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June 2016

The fastest production Audi ever: the new Audi R8

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Compact version

Power, Speed, Performance – the new high-performance Audi R8 sports car

From 0 to 100km/h in 3.2 seconds, from 0 to 200km/h, 9.9 seconds and a top speed of 330km/h. Naturally-aspirated V10 mid-engine with up to 449kW of power responds instantly to throttle inputs. Aerodynamic concept of a race car: The new Audi R8 is the dynamic vanguard of Audi – no other car with the four rings is so close to a race car.

The new R8 launches with two engine versions – as the R8 V10 plus with 449kW it is the most powerful and fastest production Audi ever built. The 5.2-litre V10 enables breathtaking performance, and its hissing, roaring sound is highly emotional. Yet fuel economy has been improved by up to 13 percent in the R8 model series compared to the previous model.

Fully variable torque distribution: the new quattro drive

In the powertrain, the lightning-quick shifts of the seven-speed S tronic dual-clutch transmission, an optimised mechanical differential lock and a new electro-hydraulically activated multi-plate clutch work together. The actively cooled all-wheel drive system can distribute torque freely between the axles. The intelligent dynamic control system for the quattro drive is incorporated into the Audi drive select dynamic handling system that offers four basic modes.

In each mode, the new high-performance sports car expresses a different character – from relaxed freeway cruiser to race car on the circuit track. In the top R8 V10 plus model, a performance leather steering wheel is standard equipment.

In its performance mode, it offers three additional modes: dry, wet and snow. They make handling even more precise and sharper, tuned to the friction coefficient of the specific road surface.

Dry weight: 1,454kg

The new Audi R8 V10 plus has a dry weight of just 1,454kg. This was primarily due to its newly conceptualised Audi Space Frame (ASF) in multi-material construction – which consists of aluminium and CFRP parts. The ASF weighs just 200kg. The entire underbody has a smooth covering, like on a race car, and the air flow exits via a large diffuser, increasing downforce. At top speed, this amounts to 40kg at the front axle and 100kg at the rear axle. The large CFRP rear wing also plays an important role in attaining these top figures.

Exclusively for the driver: operating controls

Just like in a race car, the interior of the high-performance sports car focuses on the driver. The driver can read off all key information at a glance from the Audi virtual cockpit. The steering wheel, instrument cluster and road all line up along one central visual axis. Drivers can operate all important functions with the multifunction and satellite push-buttons without having to take their hands off the steering wheel or look away from the road.

The Audi virtual cockpit is user configurable, and it shows all displays in elaborate 3D graphics – if desired, with one large rev counter and auxiliary gauges that show much more information, such as tyre temperature and torque output. MMI navigation plus with MMI touch is standard equipment in the new R8. This high-end media centre was designed to follow a simple operating logic.

Extreme lighting range: laser spot for the high beam headlight

The workmanship of the new R8 – which is handcrafted at a new plant near Neckarsulm – is superlative. Its range of optional technology components extends to the sound system from Bang & Olufsen and the Audi laser spot, which doubles the range of the high-beam light.

Sister model: Audi R8 LMS

No other production car with the four rings shows as much affinity for the race track as the new R8. This is also proven by its sister model – the new GT3 race car, the Audi R8 LMS. For the first time, Audi developed the two versions simultaneously, in order to optimally exploit synergies. Both the new Audi R8 and its motorsport variant, the R8 LMS, have made significant performance gains, thanks to the close cooperation between race car engineers, motorsport specialists and developers. Just 10 weeks after its world premiere at the Geneva Motor Show, the R8 LMS made its dazzling entrance on the 24hour racing scene, seizing overall victory on the Nürburgring.

Summary

Taking dynamism to the limit – the new Audi R8

No other production car with the four rings is as powerful, fast or distinctive: The new high-performance R8 sports car is designed for maximum dynamism in all of its technical aspects – from its Audi Space Frame (ASF) to its aerodynamics and newly developed quattro all-wheel drive. The naturally-aspirated V10 mid-engine guarantees tremendous performance, especially in the top version with 449kW: The sprint from 0 to 100km/h takes just 3.2 seconds, and its acceleration tops out at a governed maximum speed of 330km/h.

A powerful, high-revving mid-engine, a quattro drive system with freely variable torque distribution, systematic lightweight design with an ASF made of CFRP and aluminium and a dynamic chassis all make the R8 the sporty vanguard of Audi, and it is sharper than ever. The close co-operation between race car engineers, motorsport specialists and developers has led to significant performance gains – in both the road-version sports car and the R8 LMS race car that was designed simultaneously.

Engine: V10 in two versions

The engine of the new Audi high-performance sports car is available in two versions – with 397kW for the R8 V10 and 449kW for the R8 V10 plus. Their maximum engine torque – 540Nm and 560Nm, respectively – is available at 6,500rpm for both engines. Compared to the previous model, power has increased considerably, and the responsiveness of the high-revving (up to 8,700rpm), naturally aspirated 5.2-litre engine is now even more spontaneous. Like a race car engine, the V10 engine has dry sump lubrication. Its characteristic sound is now even fuller, and Audi can install a sport exhaust system as an option.

Fuel economy is improved over the previous model – by up to 13 percent.

The new V10 engine was given effective efficiency technologies. They include the COD (cylinder on demand) system, which shuts off one row of cylinders under low load conditions. Another is dual injection, which injects the fuel into the combustion chambers and induction manifold according to demand. When the driver takes their foot off the accelerator pedal at speeds

over 55km/h, the new R8 goes into a coasting mode. When the car comes to a stop, a start-stop system deactivates the V10 engine.

In the sports car world, the new Audi R8 is right among the leaders in terms of its driving performance. The V10 accelerates from 0 to 100km/h in just 3.5 seconds, and it accelerates to a top speed of 320km/h. For the V10 plus, the fastest production Audi ever, the figures are 3.2 seconds and 330km/h, and it takes just 9.9 seconds to sprint from 0 to 200km/h. In the top model, each horsepower only has to move 2.38kg of dry vehicle weight – an excellent power-to-weight ratio.

Stability and dynamics: the new quattro drive

Positioned behind the V10 is a seven-speed S tronic that executes lightning-fast gear shifts by electrical control (shift-by-wire). The dual-clutch transmission directs forces to a newly designed quattro drive system with an electro-hydraulically activated multi-plate clutch at the front axle. It has active water cooling for maximum performance. The clutch distributes drive torque fully variably according to the driving situation – up to 100 percent can be directed to either the front or rear wheels.

Management of the clutch is integrated in the Audi drive select dynamic driving system, and it gives the driver a choice between the basic modes comfort, auto, dynamic and individual. On the R8 V10 plus, the performance mode comes with three additional modes: dry, wet and snow. They adapt key handling parameters to the friction coefficient of the road surface. A mechanical rear differential lock is standard; its locking values were newly tuned to work together with the actively controlled quattro drive.

Motorsport DNA: chassis has double wishbones

The motorsport DNA of the new Audi R8 also expresses itself in the chassis area with its aluminium double wishbone suspensions. On the V10 plus, the tuning is very sporty, and electronically controlled shock absorbers (Audi magnetic ride) are standard on the V10 and available as an option in the V10 plus. The new electro-mechanical power steering system gives drivers finely differentiated road feedback. As an alternative, Audi can install dynamic steering, which adapts its steering gear ratio to the vehicle's driving speed.

The new Audi R8 V10 has standard 19-inch wheels, and the V10 plus has 20-inch wheels with size 245/30 tyres in front and 305/30 at the rear . The powerful brakes decelerate the car effectively; in the top model, the disks are made of carbon-fibre ceramic .

Besides integrating the quattro drive system, the Audi drive select system also integrates other systems into its four basic modes: the accelerator pedal, steering, S tronic, damper control (optional on the V10 plus), dynamic steering (optional) and the flaps of the exhaust system. In the dry, wet and snow performance modes, the Electronic Stabilisation Control (ESC) system is also managed.

Lightweight design: dry weight is only 1,454kg

In the top model, the R8 V10 plus, the unladen weight (without driver) is only 1,555kg and the dry weight is a low 1,454kg. Playing a decisive role in this systematic lightweight design concept is the Audi Space Frame (ASF), which weighs just 200kg thanks to a new type of multi-material construction. It comprises 79 percent aluminium and 13 percent carbon-fibre-reinforced polymer (CFRP) and was designed according to the Audi motto "The right material in the right amount at the right place."

The aluminium parts create a framework that integrates large CFRP components – the centre tunnel, rear wall and B-pillars. On the R8 V10 plus, add-on parts such as the sideblades and diffuser are made of CRFP, which complements the lightweight alloy exterior skin. Compared to the previous model, the multi-material ASF has 40 percent greater torsional rigidity, and its acoustics and crashworthiness also get top grades.

As in a race car, the aerodynamic concept of the new Audi R8 is designed primarily for driving stability. Its central element is a long and wide diffuser in the underbody. On the R8 V10 plus, a total of 140kg of downforce is generated at top speed: 40kg at the front axle and 100kg at the rear axle.

Design: low, wide and extended

The new Audi R8 is 4.42 metres long and 1.94 metres wide. Its proportions – with its cabin placed far forward, a long back and relatively short wheelbase – make the technology concept of the mid-engine sports car clearly recognisable at first glance. Characteristic design features of the previous model now take on a sharpened expression. The sideblades, for instance, are now interrupted by the continuous shoulder line that gives the sides a look of tension and excitement.

Large air inlets with vertical fins and LED headlights flank the wide, low-profile Singleframe grille that has a strong sculpted appearance. As an option, Audi can deliver LED headlights with laser spots that double the range of the high-beam headlights. This option also includes dynamic turn signals in front; they are standard in the LED tail lights. The look at the rear is shaped by the diffuser, the ventilation screen of the engine compartment and – on the V10 plus – a CFRP fixed wing.

The 11 exterior colours that are offered may be combined with any of the six versions of sideblades. The R8 V10 plus adds CFRP sideblades with a gloss finish as standard equipment (optional for the R8 V10). The Audi exclusive program lets customers order any paint colours blended according to their wishes. Buyers can also choose any colour for the sideblades.

Interior: aesthetic lightweight design

In the interior too, the lightweight design concept of the new Audi R8 is expressed in taut lines. The defining element is the arch-shaped ‘monoposto’ that wraps around the cockpit. The instrument panel appears to float weightlessly, and turbine-shaped controls for the automatic air conditioner are arranged along its lower edge. Behind the seats is a cargo space with 226 litres of capacity. It supplements the 112 litre luggage compartment at the front of the car.

The low-mounted sport seats with integrated head restraints are entirely new. In the plus model, there are lightweight bucket seats . and the all-new

R8 is standard with fine Nappa leather for the upholstery in a number of different colour combinations. In addition, two leather packages are offered as well as a new diamond quilted pattern and decorative trims in matt CFRP. Individualists can have nearly any other special wishes fulfilled in the Audi exclusive program.

Like in a race car: controls & displays

At the controls of the new Audi R8, the driver feels like a race car driver. All important functions can be controlled without drivers taking their hands off the steering wheel or looking away from the road. The R8 sport leather steering wheel with multifunction plus, which is standard on the R8 V10, integrates two satellite buttons for starting and stopping the engine and for Audi drive select. The R8 performance leather steering wheel with four control satellites (standard on the V10 plus) offers one additional push-button with a turn wheel for the performance mode and another for controlling the exhaust system.

The digital display is also reminiscent of a race car: The Audi virtual cockpit, a TFT monitor with a 12.3-inch screen, presents all information in intricately rendered, high-resolution graphics. The driver can choose between three views. In the performance view, the rev counter is centrally located, and other indicators and gauges are arranged around it – such as for torque, power, oil temperature, tyre pressure, tyre temperature, g-forces and lap times on the race track. Drivers can individually configure the gauges around the speedometer and rev counter according to their needs and uses.

Includes MMI navigation plus: equipment

The new R8 comes with a generous set of standard equipment. One highlight is MMI navigation plus with MMI touch. Like in a smartphone, the operating logic is structured in flat hierarchies, including a free text search function. Vehicle functions can be controlled from the steering wheel, the MMI terminal on the console of the centre tunnel or by voice control. The sound system from Bang & Olufsen rounds out the infotainment line-up.

New craftscales production facility: Audi Böllinger Höfe

The new Audi R8 is being built in a specially constructed production facility known as the 'Audi Böllinger Höfe' in Heilbronn. Body manufacturing and final assembly both feature many new methods and are organised highly flexibly – especially for limited volume series with a handcrafted character.

They offer a lot of freedom that enables fulfilment of individual customer requests.

As many as 500 highly qualified specialists are employed in the new R8 manufacturing facility, which is operated by quattro GmbH. They build each car with the greatest handcrafted precision in 15 cycles, each around 30 minutes long. Before delivery, each new high-performance sports car must successfully complete a stringent quality acceptance process.

For the racetrack: the Audi R8 LMS

Making its debut at the same time as the R8 road version sports car is the new R8 LMS race car. It shows just how closely motorsport and production cars are interrelated at Audi. The share of identical parts between the two cars is around 50 percent, and the bodies of both cars are produced at 'Audi Böllinger Höfe'.

The chassis of the rear-wheel drive GT3 race car is based on a multi-material ASF, which is point-reinforced, plus a safety cage. Large areas of its exterior skin are made of CFRP. The race car's homologation weight is 1,225kg. The V10 is practically identical to the production engine, and it outputs around 430kW. The car's aerodynamics have also been further developed, and its c_D figure has been lowered. Special diffusers in the rear body and smooth underbody panels create more downforce in the new R8 LMS. This makes it possible to implement a smaller spoiler, which increases the car's top speed.

Sales of the new Audi R8 LMS to customer teams worldwide will begin with the 2016 season. In 2015, the new race car competed in its first races with factory teams in international endurance races such as the 24hour race at the Nürburgring and in Spa. Just 10 weeks after its world premiere at the Geneva Motor Show, the R8 LMS made its dazzling entrance on the 24hour racing scene, seizing overall victory on the Nürburgring.

At a glance

The new Audi R8

Engine

- Naturally aspirated high-revving V10 with dry sump lubrication
- 5.2-litre displacement, two versions: 397kW and 449kW, 540Nm or 560Nm of torque at 6,500rpm
- High-revving, spontaneous engine response, characteristic sound
- Cylinder on demand (COD), coasting mode, start-stop system, dual fuel injection, fuel consumption up to 13 percent lower than in previous model.
- Excellent driving performance: 0 – 100km/h in 3.2 seconds, 0 – 200km/h in 9.9 seconds, top speed of 330km/h (on the R8 V10 plus)

Drivetrain

- Lightning-fast shifts with seven-speed S tronic, shift-by-wire signal transmission
- Newly developed quattro permanent all-wheel drive with electro-hydraulically activated multi-plate clutch, fully variable distribution of drive torque, rear differential lock.

Chassis

- Double wishbone suspensions, front and rear, optional Audi magnetic ride damper control
- High-performance brakes at all four wheels, optional ceramic brake disks
- Newly developed electromechanical steering, dynamic steering system as an alternative
- Standard 19-inch wheels with mixed tyres, standard 20-inch wheels (V10 plus)
- Audi drive select dynamic handling system with four standard modes; optional three additional performance modes for maximum dynamic performance (standard in V10 plus)

Exterior design and Audi Space Frame (ASF)

- Characteristically taut mid-engine sports car design
- Two-part sideblades, standard LED headlights, optional laser spot for high-beam, dynamic turn signals
- New Audi Space Frame in multi-material construction made of aluminium and CFRP; ASF weighs 200kg, vehicle dry weight 1,454kg (R8 V10 plus)
- Top figures for torsional rigidity, crash safety and acoustics
- Aerodynamic concept focuses on high downforce figures

Interior

- Clean lines, monoposto arch in cockpit, hovering instrument panel
- Newly conceptualised sport seats, R8 V10 plus with lightweight bucket seats
- New colours and materials, many customisation options

Controls & displays

- Controls are fully focused on the driver; all key functions are on the steering wheel
- Two steering wheel versions with two or four satellite buttons
- User-configurable Audi virtual cockpit that offers a 12.3-inch screen with brilliant, high-resolution displays is standard. Performance view shows additional information such as torque, power, oil and tyre temperatures, 'g' forces and lap times on the race track

Infotainment

- MMI navigation plus with MMI touch is standard, newly developed operating concept with flat hierarchies like on a smartphone, including free text search
- Technology is based on second generation modular infotainment platform (MIB)
- Bang & Olufsen sound system

Production

- Crafted at Audi Böllinger Höfe at the Audi production site in Neckarsulm
- Flexible and innovative production, high share of highly skilled handcrafted work

Audi R8 LMS

- GT3 race car for global customer racing program; first races already in 2015
- Around 50 percent of its parts are identical to those of production sports car, including the engine
- Reinforced ASF with safety cage, exterior skin made of CFRP

Full version

The new Audi R8: Audi has further sharpened its sporty vanguard vehicle

The previous model was already the sporty vanguard of the brand – and this applies to the second generation Audi R8 even more. The newly conceptualised high-performance sports car has been made even tauter and stronger, both on and off the race track. Embodied in its DNA is know-how acquired in the numerous car racing successes that Audi has achieved over the years – primarily in endurance racing events. The sport prototypes have won the 24 hours of Le Mans 13 times since 2000, and the R8 LMS contributed seven more overall victories in 24hour races since 2009.

Its character

The mid-mounted engine in the Audi R8 is not only a classic concept in motorsport; it is also an integral part of the brand's sporty DNA. It was already used in the Grand Prix race cars brought to the starting grid by Auto Union in the 1930s, with the powerful engines located forward of the rear axle – which was a revolutionary step at the time. In the year 2000, Audi won the 24 hours of Le Mans for the first time with the LMP R8 prototype. By 2005, the car which provided the name for today's high-performance production sports car had taken five overall victories at the Sarthe. It was then retired and replaced by the Audi R10 with a TDI engine.

The R8 also enjoyed much success in customer racing – car racing had been a key aspect of its model development from the start. In 2009, the R8 LMS embarked on its career, and by 2014 it had raced to 26 GT3 championships worldwide, 23 other titles and seven overall victories in 24 hour endurance races. Its technology was, and today – in its second generation – it still is closely related to that of the road-version sports car.

In the second generation, the road-going sports car and the motorsport version, the R8 LMS, were developed simultaneously for the first time and were presented together at the 2015 Geneva Motor Show. Close co-operation between race car engineers, motorsport specialists and developers has given the new Audi R8 a significant boost in performance.

Engine

Offering immense power and extremely good engine response – the further developed 5.2 FSI in the new R8 is a high-powered engine that was systematically designed for high engine speeds. As soon as the engine is started, it revs at 2,500rpm for fractions of a second. Under load, the naturally-aspirated 10-cylinder engine develops a very unique sound – a throaty hissing and roaring.

Audi offers the V10 with 5,204cc of displacement in two versions. On the R8 V10, the long-stroke engine (bore x stroke: 84.5 x 92.8mm) has a power output of 397kW at 8,250rpm, and its maximum torque of 540Nm is available at 6,500rpm. For the R8 V10 plus, these values are 449kW and 560Nm at the same engine speeds. At both power levels, the 5.2 FSI can rev up to 8,700rpm – at limited speed, the pistons travel a total of 26.9 metres per second.

In the new Audi R8 V10 plus, the engine's specific power is 117.2hp per litre displacement. Each horsepower only needs to move 2.38kg of weight, because the high-performance sports car only weighs 1,454kg (dry weight). This leads to impressive performance figures: The fastest production Audi ever catapults from 0 to 100km/h in 3.2 seconds and from 0 to 200km/h in 9.9 seconds. It can continue accelerating to a maximum speed of 330km/h. The new Audi R8 V10 accelerates from 0 to 100km/h in 3.5 seconds and has a top speed of 320km/h.

Compact powerplant: the V10

The V10, which is produced at the engine plant in Győr, Hungary, in part by manual assembly, is very compact. Its low mounting position in the car results in a low centre of gravity. The offset between cylinder banks is 18.5mm. The cylinder firing sequence is 1 – 6 – 5 – 10 – 2 – 7 – 3 – 8 – 4 – 9. The crankshaft is designed as a common pin shaft. The connecting rods of opposing pistons are joined to a common crank pin, which results in alternating firing intervals of 54 and 90 degrees. This rhythm makes a big contribution toward producing a very unique, motorsport-like sound. Two flaps in the exhaust system let the driver choose between a comfort-oriented sound and a sporty sound. The entire sound stage is authentic – including the babbling sound when the foot is taken off the accelerator pedal and a more roaring sound when shifting gears under full load.

The cylinder crankcase of the 5.2 FSI is manufactured in a complex low-pressure die-casting process with a high-tech aluminium alloy that combines low weight and high strength. The cylinder liners are honed from the solid piece by exposing the hard silicon crystals. The bed plate construction of the crankcase gives it maximum rigidity, and grey cast iron bearing brackets reduce heat expansion and thereby improve bearing play. The forged crankshaft and the connecting rods that are made of forged steel combine high strength and low weight, and the pistons are forged from an aluminium alloy.

Reliable under all conditions: dry sump lubrication

The motor oil, which is temperature-controlled in a dedicated cooler, comes from a dry sump – a principle borrowed from racing. This makes it possible to mount the engine extremely low. The pump module, which operates with multiple suction stages, assures proper lubrication under all conditions – including during lateral accelerations of around 1.5g, which are possible in the new R8.

The camshafts are chain driven, and they operate on the rear side of the engine. All four camshafts can be adjusted by up to 42 degrees crank angle. This enables a broad range of valve timing for the 40 valves that are actuated by roller cam followers. The exhaust valves are sodium filled for better cooling.

Compared to the previous engine, Audi has configured the V10 for even more spontaneous high power output. The compression ratio grew from 12.5:1 to 12.7:1, valve timing was configured for good chamber filling at high engine speeds, and the intake channels were optimised in the lightweight variable intake manifold. The machined inlet ducts and the valve shaft diameter of just 4.8mm also contribute to optimal flow into the cylinder.

These extraordinary efforts have led to convincing results: The 5.2 FSI revs just as spontaneously, and even reaches high revs a bit quicker than the best short-stroke engines on the global market. One indicator of this is the jump to full-load, which describes the engine's spontaneous throttle response. This means that as soon as the driver pushes the accelerator pedal fully while idling in the stationary car, full load is already available after 6.6 tenths of a second – this is nearly 20 percent faster than in the previous engine. This means that the driver can apply measured acceleration ideally

during a sporty style of driving – whether on the race track, during a controlled drift or on snow.

New combustion process: FSI plus MPI

De-throttling of the air induction system goes hand in hand with a new combustion process. Along with direct injection into the combustion chambers (FSI), the V10 adds fuel injection into the induction manifold (MPI). Two newly developed control units operating by the master-slave concept are at work: each handles part of the large amount of computing work, and together they control the dual injection process.

In the lower part-load range, only MPI injection is used. The high vacuum pressure in the induction manifold vaporises the fuel very well, which leads to clean combustion. In the moderate load range, induction manifold and direct injection are used in equal measures. In the full-load range, the FSI system, which builds up a pressure as high as 200 bar, performs around 85 percent of the injection. The directly injected fuel swirls intensively, cooling the walls of the combustion chambers, which reduces the tendency to knock. The remaining MPI share contributes to a high charge concentration and to a boost in power.

High efficiency gain: CO₂ is 33 g/m lower

Despite its highly dynamic character, the new Audi R8 consumes far less fuel than the previous model. Its V10 version had a combined NEDC fuel consumption of 13.1 litres per 100km (equates to 305g/km CO₂) – while it is now just 11.4 litres per 100km (272g/km CO₂), which represents a 13 percent reduction. In the case of the V10 plus, fuel consumption was reduced from 12.9 litres/100km (299g/km CO₂) to 12.3 litres per 100km (287g/km CO₂).

The new cylinder-on-demand (COD) technology makes a substantial contribution toward this efficiency gain. Under low to intermediate load conditions – when one of the four upper gears is engaged – it shuts down the cylinders of the left or right bank by deactivating their injection and ignition processes.

If the deactivation phase lasts longer than 30 to 60 seconds, the COD system reactivates the bank to prevent cooling of the catalytic converter, and it deactivates the other cylinder bank. During a long COD phase, it continually alternates back and forth between the two banks. The driver

does not perceive this at all. The control unit smooths the transitions, each of which takes around three-tenths of a second, by shutting off the cylinders of each bank sequentially.

Along with the COD system, the 5.2 FSI in the new Audi R8 has other efficiency technologies on-board as well. When the comfort mode of the Audi drive select dynamic driving system is active, and the vehicle speed is under 55km/h, the seven-speed S tronic switches over to freewheeling operation when the driver releases the accelerator pedal. It disengages both clutches, and the high-performance sports car coasts. Just before stopping, the start-stop system shuts the engine off entirely; the subsequent engine restart is performed gently.

Seven-speed S tronic

The drivetrain is a special highlight of the new R8 technical concept; it features a seven-speed S tronic that executes gear shifts within hundredths of a second and an intelligent quattro drive system that provides maximum stability and dynamism on any road surface. Audi is presenting the latest state of its technology here.

The seven-speed S tronic is standard with both engine versions – the V10 and the V10 plus. Operating commands are all transmitted electrically (shift-by-wire). The driver can manually shift gears using the gear selector lever or the shift paddles on the steering wheel. Or the driver can have the S tronic shift automatically in the D or S program. At the push of a button, the driver can start off with launch control which engages the clutch at around 4,500rpm – it applies the power of the V10 to the road with perfectly controlled tyre slip.

Based on its three-shaft layout with one dual drive shaft and two output shafts, the seven-speed S tronic mounted behind the engine is very compact. Its thermal management, which co-ordinates with the engine, uses an oil-water heat exchanger that is mounted to the transmission. The mechatronics, which are set up as a separate block, activates and lubricates the high-tech transmission. One oil pump suffices to supply oil to the gear wheel sets, clutches and integrated differential lock.

Two multi-plate clutches, one behind the other, operate two independent transmission sub-units. Clutch K1 transfers the torque via a solid shaft to

the fixed gear wheels for gears 1, 3, 5 and 7, which are located in the rear section of the transmission housing. A hollow shaft rotates around the solid shaft. It is connected to a second K2 clutch and acts on the gear wheels for gears 2, 4, 6, and reverse. Mounted on output shaft 1 are the gear wheels for gears R, 4, 5 and 1, while the gear wheels for gears 2, 6, 3 and 7 are mounted to output shaft 2.

Both transmission sub-units are continually active, but only one is connected to the engine at any one time. The shifting process runs so smoothly and comfortably that the driver hardly notices it. Gear shifts take just a few hundredths of a second, and they are executed with nearly no interruption of propulsive power.

On output shaft 2, the seven-speed S tronic has a connection to the propeller shaft that runs through the bed plate of the dry sump oil pan to the front axle. An electro-hydraulically activated and electronically controlled multi-plate clutch is mounted there, forming a block with the front differential.

quattro drive

The quattro drive system of the R8 has been fully re-developed. The combination of its high-performance mechanical system and software precisely tuned to the mid-engine concept makes it possible to realise dynamic handling properties in a new dimension. The intelligent all-wheel drive software continually distributes torque ideally according to the driving situation, driver inputs and ambient conditions.

The electrohydraulic multi-plate clutch integrated in the front differential transmits the calculated torque to the front wheels within just a few milliseconds. Unlike the previous component, the new clutch can distribute torque between the axles fully variably – it does not have any fixed underlying distribution. The level of maximum torque transfer was increased significantly for the best possible traction and dynamic handling.

The quattro drive is connected to the engine's coolant circulation system, which utilises three large radiators at the front of the car. This solution ensures that the clutch can perform its control work fully and precisely under all conditions. A temperature sensor and a pressure sensor continually monitor conditions and adapt control parameters as necessary. Although

the multi-plate clutch operates with minimal slip – which is necessary for defined transmission of torque – it surpasses the previous viscous coupling when it comes to efficiency.

The quattro drive is integrated in the Audi drive select dynamic handling system, which lets the driver choose between the basic modes comfort, auto, dynamic and individual. On the R8 V10 plus, there are supplemental programs in performance mode: dry, wet and snow. They adapt dynamic handling parameters to the friction coefficient of the specific road surface.

The purely mechanical rear differential further improves traction and dynamic handling – it exhibits a 25 percent locking effect in traction and 45 percent in thrust. It is precisely designed for the dynamic character of the new R8 and the actively controlled quattro drive system. This results in turn-in behaviour that practically eliminates understeer. The mid-engine is positioned very near the vertical axis of the car's centre of gravity, so the inertia of its mass hardly comes into play in fast changes of direction. The axle load distribution is 42:58 – an ideal figure.

Chassis

Whether on a race track or a mountain pass road – the new high-performance sports car from Audi impresses with its dynamics. It executes steering inputs nearly without delay, and it reaches very high speeds in curves. It does this while remaining fully neutral.

The Audi drive select system and the performance programs dry, wet and snow (standard on the V10 plus) add new facets to the driving experience. The differences in handling can be experienced, and control limits are shifted far into the dynamic limit range.

The chassis offers greater comfort than in the previous model. Double wishbones made of aluminium – a classic design principle from racing – are used in the suspensions for all four wheels. Rubber-metal mounts transfer lateral forces into the car body in a defined way, while assuring good elasticity in a longitudinal direction. New transverse link mounts at the front and rear axles enhance comfort, stability and precision. The car's track width is 1,599mm at the rear and 1,638mm at the front.

The electromechanical rack power steering system has also been redesigned from scratch. It provides differentiated road feedback and also saves a tremendous amount of energy compared to the hydraulic steering system in the previous model. It has a steering ratio of 15.7:1, and power steering assist varies as a function of the vehicle driving speed.

Dynamic steering is available as an alternative for both engine versions. Its superposition gear varies the ratio as a function of vehicle speed between 10.0:1 and 17.5:1. In a parking garage, the steering is very direct, and on the freeway it is indirect and smooth. In the performance programs (standard on the V10 plus, optional on the V10), a fixed ratio of just 13:1 is used. At the curve limit, the dynamic steering system counter-steers with tiny impulses to add more stability.

A bit stiffer: the new Audi R8 V10 plus

The chassis tuning differs between the two engine versions – the top version has stiffer springs and dampers on-board . Audi can deliver the Audi magnetic ride system (standard in the V10) – it adapts the operating mode of the dampers to the profile of the road and style of the driver – individually for each wheel at millisecond cycles. A synthetic oil in the pistons of the shock absorbers has very small magnetic particles embedded in it. When a voltage is applied to a coil, a magnetic field is generated in which the particles align transverse to the direction of flow. They thereby restrict the flow of oil through the piston channels.

Audi magnetic ride is incorporated into the control of the Audi drive select dynamic driving system, which is standard equipment in the new Audi R8. The driver can use this system to vary the mode of operation of key technical components over four basic modes: comfort, auto, dynamic and individual. In the dynamic stage, the quattro drive system assists in executing controlled, safe drifts. The accelerator pedal, steering, shift points and sound are even stiffer, so that the dynamics can be experienced. In the auto mode, on the other hand, traction has priority – this translates into high speed and fast lap times on the race track.

In the performance mode of the new Audi R8 V10 plus , the driver can use a dedicated satellite button with a turn wheel on the multifunction steering wheel plus to select one of the programs dry, wet or snow.

They too are configured for maximum dynamic performance, and they take the friction coefficient of the road surface into consideration. The Audi drive select setting also influences Electronic Stabilisation Control (ESC). On wet or snow-covered road surfaces, for instance, ESC modifies the thresholds of the ASR and ABS control systems accordingly.

Best grip: the wheels and tyres

The new Audi R8 V10 is equipped with factory-installed 19-inch wheels. On the V10, the cast alloy wheels have a 5-twin-spoke design in matt titanium look, while the V10 plus has 20-inch wheels in 10-spoke Y design in matt titanium finish. The tyres are 245/30 and 305/30 in size. Tyre pressure monitoring with direct measurement of tyre pressure and temperature is a standard feature.

There are large-size brakes behind the wheels. The standard steel disks of the new Audi R8 V10 have wave-shaped contours (wave design) that make them lightweight. They are internally ventilated and perforated. They are joined to aluminium brake caps by stainless steel pins which prevent the transfer of peak temperatures. Operating at the front wheels are eight-piston fixed calipers and disks 365mm in diameter; at the rear wheels, four-piston calipers and disks 356mm in diameter are used. The new electromechanical parking brake activates two dedicated floating calipers.

380mm diameter: the ceramic brakes

Audi installs brake disks made of carbon-fibre-reinforced ceramic on the new R8 V10 plus. The geometry of their cooling channels ensures fast heat dissipation, and the friction ring is bolted to a forged aluminium brake cap. They are 380mm in diameter in front (with six-piston fixed calipers) and 356mm at the rear (with four-piston calipers). The ceramic disks are 15.2kg lighter in weight than their steel counterparts. They are extremely temperature resistant and have a long service life. The brake calipers differ from one another in colour too. The steel brakes are painted in gloss black – or optionally gloss red – and they display R8 logos. The calipers of the ceramic disks shine in anthracite coloured paint with the ‘Audi ceramic’ signature.

The Electronic Stabilisation Control (ESC) system that is being used is also a new development. It builds up brake pressure so quickly and precisely that its work is hardly perceptible. ESC may be switched over to a sport mode, or it may be deactivated altogether. New system functions include the

multicollision brake assist system – a function that assists the driver by performing targeted braking manoeuvres after an initial collision to avoid skidding and thereby hazardous secondary collisions.

ESC rounds out the handling properties of the new Audi R8. In fast driving through curves, torque vectoring – which is a software function of ESC – applies minimal braking interventions at the wheels on the inside of a curve. The difference in propulsive forces causes the high-performance sports car to turn into the curve very slightly – making its handling even more precise, sporty and stable. In the dynamic mode, the system is configured for maximum driving enjoyment. It assists in spontaneous turn-in and controlled drifts by active adjustments and slight brake interventions when oversteer occurs.

Exterior design

No other production car from Audi is closer in concept to a race car than the new R8. The occupant cell that is placed far forward, the strong emphasis of the wheel arches and the long back recall the look of a Le Mans race car – the R 18 e-tron quattro. Compared to the previous model, the car's length (4,426mm), height (1,240mm) and wheelbase (2,650mm) have not changed significantly, but the width has grown by around four centimetres to 1,940mm.

The influential design ideas of the previous model are expressed in a tauter, more technical and precise way in the new Audi R8. Horizontal lines define the front view. The very sculptural Singleframe radiator grille in honeycomb look – executed in a matt finish on the V10 and in a gloss finish on the V10 plus – has a very broad and low design. Three-dimensionally formed surfaces join it to the wedge-shaped headlights; they emphasise the tension of the design. The four rings are placed on the hood.

37 LEDs per unit: LED headlights with laser spot

Like the grille, the large trapezoidal air inlets also have inserts in honeycomb look. Their two vertical slats match the blade in the headlights that are part of the daytime running lights signature. The vertical blade is anodised blue in the version with the laser spot high-beam lights – a version that supplements the standard LED headlights with their 37 LEDs each.

The laser spot doubles the range of the high-beam light. In each headlight there is a module with four powerful laser diodes that are just 300 micrometers in diameter. They generate a blue laser beam with a wavelength of 450 nanometers. A phosphorus converter converts it into white light with a colour temperature of 5,500 Kelvin that is pleasing to the human eye. The laser spot – which is active outside of urban areas at speeds of 60km/h and above – offers tremendous advantages in terms of visibility and safety to drivers. An intelligent camera-based sensor system detects other road users and actively adjusts the light pattern to dim the light intensity specifically for them.

Audi combines the new technology with the dynamic turn signals, which are placed along the upper edge of the headlight together with the daytime running lights. Depending on the model, the turn signals are implemented as either individual LEDs or LED blocks. As soon as the driver activates the turn signal, these LEDs light sequentially from inside to out – i.e. in the direction in which the driver is turning.

The side view of the new Audi R8 exhibits taut, clean lines that delineate curved surfaces. The contours above the wheels reference the quattro drive system. The flowing shoulder line connects the wheels with one another while dividing the sideblade in two visual elements – an upper and a lower half.

The door handles are placed nearly invisibly in the shadow of this line. This new design solution makes the high-performance sports car appear even longer and more dynamic. The light edges on the side sills are recreated in the aerodynamic blades of the Audi R18 e-tron quattro.

The fuel lid is made of aluminium in both engine versions; it is integrated in the upper blade on the right side of the car and has an R8 logo. To open it, the driver presses on the smooth surface to the left of the fuel lid, then the driver presses the nozzle right into the filler neck – just like on a race car, it is no longer necessary to unscrew a cap.

For downforce: the wings of the R8 V10 plus

At the rear, the design also documents the affinity of the new Audi R8 for motorsport – its dominating elements serve to generate downforce. The R8 V10 plus has a large fixed rear wing made of carbon-fibre-reinforced

polymer (CFRP); on the R8 V10, the spoiler is electrically extended at 120km/h. The contours on the two sides of the rear window, through which the engine is visible, contribute to smooth air flow over the car.

The diffuser with its distinctive slats is extremely wide and is flanked by the two trapezoidal tail pipes of the exhaust system. They are gloss black on the V10 and V10 plus with the standard sport exhaust system. The prominent horizontal lines give the rear body a very wide look. The verticals run diagonally downward and outward – forming a triangle and emphasising the stance of the new Audi R8 on the road.

The large inlet openings for the engine compartment – also in honeycomb look with upright slats – form a single visual unit together with the lights. Their fork-like contours produce a distinctive red signature when the daytime running lights are activated. The adaptive brake light flashes at a faster frequency with hard braking. Each tail light integrates 118 individual LEDs, which generate an absolutely uniform light pattern. The dynamic rear turn signal lights are a standard feature.

Audi offers its new high-performance sports car in 11 colours. The solid finish paints are: dynamite red, ibis white and Vegas yellow. The metallic tones are: camouflage green, floret silver, mythos black, Suzuka grey and tango red.

The colour palette is rounded out by the pearl effect paint Daytona grey, the crystal effect macaw blue and the matt finish camouflage green. The Audi exclusive program lets customers have any paint colours blended according to their wishes.

Six versions of sideblades are available – the paint colours are: ice silver, metallic (standard on the R8 V10), Kendo grey, mythos black, oxygen silver and titanium grey, matt as well as one version in gloss CFRP (standard on the R8 V10 plus). As an alternative, customers may choose any colour for the sideblades in the Audi exclusive program.

Audi Space Frame in multi-material mixed construction

Like the previous model, the new R8 also has a body in ASF (Audi Space Frame) construction – which is synonymous with extreme lightweight

design. It weighs just 200kg, which is 10 kilograms less than before – thanks to a concept being used at Audi for the first time which combines aluminium and carbon-fibre-reinforced polymer (CFRP). Large components of the occupant cell consist of CFRP, while the front and rear body modules are built exclusively of aluminium. The new multi-material ASF forms the basis for the lightweight design concept of the high-performance sports car.

In its lightweight design strategy, Audi does not just rely on a single material, but instead on an intelligent material mix – according to the motto “The right material in the right amount at the right place.” The new material CFRP is used where it can attain better results than aluminium. CFRP is used for the rear wall, the centre tunnel and the three-part B pillars. These large components, which are produced in the efficient resin transfer moulding (RTM) process, form the high-strength backbone of the ASF that is nearly torsion-free. They account for a 13 percent share of the ASF.

CFRP parts differ from one another in their structure, depending on where they are used. Audi fully exploits the material’s specific strengths. In the crossmember of the rear wall, where maximum strength in a transverse direction is what counts, the fibre layers are largely aligned unidirectionally. Up to 14 of them are placed on top of one another to form a five millimetre thick sheet with very high tensile strength of 3,950 MPa (megapascals). In the B pillar reinforcements, on the other hand, the layers are aligned in all directions to support both longitudinal and transverse loads. The tensile strength of these parts is 900 MPa.

The front and rear body modules of the new R8 are constructed entirely of aluminium – from semi-finished goods that include castings, profiles and sheets. The cast nodes, which make up 20.8 percent of the ASF, have complex interior geometries that make them well suited for absorbing large forces while offering plenty of versatility and design freedom. The A pillar nodes, for example, join key parts of the front body and the occupant cell to one another. They consist of a new, high-strength alloy with a tensile strength of 350 MPa.

The extruded profiles, together with the cast nodes, form the framework for the front and rear body modules. They have a 47.2 percent material share in the ASF. The profiles too offer a lot of design flexibility. One example is the upright profile between the suspension strut mount and the chassis joint of the rear axle. Over its approximately 60cm of length, its wall thickness

varies between 1.5mm and 6.2mm, which saves 1.3kg in weight. Audi also took new paths in lightweight design with the structural struts that stiffen the rear body – oval aluminium profiles that weigh just one kilogram form the upper structure.

Along with this optimisation of topologies, ASF developers also performed a new type of functional integration. Cast nodes from the new, high-strength alloy join the control arms directly and rigidly to the ASF. The floor of the luggage compartment is made of sheet aluminium, and it serves as a shear area that improves crash properties.

Made entirely of aluminium: the exterior skin

The outer skin of the new Audi R8, including doors and lids, is produced entirely of aluminium. Alloy sheets make up an 11.2 percent share of the ASF and are primarily used for the floor of the occupant cell and its bulkhead. A 0.6 percent share is steel, 0.5 percent other materials and 6.7 percent fasteners.

In the ASF of the new Audi R8, the combined length of the welds between the aluminium components is a full 89 metres. The aluminium and CFRP are joined exclusively by cold methods – the ASF contains 270 semi-hollow punch rivets, 207 blind rivets, 241 metric screws and 270 self-tapping screws. Cathodic dip coating, an engineered adhesive and a special seal ensure that the metal alloy does not corrode in contact areas with the CFRP.

Compared to the previous model, the ASF of the new Audi R8 has been significantly improved in all criteria. It has gained 40 percent in static torsional rigidity – which makes it an excellent material for ensuring precise handling, high crash safety and acoustically quiet vibration behaviour. The new multi-material ASF attains a top figure in the sports car segment for its lightweight index – a measure of the relationship between weight, size and stiffness. If Audi had built it in the previous aluminium technology, the ASF would have been 32kg heavier.

Aerodynamics

Aerodynamic development of the new R8 was particularly focused on one parameter that plays a predominant role in car racing – downforce, i.e. the force that presses the car down onto the road and enables high speeds

through curves. Here, the Audi R8 V10 plus enters a new dimension. At its top speed, the car generates 140kg of downforce, of which 100kg is at the rear axle.

The c_D figure of the new Audi R8 V10 plus is 0.36, and its low height results in a relatively small frontal area of 2.01m^2 – which is a requirement for the 330km/h maximum speed that the top version can reach.

On the exterior skin, the rear spoiler is very important for downforce. On the R8 V10 plus it is implemented as a fixed wing, and its profile was derived from Audi DTM race cars. The wing works together with the large diffuser on the underbody to create a trailing edge that generates as little turbulence as possible.

The diffuser is located at the height of the rear axle. It takes the accelerated air from the underbody and brings it back down to the speed of the ambient air without excessive turbulence. This suction effect lets the air flow faster, heightening downforce. Two venturi spoilers guide the high-speed air into the diffuser and nearly double its effectiveness. In the diffuser, longitudinal ribs channel the air flow so that it does not concentrate in the middle.

For good steering response: 40kg of downforce at the front axle

Drivers perceive the 40kg of downforce that the new Audi R8 V10 plus generates at the front axle in a positive way, even on fast straight-aways. This downforce prevents the steering from becoming light.

In the vicinity of the front axle there are two small diffusers which divert air through the wheel housings and thereby also serve to cool the brakes. Each of them works together with two round-bodied elements at the leading edge of the air flow and venturi spoilers.

The underbody of the new high-performance sports car, including the propeller shaft, is nearly fully enclosed by a smooth cover. In the rear body, this cover also contributes to lateral stiffness. Under the engine, nozzles known as NACA nozzles guide the cooling air to the V10 engine and the seven-speed S tronic. The pan of the dry sump lubrication system is not covered.

The V10 draws its inlet air via a screen under the rear window and via two long connecting pieces that lead to the sideblades. Flaps manage the

switching tasks and thereby control inlet noise. The engine compartment is temperature controlled in multiple ways: by narrow louvers next to the rear window, large openings under the tail lights and a narrow opening slot above the diffuser. On the R8 V10 plus, another outlet is added beneath the rear wing. In the front body, the cooling air flows through enclosed channels with little turbulence – another solution from motor racing.

Interior

The taut lines of the new R8 can also be seen in the interior. It stands for aesthetic lightweight design, which is a fundamental technical principle at Audi. Its most eye-catching element is the ‘monoposto’ – the large curved arch that encircles the area in front of the driver’s seat and conveys the atmosphere of a race cockpit. It also has knee pads in its lower area. The ‘monoposto’ encloses the Audi virtual cockpit, which is integrated into a freestanding housing.

The entire instrument panel has a lean and lightweight look; it appears to hover without being joined to the centre tunnel console. The new Audi virtual cockpit replaces the central MMI monitor that the previous model still had. In its place there is a large air vent and the control panel for the deluxe automatic air conditioner. Its cylindrical controls bear a visual resemblance to the jet engine turbines of an airplane, while the vents with their vertical louvers recall the air intake of a race car.

The wide console of the centre tunnel is also oriented toward the driver. It has a row of switches for secondary functions and the newly designed, low-profile gear lever for the seven-speed S tronic. Behind it is the MMI terminal with MMI touch – the touch-sensitive rotary/push-button switch.

The long wheelbase of 2.65 metres and shoulder width of 1.40 metres make the interior of the new Audi R8 spacious. Under the bonnet, there is a 112 litre luggage compartment. The area behind the seats, upon which a golf bag can be stowed, offers an additional storage capacity of 226 litres.

Operating concept: like in a race car

The driver sits in the new Audi R8 as they would in a race car. The entire operating concept focuses on the driver alone, who can operate all key functions without having to take the hands off the steering wheel or look away from the road.

The multifunction steering wheel plus has two large round satellite buttons – in addition to its push-buttons for the MMI. One is used to start and stop the engine, while the other is used to select the basic modes of Audi drive select. The performance steering wheel in the Audi R8 V10 plus adds two more buttons: one to control the exhaust system and the other to select the dry, wet or snow program of the performance mode.

The newly conceptualised, low-mounted seats integrate the driver and passenger into the vehicle perfectly – in a sporty, extended position. The new R8 V10 has standard sport seats with integrated head restraints on-board. They have power adjustments for height and seat back angle. Heated seats are standard. Features include power longitudinal adjustment and pneumatic functions for the lumbar supports, seat and backrest side bolsters.

On the new Audi R8 V10 plus, bucket seats with very high side bolsters are standard. In the upper area of the seat back there is an embossed R8 logo. These seats offer power height adjustment, and longitudinal adjustment is manual. Each of the newly developed bucket seats follows a strict lightweight design approach and offers comfortable sportiness. Side airbags are standard with both types of seats.

The upholstery material in the R8 fine Nappa leather, and customers can choose from different colour schemes. Together with the black instrument panel, there are the sporty tones black, rotor grey and express red. In combination with the granite grey cockpit, the elegant colours Vermont brown and parchment beige are also offered. The black covers may be upgraded to include contrasting stitching that matches the exterior paint.

In the fine Nappa leather interior, Audi offers versions that provide upholstery for various features. They include a dynamic diamond pattern which gives the seats a visually lean appearance – the diamonds grow larger from top to bottom. The options line-up is rounded out by two leather packages and four Alcantara versions for the headlining, including two with diamond pattern.

Matt CFRP is used on the Audi R8 V10 plus for parts of the ‘monoposto’ architecture and for inlays that appear in the doors and on the instrument panel and centre tunnel console. On the R8 V10 they are in high-gloss black.

As an option, Audi can also deliver this in CFRP, and in both engine versions it is also available for the housing of the Audi virtual cockpit and the air vents.

In addition, quattro GmbH offers its customers a comprehensive line-up of options for further customising the interior. For instance, illumination and personalisation are available for the aluminium door sill trims. Customers can choose from many different upholsteries, trim panels and colours – the selection is nearly unlimited.

Regardless of which colours and materials the customer selects, the interior finish reflects the high Audi quality. It can be discerned in all of its details – from the precise decorative stitching on the upholstery to the narrow, accurate parallel seams to the climate control unit in piano finish look.

Audi virtual cockpit and the new MMI

The new R8 presents two innovative brand technologies in its operating concept. The Audi virtual cockpit is the digital instrument cluster of the future, and its MMI offers a new, easy-to-understand operating logic. The TFT display of the Audi virtual cockpit has a 12.3-inch diagonal and a high resolution of 1,440 x 540 pixels. It displays razor-sharp, bright and contrast-rich images that are free of reflections. Working in the background is a Tegra 30 chip from Audi partner NVIDIA. It was designed for low electrical consumption and has separate audio, video and image processing units. Its working memory is two gigabytes.

The Audi virtual cockpit presents all information with attractive and elaborately rendered effects. The needle of the rev counter, for instance, is computed 60 times per second, so it moves absolutely fluidly, even when revving the engine under full load. Scrolling operations through lists are based on a physical model that considers inertia, elasticity and damping. The colour scheme of the display varies according to the basic menu that is selected – it is orange for the media menu and green for the phone menu.

The driver can switch between two user interfaces by pressing the 'View' button on the steering wheel. In infotainment mode, a large central window offers a lot of space for the navigation map or lists from the phone, radio or audio areas. In this mode, the rev counter and speedometer are shown as

small round instruments. In the classic view, the central window is smaller, and the instruments appear about the same size as analog gauges.

In another third view, the performance mode, a large, central rev counter dominates the screen (standard on the R8 V10 plus, optional on the R8 V10). When the seven-speed S tronic is being operated in manual mode, the rev counter's scale is displayed with a coloured background at higher engine speeds. Five segments, and at the end a red segment that indicates the limit of 8,500rpm. The Audi virtual cockpit also displays a shift light which informs the driver that the engine speed limit has been reached.

Tyre temperature and g-meter: the auxiliary gauges

The driver can place various gauges around the rev counter. Power and torque are shown as percentages. The g-meter, which ranges up to 1.5 g, visualises the forces that occur while driving through curves, braking or accelerating. A lap timer can record up to 99 laps and evaluate times. As in the race car, the driver also gets information on the status of key technical parameters – the temperatures of the engine oil and transmission fluid and tyre air pressures and temperatures.

The multi-media interface (MMI) in the new Audi R8 has an entirely new menu structure. It provides intuitive and easy operation with flat hierarchies. As in a smartphone, intelligent logic replaces branched menu trees, and frequently used functions can be accessed in just a few steps. A special highlight is MMI search, which is available for all basic menus and is operated by user input of free text. It generally generates answers after just a few letters have been input, taking the car's current location into consideration.

Entirely new: the MMI terminal

The MMI terminal on the console of the centre tunnel has a completely new design with a highly precise rotary/push-button control. The top surface of the control features the touch-sensitive MMI touch element. It lets the driver input characters as well as scroll and zoom with more than one finger. In front of and behind it are the toggle switches for the most important basic menus, the home button and the back function.

Buttons to the left and right of the rotary/push-button are used to open intelligently linked functional and shortcut menus which supplement many areas of operation. The driver can call up traffic information from the map menu, for instance, or the radio band from the radio menu. In navigation, the driver can save an entered destination in the favourites list or have parking spaces in the vicinity displayed.

Voice control has also undergone significant advanced development. The voice control system understands a large number of everyday expressions. To call a contact that is listed in the phone menu, commands such as “Connect me with Thomas Müller” suffice. The navigation system also responds to natural language inputs (“Where can I find a petrol station?”). This also applies to the basic menus Radio (“Play Radio Galaxy”) and Media (“I would like to hear music from my mobile phone.”).

The driver of the new Audi R8 can also control all MMI system functions from the steering wheel – with the exception of wiping and scrolling gestures. Using the switches and the roller on the left steering wheel spoke, the driver scrolls through the menus for the on-board computer, audio system, phone and navigation. On the right side of the steering wheel are the volume control, voice control button, express phone button and a user-configurable favourites button.

Infotainment and Audi connect

Audi delivers the Audi R8 with the top-version of the MMI as standard equipment – MMI navigation plus with MM touch. As versatile media centres, they integrate two SD card readers, the Audi Music Interface (AMI), a DVD drive, aux-in port and Bluetooth interface for voice control and audio streaming. The range of features is complemented by a 10-GB flash memory for music data, the Audi sound system with five loudspeakers, and a speed limit indicator that is based on data of the navigation map.

MMI navigation plus offers access to the voice control of a coupled smartphone. It shows the mobile phone’s incoming emails and text messages and reads them aloud. Another attractive service is online updates for the navigation map – they are made available every six months, and the first five are free-of-charge. The standard seat belt microphones for the driver and front passenger are used for telephoning and voice control of the

MMI. Three small microphones are integrated into the belts for top quality sound.

MMI navigation plus with MMI touch draws upon the computing power of the Audi modular infotainment platform (MIB). In its second generation, which is being used in the new R8, it utilises the Tegra 30 processor from NVIDIA. The Tegra chip in the MIB works together with its counterpart in the Audi virtual cockpit at computing cycles at speeds of thousandths of a second.

Production

The new Audi R8 is manufactured under the auspices of quattro GmbH, a 100percent subsidiary of AUDI AG at its 'Audi Böllinger Höfe' production facilities in Heilbronn. The AUDI AG investment in its facility in the immediate vicinity of its tradition-rich Neckarsulm production site amounts to a figure in the double-digit millions.

As many as 500 highly qualified employees work in the body manufacturing and assembly areas at the production site which has 30,000m² of production floor area. Just as for the previous model, production is organised as a flexible handcrafting process. quattro GmbH is further extending its production competence in limited production runs here. In body manufacturing, the initial focus is on the aluminium parts of the ASF. In a first step, specialists weld together the front body module, middle floor and rear body module – which are made of cast aluminium and extruded aluminium profiles – and they then join the three modules to the underbody. Robots perform joining processes that involve cold joints such as rivets and screws, while workers execute welding tasks. The body continues to grow with the addition of the greenhouse (the area of the glass surfaces) and the roof. Humans and robots work closely together in installing the CFRP parts.

High-tech transport: self-propelled assembly skids

The finished body is transferred to the assembly area on a self-propelled assembly skid, which is known as a driverless transport system (DTS). The DTS, an innovation at Audi, utilises high-power storage capacitors as its energy storage medium, and it navigates through the production floor areas via laser scanner and RFID (Radio Frequency Identification) chips. In the assembly area, which is laid out as a U-shaped chain, employees perform a

large share of the handcraft work in 15 cycles each lasting around 30 minutes.

Flexibility enjoys an extremely high priority at 'Audi Böllinger Höfe' – in body manufacturing employees also produce derivatives such as the R8 LMS race car in parallel to the production cars. The assembly area is also configured for quick modifications. The cars move through many areas of the hall on the DTS. There are no overhead conveyors or a classic 'marriage' station. The drive unit and suspensions are preassembled and installed separately from one another.

The latest ergonomic standards apply to assembly of the new Audi R8. The DTS skids can be variably adjusted up to 1.2 metres in height. The brake and coolant lines are laid out in the underbody on a lifting/pivoting platform that rotates the car 90 degrees.

Initial operation of the newly produced R8 is performed at the testing centre and comprises six separate cycles. Afterwards, each new R8 must successfully complete a stringent quality approval process on the plant's own test track. After this, an approximately one-hour test drive is conducted on public roads which also includes freeway driving. Only then is the new sports car released for delivery to the customer.

The new Audi R8 LMS

Making its debut at the same time as the new R8 production car model is the new edition of the Audi R8 LMS – a GT3 race car. Specialists from motorsport and production collaborated closely in its development. As in the first generation, the share of common parts is just under 50 percent, and both cars have made significant performance gains. The body of the R8 LMS is manufactured together with the production model at 'Audi Böllinger Höfe'.

The body of the GT3 race car is based on the point-reinforced multi-material ASF that is made of aluminium and CFRP. It is supplemented by a safety cage that is assembled before the body gets its roof. The Audi safety seat, known as the PS1, is solidly joined to the chassis, which increases rigidity. The steering column and pedals can be adjusted. A new type of CFRP element in the rear body protects the driver in case of a rear collision. With

the exception of the roof, the exterior skin consists of CFRP, and the homologation weight of the rear-wheel drive race car is 1,225kg.

The race car's V10 engine is nearly identical to the production car engine; it only omits the manifold fuel injection. Its power output is around 430kW – depending on the specific race regulations and the air restrictor that is specified in them. Audi is planning on 20,000km as the engine rebuild interval. The newly designed six-speed transmission, which is pneumatically shifted via paddle shifters, is around 20kg lighter than the previous unit; the clutch features electro-hydraulic activation. Classic, lightweight race car wishbones guide the wheels, which are 18 inches in size according to race rules. The race car also uses special steering components and wheel bearings.

Special strength: aerodynamic efficiency

One of the top qualities of the new Audi R8 LMS, which is 4.58 metres long and 1.17 metres high, is its aerodynamic efficiency. The large diffuser in the underbody – that is covered by large smooth panels – generates strong downforce, which enables a smaller rear wing. Compared to the previous model, the aerodynamic drag coefficient has been lowered by 20 percent. The flow of cooling air has been improved in all areas – in the front body and in the cockpit.

The new Audi R8 LMS conforms to 2016 GT3 race regulations, but just 10 weeks after its world premiere at the Geneva Motor Show in 2015, the R8 LMS claimed victory at the Nürburgring – making a dazzling entrance on the 24 hour racing scene.