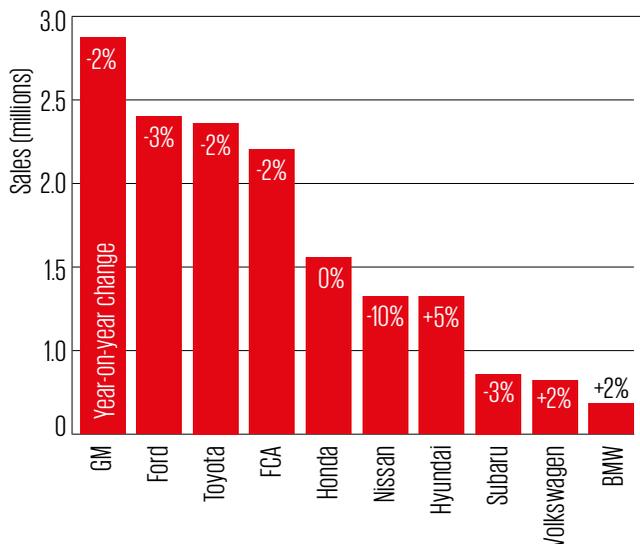
GM has held the number one spot in the US since the 1920s. Its sales did drop by around 100,000 units, but rivals Ford, Toyota and Fiat Chrysler Automobiles suffered the same small market-average reductions, too.

The most significant move was the 10% drop in sales at Nissan, sufficient to push it down behind Japanese rival Honda.

In the segments, the big winners were full-size SUVs, like the Chevrolet Suburban, which posted a 22% rise, plus compact pick-ups and full-size vans.

Minivans and the three main car segments continue their decline as blue-collar workers and 'soccer moms' switch to SUVs.

US MARKET'S LEADING CAR MAKERS

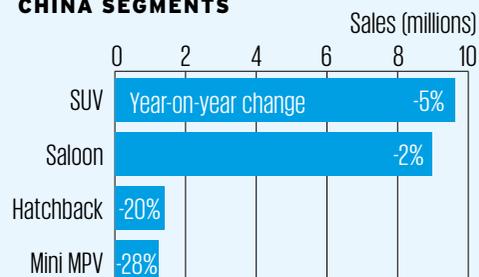


China: Will sales recovery come in 2020?

China's sales fall will take a lot of stopping as consumer confidence and the wind-down of incentives on electric cars take their toll.

"It seems we can expect a long correction unless the EV boom grows enough to offset the drop posted by gasoline cars," says Munoz.

CHINA SEGMENTS





Have an ice trip

James Attwood learns to ski the Porsche way at the Alpine version of Goodwood

The sight of a near-silent electric Formula E car on the move is no longer a novelty, but watching Daniel Abt's Audi E-tron FE06 in action was certainly surreal on this occasion.

For one thing, the single-seater wasn't on a race circuit but a snowbank-lined ice course on a frozen airfield. And it was fitted with studded ice tyres. Oh, and there was a tow rope trailing from its diffuser, at the end of which a skier was hanging on as best he could. And yet that probably wasn't the weirdest sight you could find in the vicinity of that ice track.

Try a 2012 Dakar Rally-winning Mini All4 Racing slithering on ice. Or a Porsche Taycan lapping a circuit at the same time as a historic Porsche 911 with, for reasons still unclear, a surfboard on its roof rack. A lightly modified Bentley Continental GT practising doughnuts. And Hans-Joachim Stuck reunited with the chassis in which he made his grand prix debut, now fitted with six – yes, six – studded tyres.

Welcome to the bonkers world of the GP Ice Race. You might not have heard of it yet but, after just two years, it seems poised to grow into a showcase event on the motorsport calendar: an

Alpine Festival of Speed, perhaps.

Like Goodwood, the GP Ice Race is built on a long motorsport tradition. It's centred on the bizarre discipline of skjoring, in which skiers are towed by cars. The first skjoring event in Zell am See, Austria, was held in 1937

on a frozen lake, with skiers towed by bikes. The first Dr Porsche Memorial Skjoring Race took place in 1952, before standard car races were added the next year. It became an annual tradition, although it moved from the lake to the town's airfield in 1969 after several weather-related cancellations. But after the 1974 running was cancelled at late notice, it fell off the calendar.

The revived event features timed runs, competitive races and, brilliantly, skjoring – but it's mostly just an excuse to gather an amazing collection of historic and modern cars for a slippy, slidy motorsport party.





“It’s mostly just an excuse to gather some amazing cars for a slidy motorsport party”



Olympic skier Wörndl chases a Sonderklasse



The GP Ice Race is held at Zell am See airfield in Austria

The GP Ice Race even has its own equivalent of the Duke of Richmond: co-organiser Ferdinand Porsche, great-grandson of *that* Ferdinand Porsche. He says he decided to bring the event “back from obscurity” both to meet the growing demand for historic events and because “motorsport belongs to Zell am See”.

While Goodwood is now a slickly organised event on a massive scale, the far smaller GP Ice Race teeters just on the right side of the divide between anarchic fun and chaos (an example: the media centre was located in a bathroom showroom).

With temperatures relatively high, organisers faced a battle to keep the ice course (slightly dull, short and triangular) from becoming cut up and melting into a pool of slush. That resulted in some schedule shuffling, making an already anarchic event downright confusing.

But this shortcoming was amply compensated for by the incredible machines present, whether racing, doing demonstration runs or on

static display. Modern machinery included Mitsubishi Lancers, Skoda Fabia R5s and Subaru Imprezas, while the mouthwatering historic field included numerous 911s and Volkswagen Beetles, a smattering of Saab 96s, some gorgeous classic Volvos and a handful of incredible Group B Audi Quattros. As well as giving Stig Blomqvist a run in its Formula E car, Audi reunited him with a Quattro S1 and tasked triple Le Mans winner Benoît Tréluyer with towing 1987 slalom world champion Frank Wörndl behind a 1955 DKW F91 in the skijoring.

Volkswagen gave a glimpse of the future with the Golf eR1, the test mule for the ID R hillclimb racer now repurposed as an electric showcase. But it also ran a pair of distinctive Beetles: a classic 1302 S and Tanner Foust’s mighty rallycross machine. Foust said “it was fun to rip up an ice track” but that the coolest moment of the event for him was meeting Stuck.

And that sums up the GP Ice Race. It was far from perfect: the short, tight track offered little room for cars and limited sight lines for the 20,000 or so spectators, and it was hard to know what was going on at times. But it provided truly unique sights. Where else are you going to see Stuck pedal a Formula 1 car fitted with six studded wheels, or a Nascar stock car on ice, or a classic Chevrolet Corvette sliding about a frozen airfield? Surreal? Indeed. And brilliantly so. **A**

ICY ODDITIES



MARCH-COSWORTH 761/5
Hans-Joachim Stuck used this March chassis for his F1 debut in 1974. It was rebuilt several times in different specs, including the six-wheel 2-4-0 concept, but is now restored as a 1976-spec 761/5. To give Stuck extra grip, four studded tyres were fitted on the rear axle.



OKRASA SPECIAL
British Porsche and Volkswagen dealer David Small began building this car in 1958, using spare parts and aluminium aircraft bodywork. After it sat in a garage for half a century, now-owner Steve Wright finished it over the past decade. It’s still yet to hit 500 miles.



PORSCHE TYPE 64
Based on a Volkswagen Type 60 Beetle, the Type 64 was the first car engineered by Ferdinand Porsche, for the 1939 Berlin-Rome race. When the sole surviving original was rebuilt a decade ago, restorer Michael Barbach simultaneously crafted this replica.

WHEN RALLYING MEETS SKIING

Skijoring might just be the best motorsport you’ve never seen, spectacular and surreal in equal measure. Skiers are towed round a course by a car (or horses, dogs or snowmobiles); the fastest time wins, and there’s plenty of technique to it.

Professional skier Dominik Hartmann was towed by friend Dominik Rickauer’s Jägermeister-liveried 1977 911. “Physically, it’s hard,” Hartmann says. “You need lots of muscles in your arm just to hold the rope.” The key, he tells us, is ensuring that both skier and driver know how they’ll tackle each bend.

While the driver sets the pace, the skier controls the distance between the two by adjusting the slack in the tow rope. “You have to know what they’re going to do,” adds Hartmann. “To carry speed through the bend, a rally car wants to drift, and the skier has to get to the inside for each corner to ensure a smooth line.”



As if regular Formula E races aren’t mad enough...

Need a clutch release lever for your Vauxhall Corsa? Not a problem. There are hundreds of suppliers ready to service your enquiry and it should be with you tomorrow. Cost: about £16.

But what if you need one for your Porsche 959, an extremely rare car, parts for which you're unlikely to get online, never mind over the counter? Until a year or so ago you would have had to get one specially made at great expense but, since 2018, Porsche has been able to produce the part on demand and at reasonable cost using 3D printing and, specifically, a process called selective laser melting.

This involves spreading a shallow layer of steel filings in a sealed container. Guided by CAD data derived from scanning an existing example of the part, a laser melts the material in the desired locations before another layer is applied and the process repeated until the component is produced. Another technique, more suited to plastic components, is selective laser sintering, where the material is heated almost to melting point as a laser fuses the plastic powder at predetermined points.

Porsche uses these processes – called additive manufacturing because they involve adding layers of material – to produce around 30 parts for its older models, for which creating tooling and producing them in the conventional way would be prohibitively expensive.

Porsche isn't alone. Across the motor industry, companies large and small are using the same techniques to produce everything from prototypes or pattern parts for moulds to one-off, functioning components. They fall under the grand name of reverse engineering because they involve deconstructing a finished component to determine how to remanufacture it.

One company doing this work is A2P2, based in Nottingham. It's at the back of a busy workshop that's home to INRacing, a company specialising in the restoration, maintenance and sale of historic road and race cars and founded by a chap called Ian Nuthall.

When I visit, the workshop is filled with rare motors, including a 1959 Tec-Mec Maserati, a 1959 Lotus 15 once raced by Graham Hill, a couple of 1952 Cooper Bristols and a 1965 Autodelta Alfa Romeo GTA. A2P2 has had a hand in helping to keep them active, as I discover when I meet its founder, Alistair Pugh.

In contrast to INR's workshop with its ramps, lathes and even a huge five-axis CNC milling machine, Pugh's place is a high-tech oasis of calm. In one corner is a 3D printer, methodically layering up, in plastic, a bevel box for a pre-war, chain-driven Frazer Nash. Once completed, it will form the pattern for a sand cast moulding in metal. As it quietly goes about its



Some day my prints will come

Owners of classic cars in need of rare parts can now live happily ever after thanks to 3D printing. John Evans finds out more

PHOTOGRAPHY MAX EDLESTON

business, Pugh draws my attention to the room's other occupant: a 3D laser scanner. Looking like an angle-poise lamp but with a probe



Alistair Pugh (right) is the founder of A2P2

at the end rather than a bulb, it's fixed to a sturdy metal table and connected to a laptop.

Pugh's colleague, Alberto, shows how, by painstakingly moving the probe around a component – in this case, the diff casing from a 1952 Alta GP car – he can capture and digitise its every dimension, including the internal faces of the screw bores. The result is an accurate digital representation that can be converted into a CAD file for a 3D printer or into an engineering drawing for a machine shop to follow.

“From gaskets to gearboxes: scan it, draw it, make it’, we like to say,” explains Pugh. “Laser scanning and 3D printing have so many uses, from enabling classic car owners to have a digitised record of their car from which body panels, for example, can be recreated after a crash, to producing replica parts in plastic as a pattern for a sand cast or simply to test fit and function.”

On that point, he takes the other half of the Alta's diff casing, produced earlier in plastic by the 3D printer, and inside it places the original crown wheel and pinion, and limited-slip differential so I can

HELP FOR MORE MODERN CLASSICS, TOO

Stuck for that gearlever bellows for your E30-gen BMW? Exhausted eBay in your search for a sun visor fixing for your 1985 Audi Coupé? Combed the planet for engine cover clips for your Renault Clio Williams?

You need GRYP. The Bordeaux-based firm, founded by three young engineers only a couple of years ago, specialises in the 3D printing of obscure or simply impossible-to-find parts for old and, crucially, modern-day classic cars. The parts it prints include fasteners, covers, logos, bumper corners and engine cable passes. It can print more complex parts, too, such as the mechanism for the cabin ventilation system

in an Aston Martin V8 Vantage.

"We have done parts for cars from 1929 to 2000 but we do more for the younger ones because those cars were made using more plastic," says Bastien Vanlathem, a co-founder. "For older cars, we can create parts in composite materials, including carbonfibre, that are more resistant than aluminium.

"We need an original part, complete or broken, to scan. At the same time, we may correct weaknesses in the design and perhaps print it in a tougher material. Our goal is that all collectors can find the parts they need for their special car."

Visit gryp-3d.com to learn more.



Scanning captures data that must be interpreted wisely



From handles to whole doors, all is feasible



A2P2 is reviving a rare coupé from scratch



Accuracy of printed parts is checked in situ

see how they fit snugly into their respective places.

But should it all look like just moving a probe and clicking a mouse, Pugh is quick to point out that interpreting the data and knowing what is possible from a manufacturing perspective are crucial. The former graduate engineer speaks from experience, having started out spannering for Nuthall before moving into contract work with Ford, Aston Martin and Jaguar. In fact, it was Nuthall who lent Pugh the £125,000 necessary to buy his first scanner.

He's now on his fourth and, using

in conjunction with his 3D printer, Pugh has produced a huge variety of components, including a modified and strengthened sump with anti-surge baffles for a Renault 5 Turbo, a bell housing and diff casing for a Volvo 242 GT and even door handles for an E30-era BMW M3. However, one of his proudest achievements is

“
In one corner is a 3D printer, layering up a bevel box for a Frazer Nash
”

producing a digitised version of a very rare pre-war coupé – with only a saloon version and photographs to go on.

He says: "With no existing model available, we had to scan the saloon's chassis, steering wheel, back axle and engine to establish the coupé's hard points and the locations of its major mechanicals. Then we placed a scale archive image of the coupé behind the resulting CAD drawing as a guide to the body's angles and curves. This part was all done by eye. Having established the body's shape, we created a one-eighth-scale buck in the 3D printer. This we

used to give us the dimensions for the car's ash body frame."

And here before me in the workshop is that partly assembled frame in actual size, looking for all the world like a particularly complicated piece of self-assembly furniture. It's an inspiring story of how a long-lost car has been brought back to life by modern technology. But as I make my way out of Pugh's high-tech workspace and past the assorted historic road and race cars in INR's workshop, it's obvious that it's not the only example of modern technology coming to the rescue of old and not so old motors. **A**



The people's garage

A VW restoration business that was close to shutting down in the wake of a national tragedy has managed to turn its fortunes around. Felix Page finds out how

PHOTOGRAPHY MAX EDLESTON

It's a busy day at Jack's Garage in London's Notting Hill. On a ramp, a well-worn Mk2 Golf is undergoing an overhaul, a stripped-down Type 2 camper is being reassembled in the bodyshop and the phone is ringing off the hook. There's nothing to suggest that, just over a year ago, this classic Volkswagen specialist was nearly forced to close in the aftermath of a national tragedy.

It's difficult to ignore the 221ft shell of Grenfell Tower looming overhead. White sheeting now hides the extensive fire damage, but the legacy of what happened here in 2017 is palpable. Joseph Salama, owner of Jack's Garage for 12 years, explains how his business's proximity to

the site nearly made continued operations untenable in the months after the disaster.

"Parts deliveries couldn't arrive, clients couldn't pick up cars and pay or drop off their vehicles," says Salama. He also recalls several incidents where he had to calm down customers who broke down upon seeing the tower. "A lot of people don't register how close we are," says Salama. "Consciously or subconsciously, if you had a choice to come into the area, the majority of people chose not to."

As Christmas 2017 neared and turnover reached new lows, Salama had to start making cutbacks. "A lot of staff left of their own accord, and I had to let a few go," he says. "The workforce more than halved

– we had 14 people, now we've got seven." Two days before the shop shut for the holidays, a threatening visit from bailiffs forced Salama to forego his own salary in order to pay an outstanding energy bill. Things were not looking good, and drastic changes needed to be made.

Which brings us to the yellow Beetle convertible parked outside. To the casual observer it's a nicely restored example but, in place of the traditional air-cooled engine, you'll find the Bosch electric motor from the e-Up city car. Some will call it sacrilege, but self-confessed 'dubhead' Salama is all but converted. "The driving experience is incredibly refined – the weight distribution and handling is amazing," he says. Driving this car is "terribly exciting"

and it's "bloody fast" to boot.

This electric Beetle (Salama calls this one Bumblebee, for obvious reasons) is the work of German classic car specialist eClassics, and this particular prototype – one of just 10 in existence – is here as a symbol of a new partnership between the two businesses. Following a successful pitch at last year's Frankfurt motor show, Salama has secured the rights to operate as eClassics' UK outpost and will begin selling right-hand-drive electric Beetles in the coming months. Demonstrating his enthusiasm for the project wasn't a problem, he explains, but showing that his charmingly traditional garage could deal with such future-thinking technology was a challenge.

Parked in front of Bumblebee is



Jack's Garage's bread and butter business is recovering following the Grenfell fire

another electric Beetle, this time a homegrown effort. Once Salama's daily driver, it has been equipped with a lightly used Tesla battery pack and a universal electric motor from industrial equipment firm Curtis. "This car flies," he says, "but it's not refined." Despite its flaws, this early foray into electrification proved to eClassics that Jack's was ready to adopt a new way of thinking. "We had a steep learning curve, and I don't think they would even entertain the thought of having us as a partner if we hadn't done that conversion first," says Salama.

Now Salama can look forward to a stable and lucrative future for his business. Jack's Garage has already ordered an electric Beetle chassis from eClassics, and plans to be driving its very own demo car in the months to come. UK customers will then be able to order a ready-made example from Jack's or take their own beloved Bug in for the electric treatment. Aside from the performance and reliability upgrades that come with an electric powertrain, Salama emphasises the usability of the modernised classic, thanks to an agreement between eClassics and VW's Group Components parts arm. "If something happens,

you don't have to get it recovered back to eClassics or London, you can go to any VW dealership and they'll type the chassis number into the system and access all of the components used in that build." So not only is the electric Beetle as quick and dependable as the e-Up, it's arguably equally viable as a daily driver.

That said, the insectile EV does rather command a premium over the average unconverted example. eClassics will carry out the EV treatment on a customer's car in Germany from €50,000 (£43,000), but a ready-to-rock example pushes that close to €100,000 (£86,000). That buys a fully restored Beetle with around 100 miles of electric range, regenerative deceleration functionality and a 36kWh battery pack. Added niceties include a reversing camera, sat-nav, uprated sound system and centrally mounted touchscreen. Not bad, really, considering 'dashboard padding' is the only optional extra fitted to this reporter's own classic Beetle.

So could this be the first step towards future-proofing a motoring icon? Diehard VW enthusiasts will have to overcome their loyalty to the Type 1 if so. Even Salama remarks that driving it "feels slightly sacrilegious – with the lack of noise and petrol", but notes that "there



Salama (right): "The ICE industry is dying"

are so many of them – in terms of recycling and upcycling, this is the perfect vehicle of choice". It certainly won't boil as much blood across the classic car community as Aston Martin's electric DB4 or the Jaguar E-Type Zero, and the fact that eClassics has official backing from VW is testament to the ongoing value of the car maker's heritage. "Look at other manufacturers," Salama says. "They do one or two conversions, just as marketing tools to show they can do it. VW has taken a different route." It's worth noting that after eClassics first showed the electric Beetle to VW's top brass, it was apparently secreted to the driveway of a Mr H Diess for the weekend at his request...

Looking up as the sun passes behind Grenfell Tower, Salama explains that, in the wake of the tragedy, his focus is firmly on the future. Classic cars will still be his garage's bread and butter for now, but he notes: "If you don't move with the times, you get left behind." Just a year ago Jack's was down to a skeleton crew, but expansion is now on the cards and Salama is plotting a recruitment drive to cope with the EV conversion workload – and potentially the construction of an eClassics showroom for the UK.

Unlike many independent mechanics, Salama is embracing the challenges of electrification and is aware of the need to change our way of thinking. "The ICE industry is dying globally – and anybody in this industry who hasn't accepted that needs to re-educate themselves," he says. It's not what you might expect to hear from someone whose average to-do list includes carburettor rebuilds, exhaust welding and fuel pipe replacements, but it does offer a pretty good idea of what the future of the classic car looks like. **A**

DRIVING THE BUMBLEBEE

Well this is strange. There's no overpowering aroma of petrol, the door shuts on the first try and moving the gearlever is a one-man job.

Even before setting off, the eClassics Beetle has proved a much more refined steer than its conventionally fuelled counterpart, and although you still need to physically turn a key, the resulting off-beat clatter of an air-cooled boxer engine is notable by its absence.

It helps to forget the charms of the original car, but the task is made all the easier by Bumblebee's linear

acceleration curve and unflappable road-holding in corners. It genuinely feels sporty; overtaking manoeuvres are dispatched in seconds and a few spirited laps of a quiet roundabout show how the effects of a 350kg



weight gain are all but cancelled out by vastly improved weight distribution. The brakes – from Porsche, in the case of this prototype – are uncharacteristically effective, too. That said, the accelerator is still far too close to the brake pedal (despite the absence of a clutch), the steering wheel remains much too large for such a small car and our back-seat passenger may not walk again for several days. In short, for all its improvements, this is still a VW Beetle – and it's none the worse for that.



Beetle EV conversions have VW approval

Ariel Atom

ENGINE DONOR HONDA

From the moment the world first clapped eyes on the unusual exoskeletal chassis of the Atom, there was no doubt that the car would be exciting to drive.

Niki Smart's handiwork was brought to fruition by former Aston Martin stylist and design lecturer Simon Saunders. And wisely, he not only chose to source a donor engine but ensured it would be a reliable one. Honda's four-cylinder VTEC engines, over time both naturally aspirated and turbocharged, were the answer. Today, the latest K20C turbocharged unit from the Civic Type R does a sterling job of scaring whichever souls are brave enough to climb aboard an Atom.

Brother, can you spare me an engine?

Some of the greatest driver's cars blend chassis and engine from different manufacturers. James Mills chooses 10 of the best



McLaren F1

ENGINE DONOR BMW

Today's McLarens have engines of the firm's own making but, for its first road car, which would be built in tiny numbers, McLaren had to buy one in. When plans for a Honda engine fell through, Gordon Murray turned to master BMW engine designer Paul Rosche and challenged him with an exacting brief. The 6.1-litre 60deg V12 was barely any larger than a 3.5-litre Formula 1 engine, and its figures were the stuff of legend at the time. Murray's next project is his T50 supercar. This time, Cosworth has the task of creating the V12.



Ford Focus ST

ENGINE DONOR VOLVO

If the first generation, ST170 version of the Focus faced one common criticism, it was that its 2.0-litre four-cylinder Zetec engine was underwhelming for a car with such a capable chassis. Ford avoided making the same mistake with its next ST by calling in a favour from then stablemate Volvo and setting to work on its 2.3-litre turbocharged five-pot.

The result was a 2.5-litre engine with variable valve timing for both cams, a lighter flywheel, revised engine mapping and just over 220bhp. It delivered the performance hot hatch drivers had come to expect, but just as significantly it introduced one of the most charismatic engine notes in the class.

Sometimes, admitting defeat and buying in an engine is the simplest – and best – approach to creating a great driver's car.

Regardless of the genre, you'll find spirited machines that owe much to their donor engine. From exclusive brands, such as Aston Martin, to quirky innovators like Citroën, and all manner of manufacturers in between, many makers have opted for a tried-and-tested approach that, when done right, delivers an enduring car for drivers.

Here are 10 of Autocar's favourite cars with donor engines.



TVR Griffith 500

ENGINE DONOR ROVER

Although you can trace the Rover V8 engine's roots to the Buick 215 motor, it would be churlish not to credit Rover for giving TVR's cars the character that would go on to stand them apart from the more sensible BMWs and Porsches.

Perhaps the car most fondly associated with that engine is the Griffith 500, the most potent of the TVR range. The British manufacturer took the engine to 5.0 litres and around 340bhp – and the soapstone-shaped Griffith's bellow could drown out Brian Blessed.



Lamborghini Gallardo LP560-4

ENGINE DONOR AUDI

The shrill yelp of Lamborghini's V10 had been standing the hairs up on the back of drivers' necks since the Gallardo was launched in 2003. But it was, in Lamborghini's own words, at its limit in terms of development. For 2008, a bigger-capacity 5.2-litre V10 made its debut, and it was largely developed by Audi. A new direct-injection system helped lift power to 560bhp, and no one was heard to complain about the association with the German parent company.



Pagani Zonda

ENGINE DONOR MERCEDES-AMG

When your competitors are Ferrari and Lamborghini, you need something special in the engine department to convince prospective customers to add your supercar to their garage. Which is why Horacio Pagani turned to Mercedes-AMG and its naturally aspirated M120 V12 to power his Zonda.

Over time it would grow from 6.0 litres to 7.0 then 7.3, and would provide no less a spectacular sense of occasion than the best that the Italians could offer.

Aston Martin DB7 Vantage

ENGINE DONOR FORD

These days, 'Aston Martin' and 'V12' are as inextricably linked as fruit and nut, but in the mid-1990s the sports car maker had yet to stretch beyond six- and eight-cylinder lumps and build a V12-powered car. That would all change with 1999's DB7 Vantage.

The basis of the new V12 engine was the Ford Duratec V6. Ford owned Aston Martin through its Premier Automotive Group, and Walter Hayes, Aston's CEO, was a former Ford man who was able to smooth the way for the project to get the nod. It was built at Ford's Cologne factory, in the west of Germany, and went on to power the Vanquish, DB9, DBS and One-77 – but, unsurprisingly, it didn't feature in the Cygnet.



Ford Cortina Lotus

ENGINE DONOR LOTUS

When Colin Chapman wanted an engine of Lotus's own making to replace the Coventry Climax units, and Ford's Walter Hayes needed a hot engine to put his company on the map in motorsport, the happy result gave us the Ford Cortina Lotus, or Lotus Cortina.

The 1.5-litre, four-cylinder, twin-overhead cam unit was married to the close-ratio gearbox from an Elan, while extensive changes to the suspension, brakes and bodywork resulted in the complete package earning critical acclaim.



Citroën SM

ENGINE DONOR MASERATI

The motor industry choked on its cornflakes the morning Citroën's purchase of a controlling interest in Maserati was reported in 1968. Yes, car companies were driving forward with expansionist strategies, but this one was lost on most onlookers.

Happily, however, it resulted in the wonderfully out-there SM. It sported an advanced, lightweight, all-aluminium 2.7-litre V6, said to have been developed from Maserati's V8 in only three weeks. Whether this had any bearing on the car's dependability remains to be seen.



Caterham Seven

ENGINE DONOR ROVER

Where to start with the Caterham Seven? This is a sports car that has been through nearly as many donor engines as it has sets of tyres at drift schools and driving demo days. It started off life with the Lotus-Ford Twincam then switched to the Ford Kent Crossflow before trying motors from Vauxhall, Rover and, more recently, Ford again.

Seven stalwarts will argue over which was best until the cows come home or the roof is put back up (whichever comes first), but it was the 16-valve four-cylinder Rover K-Series motor that really put the Seven on the map by introducing it to a wider audience, especially in Superlight spec.

WHICH OF THESE WAS DESIGNED BY BMW?

The answer is all of them because BMW's Designworks spends 50% of its time working for non-BMW brands. **Jim Holder** sees how such designs feed back into the car side

You've probably heard that car companies no longer wish to be known as car companies. These days, it is de rigueur to present yourself as a mobility company, unconstrained by the metaphorical straitjackets of four wheels and an engine.

What you may not know is that many car companies, and especially design divisions, have long had the freedom to move outside established automotive circles – and few more so than Designworks, a California-based design consultancy set up in 1972 and bought by BMW in 1995 after it had built its reputation for forward thinking.

In essence, it's a subsidiary of BMW that is open for business to outsiders. So while its headline credits include early iterations of the BMW 3 and 8 Series and X5 and more recent work on the 5 Series, it is just as likely to be working on cabin designs for Singapore Airlines or a vision of the future of camping for The North Face.

"We work to a 50:50 model of working for BMW Group brands and for outside brands," says Designworks president Holger Hampf. "For BMW projects, we must compete internally to win the right to keep moving forward with designs, while for outside projects we operate with the aim of extending our learning but also of being a profit centre.

"In that sense, we are about entrepreneurial design. We don't want to work for anyone, but we do set ambitious financial targets that drive us into spaces of interest and allow us to provoke and learn in areas of mobility that perhaps the group wouldn't have time or resource to look at otherwise."

So here is a selection of some of the eye-catching projects that it has worked on.

Skai passenger drone

Clean, sustainable transport needs a radical rethink and this is Designworks' interpretation: a five-passenger drone propelled by six hydrogen-powered rotors. The target flight time is four hours and – before your eyebrows rise too far – working prototypes are being readied.

"Everyone wants to hear BMW's interpretation of the future of the car, but that's not what this is about," says Hampf. "This is about immersing ourselves in another world so that we have thought leadership in getting from A to B by other means."

The biggest challenge, says Hampf, is getting the weight down so that the drones can lift the pod and passengers: "Battery electric would never have worked, but liquid hydrogen is interesting. There is some serious investment behind that technology."

POSSIBLE INSIGHTS Lightweight materials, hydrogen power, customer acceptance of new tech, ride-hailing insight, design reassurance.



USOC Paralympic wheelchair

Sport is rarely just about physical endeavour: be it a swimming suit, running shoe or racing car, there are always variables that distort the balance. In most sports, that's actively encouraged, including in Paralympic wheelchair racing.

"We started as an Olympic sponsor in 2010 and started working with Team USA," says Hampf. "From a design perspective, it was interesting to conceive everything from the perspective of function over form – but never to the abandonment of form."

Perhaps inevitably, that led initially to the wind tunnel and carbonfibre workshop, and then on to a chassis redesign and insights into making customised chairs for each athlete, designed following 3D body scans, to reduce drag and achieve perfect weight distribution.

"The beauty was the passion of our clients," says Hampf. "They wanted perfection and the outcome was very rewarding."

In 2012, Team USA won seven medals and set four Paralympic world records. Designworks continues to perfect the chairs today, as well as working on a bobsleigh design and improvements in prosthetics for athletes.

POSSIBLE INSIGHTS Prototyping, lightweight materials, ergonomics, mobility challenges.



Ionity charging station

You are likely to have heard of Ionity, the firm initially set up by BMW, Daimler, Ford and Volkswagen to roll out fast-charging stations for electric cars and taking on new automotive partners all the time as its ambition gathers momentum.

Given the competing brands, settling on a design for the charging stations could have been a political nightmare. Step forward Designworks. "The initial thought might be it's a box in the ground, but think deeper and it is the touchpoint between our brand and our customers," says Hampf. "So the brief was actually quite complex: it had to convey quality but be durable and deliver the easiest user experience possible."

The result is rolling out for all to see: a clean, futuristic design that incorporates a touchscreen and LED lights. Four hundred Ionity charging stations will be installed in Europe by the end of the year.

POSSIBLE INSIGHTS Prototyping, industrial design themes, user interaction and experiences.



The North Face Futurelight Camper

The trend towards underlining just what a future-thinking car company you are by attending the Consumer Electronics Show in Las Vegas each January began about a decade ago. But while many car companies made their point by getting senior leaders to give keynote addresses, Designworks and its clients have been displaying real concepts.

Futurelight is currently used for high-end North Face clothing and billed as the world's most advanced breathable waterproof outerwear. In other words, it can allow airflow in and out but keep water out. Designworks took the material and applied it to a camper concept, stretching the material over a dome that could provide protection in any environment – all of which were displayed in a virtual reality environment.

POSSIBLE INSIGHTS Business strategy, industrial design, virtual design techniques.



Singapore Airlines first class cabin

It makes sense that a firm rooted in a car company would know a thing or two about making luxurious cabins – especially one that owns Rolls-Royce and has been commissioned to recreate the first class experience.

The restrictions were space and brand guidelines, the solution to create a theme that delivered the comfort and warmth of a living room through the use of colours, materials and especially lighting, with an added layer of hospitality, conveyed by the wraparound arms enveloping the seat.

POSSIBLE INSIGHTS Materials and lighting in autonomous space, industrial design.



BMW Vision Ride Helmet

One of the biggest causes of motorbike accidents is a rider taking his or her eyes off the road ahead to look at various dials and displays. It therefore sounds obvious enough to incorporate car-like head-up displays into helmets.

The technical solution wasn't so simple, of course, with cost-effective car units requiring more space than is available in a crash helmet. The end solution combines the best of the now-defunct Google Glasses concept but with an emphasis on ease of use while on the move.

POSSIBLE INSIGHTS Prototyping, industrial design, user experience.