

This press kit accompanied the UK launch of the fourth generation GS range in July 2012. Some changes were made to the model range during its time on sale, which can be tracked using the Timeline feature available on the Lexus GS archive web page. Additional assets and information relating to the fourth generation GS range may be obtained from the Lexus press office if required.

THE NEW LEXUS GS

IN BRIEF

The new, fourth generation Lexus GS goes on sale in the UK in July in two versions: the GS 250 and the high performance, full hybrid GS 450h flagship model.

The new car has an all-new exterior and interior, which display further development of Lexus's L-finesse design philosophy. On the outside the principle expression of this is a much stronger frontal treatment, giving the GS greater, individual road presence.

The cabin, too, represents a continuation of the L-finesse design theme, with a dual-zone, driver-focused cockpit and adept use of advanced human-machine interface technologies that help keep the driver alert and passengers comfortable during long journeys.

Several innovative technologies make their first appearance in the new GS. These include a new energy-saving air conditioning system with 'nanoe' technology; a second generation of Lexus's Remote Touch Interface, linked to the world's largest in-car multimedia display screen; and a choice of audio systems engineered for excellent power and sound clarity.

The beautifully crafted interior provides more space and comfort for everyone on board. There is more legroom and up to 30mm extra headroom for the driver and front seat passenger, while in the rear there is 20mm more knee room and a 25mm increase in headroom. The GS 250 gains an extra 30 per cent in boot space, while smart packaging of the hybrid battery means there is more than 55 per cent extra storage room in the boot of the GS 450h.

Both GS 250 and GS 450h are available in F Sport trim, with exclusive exterior and interior design elements and specially tuned suspension.

The GS 450h is the world's first front-engine/rear-wheel drive premium performance saloon to be equipped with a petrol engine – electric motor full hybrid system. The powertrain includes a V6 Atkinson cycle petrol engine with next-generation D-4S direct fuel injection.

Every element in the second generation Lexus Hybrid Drive system has been improved, bringing about significant reductions in emissions, while at the same time giving performance that is comparable to that of V8-powered rivals.

Total system output is 341bhp/254kW, enabling the GS 450h to accelerate from nought to 62mph in 5.9 seconds. Top speed is 155mph (250km/h). Conversely, fuel consumption has been brought down by more than 20 per cent to 46.3mpg, with CO₂ emissions falling to 141g/km.

The GS 250 is equipped with a fuel-efficient, low emissions 2.5-litre V6 engine that is new to the GS range.

The fourth generation GS has been engineered to give an engaging driving experience, with sharp, accurate steering, excellent body control, high speed stability and the kind of ride comfort that's expected of a Lexus saloon.

Significantly improved driving dynamics have been achieved by re-engineering the bodyshell and gaining a 14 per cent increase in structural rigidity. New suspension, more powerful brakes and the use of advanced technologies such as Adaptive Variable Suspension and the new Lexus Dynamic Handling system, also have a positive impact on the car's dynamic abilities.

The GS 450h F Sport features the Lexus Dynamic Handling system, which marks a world-first integration of the vehicle's steering systems: Dynamic Rear Steering, Variable Gear Ratio Steering and electric power steering. It co-ordinates every aspect of front and rear wheel control to provide sharp, agile and confident behaviour, with more direct response to driver inputs.

The new GS is comprehensively equipped with the most technologically advanced active safety and driver assistance system on the market. Step 5 VDIM extends the Vehicle Dynamics Integrated Management system to incorporate the new Lexus Dynamic Handling. This means that during cornering or under braking, the system can achieve the ideal slip angle between the front and rear wheels.

The Advanced Pre-Crash Safety system (an option on the GS 450h Premier) includes a Driver Monitor Camera, and its complementary Adaptive Cruise Control can now function down to 0mph.

DESIGN AND PACKAGING

- Next generation of Lexus L-finesse design, including new trademark "spindle" grille
- GS F Sport models gain exclusive features inside and out
- Interior features driver-focused cockpit and advanced human-machine interface technologies
- More space in the cabin and in the boot
- Contemporary interior design with hand-crafted quality feel

- Market's largest – 12.3-inch – in-car multimedia display
- Improve satellite navigation with broader range of information
- New S-Flow energy saving air conditioning with air-purifying nanoe technology

EXTERIOR DESIGN

The fourth generation Lexus GS has an all-new exterior that reflects further development of Lexus's L-finesse design philosophy, giving the car a stronger, more individual appearance.

Although the car's overall length is the same as its predecessor, the front overhang is shorter by 10mm, the rear overhang is 10mm longer, and the overall height has been increased by 30mm. The front and rear tracks have been widened by 40 and 50mm respectively, improving stability at high speed. The new GS is wider, too, by 20mm.

A key element in the new design – and the one which will make the new GS instantly recognisable – is the powerful front-end arrangement with a new spindle-shape arrangement of the upper and lower grilles. This is an evolution of a styling cue first seen on the CT 200h in which the inverted trapezoid upper grille and slanted lower grille are combined in a single element, bridging the mid-section of the bumper. Brake cooling ducts positioned either side of the spindle grille add to the distinctive appearance, while serving a functional purpose.

The spindle grille treatment is to become a feature of Lexus models across the brand, creating a strong family identity.

The headlamp units are set on a higher plane than the grille, a design characteristic that's unique to Lexus models, drawing the eye to the apex of the car and reinforcing the impression of speed and agility.

The lights themselves are underscored by new integrated LED daytime running lights set in the L-finesse arrowhead motif, giving the car a distinctive lighting signature.

The GS 450h features a three-lamp design that aligns the turn indicator and – optional on the Premier model - LED high and low beam headlights (a Lexus 'first') in a single horizontal row. The LED lamps give better illumination and lighting range, even when driving on low beam.

The deep front bumper features sharply sculpted fog lamp housings, and forms a wide, trapezoid shape that effectively anchors the muscular front wings and flared wheel arches, emphasising the car's wide track.

In profile the new GS shares its predecessor's long, elegant cabin proportions and 'slingshot' window design, highlighted by a stainless steel door frame moulding. The 15mm higher roofline reflects the

increase in space for rear seat passengers and the larger boot, while achieving aerodynamic efficiency and a Cd 0.27 drag coefficient.

The attention to detail extends to the door handles, designed to be easier to grip, and the smart entry lock mechanism, which has been changed from a push switch to a touch sensor for easier use. The door mirror housings now incorporate both LED turn indicators and puddle lights. The door panel gaps and the gap between the wheel arches and the tyres have been reduced.

At the rear, the new design narrows behind the flared wheel arches, exposing the lower portion of the rear tyres, emphasising the wider rear track. The LED lamp clusters feature aero stabilising fins – elements that enhance the car's aerodynamic efficiency and driving stability.

On the GS 450h the rear bumper covers the exhaust tailpipes. The full hybrid model also carries hybrid-specific blue badging on the front, rear and sides.

F Sport features

The F Sport package for the GS 250 and GS 450h includes a series of exclusive exterior features, including front grille and bumper, rear bumper and lip spoiler, 19-inch alloys and F Sport badging.

The front bumper has a more pronounced three-dimensional form at the sides, with larger side grilles. These combine with an F Sport-specific mesh design in the upper and lower grilles to give a sportier appearance.

The rear diffuser on the GS 250 F Sport has a grey metallic paint finish, while on the GS 450h there is a combination of grey metallic paint with a chrome moulding to the lower section of the bumper. Both versions are fitted with an F Sport rear spoiler and dark-finish 19-inch alloy wheels.

Exterior colours

Nine exterior colours are available for SE, Luxury and Premier versions of the new GS: Arctic Pearl, Sonic Silver, Velvet Black, Mercury Grey, Meteor Blue, Crimson Red, Atlantic Blue, Celestial Black and, for GS 450h only, Obsidian Black.

The F Sport models have a different range of colours: Arctic Pearl, Sonic Silver, Velvet Black, Mercury Grey and Crimson Red.

The new Crimson Red finish features flakes of glass incorporated in the coating to give the paint a high brilliance. Sonic Silver, used for the first time on the new GS, uses a new Lexus coating technology that adds an extra metallic texture to the finish that gives both strong shading and sharply defined highlighting effects. This brings out both the subtleties of the bodywork and its defined lines, and makes the surface

appear finely polished.

INTERIOR DESIGN

The ergonomics and driver-focused cockpit of the new GS are designed to help the driver remain alert and keep all passengers comfortable over long journeys. The interior carries forward a new design theme introduced in the CT 200h, in which all the functional elements are consolidated in the area immediately surrounding the driver's seat.

Driver-focused cockpit

The clean, uncluttered dashboard design forms a wide horizontal plane, adding to the sense of space inside the vehicle. The shape of the front doors and centre console trim combine to give driver and front seat passenger the sense of being safely cocooned in the car, and every aspect of the driving position has been considered to achieve ideal positioning of the controls, maximise comfort and minimise driver distraction and fatigue.

The dashboard is divided into two distinct zones: the upper Display Zone, including (on models where the Mark Levinson Premium Sound system is specified) a 12.3-inch multimedia screen – the largest yet seen in a production car – set an ideal distance for at-a-glance viewing; and the lower Operation Zone, with system controls, including a second generation version of Lexus's award-winning computer mouse-style Remote Touch Interface.

A new front seat design has a lower hip point, placing the driver closer to the car's centre of gravity and giving better body holding and comfort. An extended seat sliding adjustment range makes it easier for more occupants to find the best position, and there is a new folding adjustment for the mid-section of the seat. The multiple adjustment mechanisms also include a butterfly-shape headrest (GS 450h Premier), shoulder support, side support, four-way lumbar support and a cushion length that can be adjusted through 76mm.

The airflow volume in the seat ventilation system has been almost doubled compared to the current GS model, and the addition of soft padded finishes to the centre console arm rest, knee pads and door arm rests further add to the comfort of the driving position when travelling for long distances.

The telescopic reach of the steering wheel has been increased by 50mm, bringing it closer to the driver, and the wheel itself has been set at a low angle, so large steering inputs can be made without the driver having to move their body unnecessarily through over-reaching. Even the cross-section of the wheel has been adjusted; no longer uniform throughout its circumference, it has a varying profile that makes it more comfortable to grip and smoother to steer.

The shape and surface angle of the brake pedal have been optimised and the footrest has been increased

in length to 300mm, for a better fit and greater comfort.

The driver's forward visibility has been improved, thanks to slimmer A-pillars and a taller windscreen, creating a wider field of view. The visibility range over the bonnet has been extended so that the driver can easily pinpoint the vehicle's extremities, making the car easier to manoeuvre in tight spaces..

Comfort, convenience and contemporary craftsmanship

Although the wheelbase of the new GS is the same as that of its predecessor, there is more space and comfort for all on board. The front and rear door openings have been designed to make it easier to get in and out of the car, with a particular focus on head clearance.

Driver and front passenger benefit from a new seat back design that is particularly more comfortable for taller people. A greater seat sliding range and height adjustment deliver more legroom and up to 30mm more headroom.

There are new rear seats, with a revised seatback angle and redesigned cushion shape for extra comfort. The thin front seatback design means there is 20mm more knee room, and there is an additional 25mm of headroom.

A series of factors have made the luggage space both significantly larger and more practical to use, including a more compact rear suspension, a wider opening, increased deck length and reduced deck height. In the GS 250 the volume has risen to 552 litres, which is 30 per cent larger than the current non-hybrid GS. Smart packaging of the hybrid battery into a stacked format has also increased load capacity in the GS 450h – up 55 per cent to 465 litres.

Throughout the interior the use of high quality materials and finishes conveys a contemporary, premium look and feel, displaying the kind of craftsmanship and attention to detail for which Lexus is renowned worldwide.

A more varied range of interior colours has replaced the traditional two-tone design. Dashboard, floor and steering wheel are uniformly black, to give a sporty, luxurious feel, and the leather instrument panel has coloured stitching in grey or ivory (according to interior colour choice). Matching seat and door upholstery is available in a wide range of colours.

The sense of luxury and sophistication inside the car is reinforced by Lexus's painstaking attention to detail. This can be seen in the carefully crafted satin metal trim details, high quality stitching and the brushed aluminium used for the knobs on the audio system. Another feature is the new analogue clock with LED indicators, forged from a single ingot of metal.

The quality of the interior is complimented by an all-white LED lighting system, elements of which illuminate as the driver and passengers approach the car, even before it is unlocked. They then activate and fade in sequence with the vehicle's starting procedure.

F Sport exclusive features

The interior of the F Sport models includes matching door and seat upholstery, which can be specified in an additional Garnet red colour, together with new aluminium details, 16-way adjustable F Sport front seats, a black roof lining and pillar finish, perforated leather steering wheel and gear knob trim, aluminium pedals and dashboard trim, black Lexus logo scuff plates and F Sport badging on the steering wheel.

INNOVATIVE ON-BOARD TECHNOLOGIES

Several innovative technologies make their first appearance in the new GS, including a new, energy-saving air conditioning system, a second generation of Lexus's Remote Touch Interface linked to the market's largest multimedia display, and a choice of audio systems that give superb power and clarity.

Second generation RTI with 12.3-inch multimedia display

Lexus has revised its Remote Touch Interface multi-control device to make it easier and more intuitive to use.

It's the first system of its kind to adopt a slide haptic joystick mechanism – a slide-type controller that is much like a computer mouse. Its operation has been changed so that an Enter command is now made simply by pushing the controller. It also gains ambient lighting and the height difference between the RTI and the armrest has been minimised.

The user can move the cursor quickly and easily across the multimedia display, which at 12.3 inches is the largest found in any production car (fitted where the Mark Levinson Premium Sound is specified, standard in the GS 450h Premier). The full colour, LED screen has an ultra-wide 24:9 format and is large enough for two types of information to be displayed simultaneously, such as the map and audio; night view and map; and navigation and incoming call.

Improved navigation system

The new GS's HDD navigation system has been enhanced to include TPEG (Transport Protocol Expert Group) data, including TFP (Traffic Flow and Protection) information and local parking space availability and charges. The system can allow a specific parking space to be defined as a journey destination.

S-Flow air conditioning with nanoe technology

The new air conditioning system fitted to the GS 450h Premier is considerably more powerful and features

S-Flow technology to maintain optimum comfort while significantly reducing power consumption. It uses sensors to determine if the front passenger seat is occupied; if it isn't, it automatically closes all the vents serving that seat. The same applies to the rear seats, when the S-Flow button is switched on.

The system also measures the ambient air temperature, the interior air temperature and insulation to calculate the optimum level of air conditioning. The target airflow volume is determined for each seat through the Temperature Airflow Output control. When the thermal load on the system is large (cool-down in summer, warm-up in winter), air conditioning is implemented throughout the car to achieve a comfortable temperature quickly. Once the temperature in the cabin is stabilised, the system adjusts to concentrate only on those seats that are occupied.

Development of the centralised occupant-sensing control included intensive vehicle wind tunnel testing and repeated tests on both test tracks and actual roads to ensure a comfortable environment could be maintained in different environments.

The system also features upper and lower independent, multi-layer air mix technology so that the cabin environment can be tailored to suit driver and front and rear passengers. For example the upper air mix can be set for coolness to deal with the effects of sun through the windows, while the lower air mix can be set for warmth.

A two-tier interior/exterior air control prevents window fogging by introducing low humidity exterior air into the upper half of the cabin while circulating interior air to maintain heating around the foot area. This avoids ventilation losses that are a characteristic of conventional systems.

There is also a new deodorising filter which, as well as blocking dust and pollen, removes any exhaust gas from the ambient air.

The air conditioning incorporates new nanoe technology, an air cleaning technology that operates automatically when the system is switched on. It releases minute, 20 to 50nm-diameter nanoe particles – negatively charged ions wrapped in water molecules – through the driver's dashboard air vent.

These nanoe ions have the ability to purify the air and eliminate odours by attaching themselves to airborne particles and molecules. They can also deodorise the seats and roof lining to create a cleaner cabin environment.

In addition, because nanoe moisture content is about 1,000 times that of conventional ions, they are also said to have a moisturising effect on human skin and hair.

Audio systems

Two audio systems are available in the new GS. The standard system features a fully digital Class-D

amplifier that can create virtually distortion-free sound with minimal voltage losses. The natural sound dynamics and rich harmonies it generates are faithfully reproduced by a 12-speaker layout that includes a new, front three-way system.

The new, top-of-the-range 17-speaker Mark Levinson Premium Audio system (fitted as standard in the GS 450h Premier) creates sound based on the concepts of Effortless Dynamics and Effortless Transient Response, offering sound quality equivalent to a live concert performance.

Using the same technologies as those found in top-end home audio systems, it features a new Generation III ML5 amplifier. Far outstripping the performance of the sound system in the current GS, this amplifier generates 125 Watts per channel and a total of 835 Watts (75 and 505W more power, respectively, than the current system). At the same time, it consumes just 6.5 Amps, less than a quarter that used by the current system.

GreenEdge power-saving technology has been incorporated in each of the 17 speakers, enabling twice the volume to be developed for the same power consumption. The technology covers a wider frequency band than conventional systems, giving it an enhanced dynamic range.

Five new 90mm GreenEdge Unity speakers are used. They have a coaxial structure which integrates mid and high-range units within the same structure. The positioning of these Unity speakers all around the cabin gives a consistent timbre for both front and rear occupants, resulting a new level of surround sound, definition atmosphere and quality.

DRIVING DYNAMICS

- Rigid bodyshell and new suspension
- Adaptive Variable Suspension
- Eco, Normal, Sport and Sport Plus driving modes, with manual paddle override
- GS 450h F sport available with Lexus Dynamic Handling four-wheel steering system

The new GS has been designed to give a much more engaging and enjoyable driving experience, with sharp, responsive steering, excellent body control, high speed stability and the ride comfort expected of a Lexus performance saloon.

Significant improvements in driving dynamics have been achieved on three levels:

- A re-engineered bodyshell that is 14 per cent more rigid, new suspension for better agility, stability and ride comfort, and more powerful brakes.
- Adaptive Variable Suspension, for better ride quality, stability, body control and steering response (F Sport and Premier models).

- Lexus Dynamic Handling system (GS 450h F Sport), a platform technology which offers integration of the Dynamic Rear Steering, Variable Gear Ratio Steering and electric power steering to co-ordinate all aspects of front and rear wheel control and provide, agile, sharp and confident driving behaviour with a more direct response to driver inputs.

Body rigidity

Body rigidity has been optimised with extensive use of computer-aided design, ensuring precise vehicle movement in response to steering input.

The new GS features new underbody, rear suspension member and front end module components, and additional spot or laser welding has improved the rigidity of the door openings, rear underbody and rear partition. Additional reinforcements or thicker gauge sheet metal has been used in the cowl panel, front and rear underbody and rear partition, and the design of the front suspension member, rocker inner and dash panel has been made stronger.

In combination, these changes have increased the torsional rigidity of the bodyshell by 14 per cent, allowing the new GS to respond with much greater accuracy to driver commands..

Aerodynamics

The new GS marks the introduction of a completely new approach to the management of airflow over the vehicle body: aerodynamic damping. The basic concept involves bringing the flow of air closer to the body, using it to help control the vehicle's movement and improve handling stability.

The car's smooth, flowing bodywork has exceptionally narrow panel gaps and minimal protrusions, and these, allied with numerous under-body elements and aero-stabilising fins, promote stability and help keep wind noise to a minimum.

Particular attention has been paid to rectifying the airflow along the sides of the vehicle to provide body movement damping. The smoothing of airflow in and around the wheel arches, and the reduction of air pressure within the wheel arches themselves, contribute to improved steering response, a flat ride and better roadholding. Aero-stabilising fins on the rear lamp clusters generate a vortex to the rear of the vehicle, which helps improve handling stability.

Together these elements give the new GS 450h a coefficient of drag of Cd 0.27.

Suspension

The new GS uses a double wishbone front suspension and a multilink rear suspension system, combining Lexus ride comfort with agility, steering feel and a particular focus on rear stability.

The front, high-mount, double wishbone set-up incorporates new-design unequal length upper and lower control arms made of forged aluminium, which both reduces system weight and improves ride comfort. The rigidity of the upper and lower arms, the hub bearing unit and the steering knuckle has been increased for better steering responsiveness. Caster trail has been increased for better straight line stability and steering feel.

The stabiliser arm ratio has been improved, the stabiliser system spring rate has been increased and the shock absorber rebound spring rate has been substantially increased, optimising the roll attitude. The lower bushing has been enlarged, as well, to minimise the transmission of vibrations.

At the rear there is an advanced multilink set-up with toe control bars, and an aluminium rear axle carrier that has been completely redesigned. The spring and shock absorber units have been separated to increase their efficiency and create a more compact design, so there is less intrusion in the luggage space.

The vehicle's rear stability has been significantly improved through the addition of a rebound spring; increased stabiliser shock absorber arm ratios; the replacement of suspension ball joints with bush joints; the positioning of the toe control arm at the rear; and the minimisation of toe change during the suspension stroke.

As well as greatly increasing stability, these components also combine to improve the car's roll posture, ride comfort and straight line stability, while reducing harshness. Using low friction oil in the front and rear shock absorbers has further improved ride comfort.

F Sport suspension

GS F Sport models have retuned front and rear suspension, further enhancing the efficiency of the Adaptive Variable Suspension, maximising body control and steering response.

The characteristics of the front and rear shock absorbers have been modified to optimise AVS damping control, while the use of low viscosity oil reduces friction and so improves the shock absorbers' efficiency. The rear suspension shock absorber has been inclined further to the rear, and the lower bushing has been made larger and stiffer.

Brakes

The GS's braking system has been designed to offer more power and control, with improved pedal feel and consistently fade-free performance. At the front there are 334 x 30mm ventilated discs, and at the rear there are 310 x 18mm solid discs. Tyre friction performance and ABS control have been adjusted to achieve the shortest possible stopping distances.

Brake booster power has been increased, and the shape, angle and ratio of the brake pedal have been changed to give instant response to changes in pedal force and greater controllability. An increase in the volume of ducted cooling airflow has improved brake cooling performance, which reduces brake fade, even under lengthy use.

The Electronically Controlled Braking system has been modified to give greater responsiveness, from the first touch of the pedal.

F Sport models have larger, 356 x 30mm ventilated front discs. And in a world-first introduction, the hat section of the two-piece rotor has been fabricated in aluminium to reduce weight and suppress heat deformation.

Adaptive Variable Suspension

The AVS system, fitted to the F Sport and Premier models, allows the driver to fine-tune the car's ride with a choice of two damper settings: Normal for everyday driving and Sport Plus mode mode for improved body control and precise steering responses when cornering.

AVS automatically adjusts suspension performance at all four wheels independently, activating the adjustable damping force shock absorbers, in response to the way the car is being driven, vehicle body motion and road surface conditions.

Selecting Sport Plus mode automatically increases the difference between inner and outer shock absorber damping through corners, to further reduce vehicle roll. At the same time, the VGRS reduces the steering gear ratio by about 10 per cent, and the electric power steering increases the level of steering assist torque by about four per cent. Together this minimises body roll, sharpens vehicle handling and improves steering feel.

Selectable drive modes

The new GS has a Drive Mode Select system that allows the driver to choose between Eco, Normal, Sport and, on F Sport and Premier models, Sport Plus driving modes, to make the most of either the car's environmental efficiency, or its dynamic qualities.

In Eco mode, engine power output, throttle opening and the air conditioning are controlled to maximise fuel economy. As well as moderate changes in the driving force, the air conditioning is adjusted to limit losses through ventilation. At temperatures below 10°C for the GS 450h and 3°C for the GS 250, the seat heater is automatically switched on. The system changes to air recirculation at 20°C and above, and the airflow volume is lowered when in 'high' setting. The air conditioning will remain switched off until the engine coolant

reaches 30.5°C.

Eco mode can be selected by turning the control dial anti-clockwise. Doing so turns illumination of the dashboard meters and the Eco mode indicator to blue.

In Sport mode the powertrain is adapted for more responsive acceleration. In the GS 250 this is brought about by a change in shift timing; in the GS 450h it is achieved through enhancements in the drive force and engine responsiveness under, respectively, partial and full throttle. To engage Sport, the selector dial is turned once, clockwise. The meter lighting turns red and Sport mode is shown on the multimedia screen.

Sport Plus mode is provided on models that are fitted with Adaptive Variable Suspension. It combines the change in powertrain performance provide by Sport mode, together with co-ordinated control of the Step 5 Vehicle Dynamics Integrated Management. This control of the car's suspension, steering and handling systems improves the GS's stability and steering to give more sporty driving dynamics. Two clockwise turns of the selector dial are required to engage Sport Plus, which, again, triggers red meter lighting and indication of the mode on the multimedia display.

The close ratio six-speed automatic transmission in the GS 250 features a sequential shift mode. It delivers faster shifting speeds, earlier torque converter lock-up and downshift throttle blips to support the different driving modes available via the Drive Mode Select system

Lexus Dynamic Handling

The GS 450h F Sport is equipped with the new Lexus Dynamic Handling system, making the world's first hybrid to feature integrated four-wheel steering.

This leading-edge technology provides integration of Dynamic Rear Steering, Variable Gear Ratio Steering and electric power steering to co-ordinate all aspects of front and rear wheel control and provide agile, sharp and confident driving behaviour, with more direct vehicle response to driver inputs.

LDH monitors vehicle speed steering direction and driver inputs to calculate the optimum angle for all four wheels. Using VGRS at the front and DRS at the rear, it can independently adjust the front and rear wheel steering angles to improve turn-in response, rear grip, vehicle stability and overall agility when cornering.

It also monitors vehicle speed and yaw rate, steering and speed, and lateral G-forces to define the required steering input to maximum of two degrees. At most speeds below 50mph (80km/h), the front and rear wheels turn in opposite directions; in certain conditions above this speed they turn in the same direction.

LDH also automatically adjusts tuning of the adaptive suspension and active safety systems to suit the road

conditions, vehicle speed and driving style.

ENGINES AND TRANSMISSIONS

- GS 450h with second generation Lexus Hybrid Drive
- Hybrid system uses new Atkinson cycle V6 petrol engine with next generation D-4S direct injection
- Fuel consumption improved by more than 23 per cent, CO₂ emissions reduced to 141g/km
- GS 250 introduced to the range for the first time

In the UK the new GS is offered with two powertrains: the full hybrid GS 450h, featuring the second generation Lexus Hybrid Drive, and the GS 250, which is powered by a 2.5-litre V6 petrol engine, new to the GS range. In some European markets a new GS 350 AWD is also available, but this is not being offered for sale in the UK.

GS 450h

The new GS 450h reinforces Lexus's commitment to the future of full hybrid drive technology. Comprehensive improvements have been made to every aspect of the powertrain, delivering significant reductions in fuel consumption and CO₂, NOx and PM emissions, with no loss of performance.

Total system output is 341bhp/254kW, enabling nought to 62mph acceleration 5.9 seconds and a top speed of 155mph (250km/h). Conversely, official combined cycle fuel consumption has been reduced to 46.3mpg and CO₂ emissions have fallen to 141g/km (Band E for UK road tax/Vehicle Excise Duty).

Lexus Hybrid Drive system architecture

Like every Lexus hybrid vehicle, the new GS 450h is a full hybrid, capable of operating in petrol or electric modes alone, as well as in a combination of both. The Lexus Hybrid Drive system features an ultra-smooth 286bhp/215kW 3.5-litre V6 petrol engine mated to a compact, high-output, water cooled permanent magnet electric motor.

The system also comprises a generator, a high-performance nickel-metal hydride battery, a power split device and a compact power control unit which governs the high speed interaction of the system's components. The power split device uses a planetary reduction gear system to combine and re-allocate power from the engine, electric motor and generator in line with operating requirements.

3.5-litre Atkinson cycle V6

The 3.5-litre DOHC V6 petrol engine has been adapted specifically for use in the hybrid powertrain, with a number of technical improvements. It adopts the Atkinson cycle, which helps maximise the hybrid drive's fuel efficiency.

In conventional four-cycle petrol engines, there are times when fuel enrichment is needed to cool exhaust gases and prevent damage or destruction of the catalytic converters. In an Atkinson cycle engine, the intake valves close late, which delays compression. This creates a high expansion ratio for less

compression, reducing intake and exhaust energy losses and converting combustion energy into engine power more effectively. As a result, the exhaust temperature is lower than that of conventional engines.

Further reductions in fuel consumption have been achieved by a high, 13.0:1 physical compression ratio, a new, mid-port intake tumble generator, and the adoption of next generation D-4S direct injection technology.

D-4S is the latest evolution of Lexus's stoichiometric, four-stroke direct injection. With one injector in the combustion chamber and a second in the intake port, it combines the strengths of both direct and port injection. This allows for optimum engine efficiency over the full power band and improves torque across the rev range, while keeping fuel consumption and exhaust emissions to a minimum.

The system features new slit-type injector nozzles with a modified port shape, a higher fuel pressure for more efficient combustion, and idle port injection for better NVH performance.

Engine noise, vibration and friction have been reduced by using a lightweight chain, a piston pin offset change and a reduction in the number of drive belt reinforcement ribs.

Engine durability has been improved as well, by the removal of all external oil lines, and environmental performance has been supported by a new-specification catalyst which has a much-reduced precious metals content.

Additional hybrid system improvements

The cooling performance of the Power Control Unit has been improved by adopting dual cooling paths and single-piece, integrated DC/DC converter.

System control has also been enhanced, with the PCU boosting motor drive voltage to a maximum 650V in Sport mode, and limiting it to a maximum 500V in Eco mode.

The electric motor has lighter mounts and a reduction in friction, and the range of the system's regenerative braking operation has been expanded, which supports greater fuel efficiency.

The packaging of the battery has been redesigned, with its new stacked configuration causing less intrusion on the space available in the boot.

GS 250

A 2.5-litre V6 has been introduced into the GS range for the first time, powering the new GS 250.

The engine features D-4S direct injection and Dual VVT-i intelligent variable valve timing on both intake and exhaust camshafts, enhancing performance.

The unit develops 207bhp/154kW at 6,400rpm and 253Nm of torque at 4,800rpm. The GS 250 accelerates from nought to 62mph in 8.6 seconds and will attain a top speed of 143mph (230km/h). Fuel consumption is 31.7mpg (combined cycle) and CO₂ emissions are 207g/km.

The new engine is matched to Lexus's 6 Super ECT close ratio six-speed automatic transmission, which features a sequential manual shift mode. It features faster shift speeds, earlier torque converter lock-up and downshift throttle blips to support the range of driving modes available through the Drive Mode Select system.

SAFETY

- Advanced Pre-Crash Safety system with Driver Monitor Camera
- Adaptive Cruise Control now functions at speeds down to 0mph
- Step 5 Vehicle Dynamics Integrated Management with Lexus Dynamic Handling
- Blind Spot Monitor

The advanced Pre-Crash Safety system, which now incorporates a Driver Monitor Camera, will pre-emptively optimise front seat belt and emergency braking operation to help reduce collision damage and injuries. The complementary Adaptive Cruise Control, available on the GS 450h, now functions at all speeds down to 0mph. These features are offered, together with the Driver Monitor Camera and Lane Keep Assist as a combined option on the GS 450h Premier model.

The vehicle is fitted with 10 airbags and the rear seatbelts have pretensioners as standard. Adaptive Front-Lighting (AFS) gives better illumination through bends and when turning at junctions, and the car's front bumper, cowl and corrugated sheet bonnet have been designed to give better protection for pedestrians in the event of a collision.

PREVENTIVE SAFETY

Advanced Pre-Crash Safety system

The PCS system (an option on the GS 450h Premier) uses a millimetre-wave radar sensor that operates over a 20-degree scanning radius to detect obstacles in the vehicle's path, even when cornering.

Using a number of sensors, a pre-collision computer monitors vehicle speed, steering angle and yaw rate inputs to help determine in advance whether an impending collision is unavoidable.

If there is a high risk of a collision, PCS will alert the driver with a buzzer and warning on the multimedia

display, activate the Pre-Crash Seatbelt pretensioners, and, when the driver begins to brake, provide Pre-Crash Brake Assist to supplement the braking effort.

PCS also implements close interaction between the Variable Gear Ratio Steering and Dynamic Rear Steering within the GS's Step 5 Vehicle Dynamics Integrated Management, improving vehicle response to the driver's emergency steering inputs, and so increasing the chance of avoiding the obstacle.

If the driver does not brake and a collision becomes inevitable, the Pre-Crash Brake will automatically apply the brakes to reduce impact speed.

PCS has been revised in the new GS, with an increase in brake intervention timing from 0.8 to 1.2 seconds before the anticipated impact. This improves the chances of avoiding a frontal collision and, in the event of impact, reduces the collision speed by about 9mph (15km/h).

Driver Monitor Camera

The PCS option also incorporates a Driver Monitor Camera, which uses two near-infrared LEDs and a CCD camera built into the top of the steering column. The system monitors various aspects of the driver's face, including the degree of eye opening, so that it can determine when the eyes are closed. If this is the case when there is a danger of collision, the timing of the pre-crash warning sequence is brought forward to alert the driver in good time.

All-speed Adaptive Cruise Control

The Adaptive Cruise Control (included in the PCS option package) works in two modes: constant speed control and vehicle-to-vehicle distance control. Working at speeds above 31mph (50km/h), the constant speed control operates just like a conventional cruise control system.

The vehicle-to-vehicle distance control can differentiate between vehicles directly ahead, and those in an adjacent lane. It uses the PCS millimetre-wave radar sensor, allied to constant speed, decelerator, follow-up and accelerator controls, to automatically slow the car, match the speed of the vehicle in front and, once the road ahead is clear, accelerate back to the previously selected cruising speed.

As in the LS 600h, ACC can now operate at speeds down to 0mph. After being brought to a complete stop, when the vehicle in front begins to move again, the driver needs only to press the accelerator briefly to reactivate the ACC.

ACTIVE SAFETY

Step 5 Vehicle Dynamics Integrated Management

The latest, Step 5 generation of Lexus's VDIM system enhances performance, traction control and vehicle

stability.

Sensors throughout the vehicle provide comprehensive status data, with which the VDIM integrates the Electronically Controlled Brake, four-wheel independent braking, ABS, EBD, traction control and Vehicle Stability Control active safety systems with the electric power steering, Variable Gear Ratio Steering, Adaptive Variable Suspension and, for the first time, Dynamic Rear Steering systems.

The VDIM on the current GS can help restrain vehicle yaw and roll motion through control of the AVS and VGRS. The new Step 5 system incorporates the Lexus Dynamic Handling system, which allows it to control the steering angle of all four wheels, achieving the ideal slip angle to help govern the vehicle's lateral motion. This gives extra stability, for example when there is a risk of understeer or oversteer when cornering, or braking on surfaces with different levels of grip between the left and right hand wheels.

Through this integrated control of all the elements related to vehicle movement, including motor torque, brakes and steering, VDIM not only optimises the activation of braking, stability and traction control systems, it can also improve the vehicle's overall kinetic performance.

Furthermore, whereas conventional safety systems are only activated immediately after the limits of a vehicle's performance envelope have been reached, VDIM activates control before that limit. As a result the performance threshold is extended through less obtrusive intervention, making for a more rewarding driving experience.

Lane-Keep Assist

The new GS's Lane-Keep Assist system, included in the Pre-Crash Safety and Adaptive Cruise Control option package for the GS 450h Premier, uses an on-board camera to detect road lane markings and help keep the driver from drifting off course.

The system, which now offers smoother steering corrections, calculates and generates the steering torque input required to help the driver make the adjustment necessary to bring the car back into its lane.

Blind Spot Monitor

The Blind Spot Monitor uses radars mounted on the corners of the rear bumper to detect vehicles overtaking in adjacent lanes.

Working at speeds above 25mph (40km/h) and when the relative speed of the two vehicles is less than around 17mph (28km/h), the system activates a warning light in the offside door mirror. If the turn indicators are working at the time, the light will flash at a faster frequency.

Adaptive Front-lighting System with automatic high beam

The Adaptive Front-lighting System automatically swivels the headlamp beam, helping light up a bend as the driver steers into it.

The new system, featured on the GS F Sport and Premier models, has a more advanced control which increases the swivel angle of one headlamp only at low speeds to give better visibility at junctions. Both lamps are swivelled at higher speeds for better illumination and less glare for oncoming vehicles.

With the introduction of Dynamic Rear Steering, swivel control has been developed to monitor the front and rear wheel steering angle difference, as well as vehicle speed.

The headlamps also have an automatic high beam function. A camera in the inner mirror detects light sources on the road ahead, including the headlamps of oncoming vehicles, the tail lamps of vehicles in front, and street lighting, and automatically switches the high beam on and off accordingly, so the driver does not have use the manual beam control.

Emergency brake signal

The emergency brake signal system monitors vehicle status and, based on information from the wheel speed sensors and the brake pedal switch, automatically flashes the brake lamps under emergency braking.

By using LEDs, the response speed of the brake lights has been significantly improved, giving following drivers the earliest possible warning.

Tyre pressure monitor

The tyre pressure monitor will detect a loss of pressure in one or more tyres and alert the driver with a warning light on the dashboard. On the GS 450h Premier it also displays the current pressure level.

PASSIVE SAFETY

Body structure

Lexus works to achieve the highest car-to-car impact compatibility standards, and to this end the new GS has been designed with the aim of delivering class-leading safety performance in frontal, offset, side-on and rear collisions.

Comprehensive use of high and ultra-high tensile steel in the body structure allows for optimum transfer and dispersal of impact loads, minimising the degree of cabin deformation in a collision and so helping keep clear space around the occupants.

Particular attention has been paid to side impact protection, with ultra-high tensile steel used for the rocker outer reinforcement and an increase in sheet thickness in the rear door impact beam. Also, Lexus has made its first use of hot press steel for construction of the B-pillars.

During the die moulding of hot press steel, firing and quenching occur at the same time as the pressing, which allows profiles to be created that would be difficult to achieve with cold sheet steel, increasing material strength.

Pedestrian protection

The front bumper, cowl and corrugated sheet bonnet have been designed to offer better pedestrian protection.

The bead height and pitch of the bonnet have been optimised with a new, thinner design. The frontal bonnet structure has been designed to deform easily on contact with a pedestrian's upper legs, and providing a gap between the bonnet and the top of the headlamps helps reduce the force of a head impact.

Impact-absorbing materials built into the front bumper help reduce the load applied to a pedestrian's legs, and the front wings incorporate a new structure that also alleviates any head impact.

Both the cowl panel and louvre adopt easily deformable structures, with the degree of deformation controlled by the use of different sheet thicknesses.

Airbags

The new GS is fitted with 10 airbags: dual stage front airbags and knee airbags for the driver and front passenger (the passenger knee airbag is installed in the door of the glovebox); front and rear side airbags; and front and rear curtain airbags.

The front airbags have variable force control, with sensors determining the severity of an impact and the appropriate force with which the air bags should be deployed.

EQUIPMENT

- New GS offered in a six-model range in the UK: GS 250 SE, GS 250/450h Luxury, GS 250/450h F Sport and GS 450h Premier
- Lexus luxury as standard, including
 - Full leather, heated/ventilated, electrically adjustable front seats
 - Bi-xenon headlights with LED daytime running lights
 - Dusk-sensing headlights and rain-sensing wipers
 - Smart (keyless) entry and start

- Cruise control
- F Sport models equipped with sports styling features, plus Lexus Dynamic Handling four-wheel steering system for the GS 450h F Sport
- GS 450h Premier equipped with 17-speaker Mark Levinson Premium Sound system, linked to 12.3-inch central display – the largest screen on the market
- Advanced safety features including new blind spot detection system (standard from Luxury grade) and automatic headlamp beam operation (standard on F Sport and Premier)
- Available to order now, first customer deliveries in mid-June

UK Grade structure

Entry point to the new GS range is the GS 250 SE, powered by a 207bhp (154kW) 2.5-litre V6 Dual VVT-i petrol engine.

The specification includes 17-inch alloy wheels, automatic bi-xenon headlamps and windscreen wipers, LED daytime running lights and a rear-view camera with parking guide monitor. Cabin comfort is assured with smooth leather upholstery, dual-zone climate control and electrically adjustable front seats (10-way, with memory setting for the driver's seat) with heating and ventilation functions. The steering wheel is electrically adjustable, too, and incorporates paddle shifts. On-board entertainment is provided by a 12-speaker audio system with CD player, DAB tuner, Bluetooth and USB/Aux ports for connecting personal music players.

Both the GS 250 and full hybrid GS 450h are offered in Luxury and F Sport grade. The Luxury trim builds on the SE specification with the introduction of 18-inch alloys, front and rear parking sensors, an auto-dimming rear-view mirror and an HDD satellite navigation system with Remote Touch Interface controller. Luxury grade also provides a new blind spot detection system integrated into the folding/auto-dimming door mirrors.

F Sport versions of GS make a stronger style statement thanks to 19-inch rims, a boot-lip spoiler and sports-styled bumpers and front grille with a distinctive F Sport mesh design. In addition to the Luxury specification, the F Sport has bi-xenon headlights with an automatic high beam function, as well Lexus's Adaptive Front-lighting System, which adjusts the beam direction as the car approaches bends and turns at junctions.

The F Sport look carries through to the cabin with sports pedals and perforated leather-trimmed sports steering wheel and gear knob. The front sports seats gain further adjustment functions – 16-way for the driver, plus four-way lumbar support.

The F Sport benefits from Adaptive Variable Suspension, plus, on the 450h model, the Lexus Dynamic

Handling system, which brings together a comprehensive array of steering and handling features, including Dynamic Rear Steering, electric power steering, Variable Gear Ratio Steering and Vehicle Dynamics Integrated Management.

At the top of the range, the GS 450h Premier is fitted with 18-spoke 18-inch alloy wheels and the same bi-xenon headlamp system as the F Sport models. The F Sport's adaptive suspension and selectable drive modes are also part of the Premier's specification.

In the cabin the seats are upholstered in semi-aniline leather, with both front seats benefiting from 18-way electric adjustment and memory settings. The passenger seat offers extra leg support and a rear easy access function.

The sophisticated climate control system is divided three-ways between the front left and right and rear sections of the cabin, and is equipped with an ioniser to help maintain an ideal environment.

The HDD navigation and premium Mark Levinson sound system are linked to a 12.3-inch central display screen, the largest on the market. Other details include automatic boot closing, sunshades for the rear windows (electrically operated for the back window) and a tyre pressure warning system.

Options

The Mark Levinson premium surround system with 12.3-inch navigation and multimedia screen is available for all Luxury and F Sport GS models, while a sun roof is offered for all versions except the GS 250 SE.

The Premier specification can be taken to another level with the addition of LED headlamps and a preventive safety package featuring Adaptive Cruise Control and Pre-Crash Safety.

Metallic or mica paint is an option across the board, while full-map navigation is available for the GS 250 SE.