

THE LEXUS IS

KEY POINTS

- Lexus's top-selling sports saloon
- Designed according to L-finesse principles, with distinctive, powerful and elegant exterior styling
- Refined interior with luxury detailing
- 205bhp 2.5-litre V6 direct injection petrol engine, giving nought to 62mph in 8.1 seconds (8.4 auto), and top speed of 144mph (141mph auto)
- Also available with Lexus's first diesel, a 175bhp 2.2-litre unit, in the IS 220d
- IS 220d CO₂ emissions reduced to 148g/km
- Ultra-low nitrogen oxides and particulate matter emissions, thanks to Lexus Clean Diesel Technology
- Four equipment grades - SE, SE-I, F-Sport and SE-L
- F-Sport grade features inspired by ultra-high performance Lexus IS F
- All versions equipped with 10 airbags, including driver and front passenger knee airbags
- ABS, Electronic Brakeforce Distribution (EBD), Brake Assist System (BAS) and Traction Control (TRC) standard on all models, Vehicle Stability Control (VSC) standard on all models
- Vehicle Dynamics Integrated Management (VDIM) standard on all models
- Adaptive Cruise Control (ACC) and Pre-Crash Safety (PCS) system optional on IS 250 SE-L automatic
- Exceptional standard equipment list includes climate control, 16-inch alloy wheels, smart keyless entry and start-up, sequenced LED interior lighting and electric folding and heated door mirrors
- Optional HDD Full-Map Navigation Package for SE and SE-I models with 13-speaker sound system, touch screen operation, Bluetooth and Rear Park Assist Monitor
- Optional Multimedia Package for SE-L models with 14-speaker premium Mark Levinson hi-fi with six-disc DVD autochanger and 5.1 surround sound, plus HDD satellite navigation with Dynamic Route Guidance, Bluetooth and Rear Park Assist Monitor
- On sale in the UK since November 2005

INTRODUCTION

The IS is well-established as Lexus's top-selling model in Europe, acclaimed for its superb driving dynamics, refined performance, peerless quality and superb specification. The second generation IS – an all-new car - extends all these qualities in a vehicle which benefits from striking, individual styling, superior dynamic performance, enhanced safety provisions and hallmark Lexus luxury and refinement.

DESIGN

The IS was created according to the principles of L-finesse, the design language that has shaped the appearance of the current generation of Lexus models. It has a wide track with short front and rear overhangs, giving the car a broad, muscular stance. Sweeping coachwork lines emphasise the 'shadow finish' of contrasting convex and concave surfaces and flow into a signature arrowhead shape through the C-pillar.

Build quality and perceived quality are of the highest order throughout, with attention to detail witnessed in the careful matching of wood trim sections, 'invisible' seam stitching on leather upholstery and improved fit and finish that reduce gaps to new low levels and eradicate some altogether.

BODY AND CHASSIS

The IS is 175mm longer and 75mm wider than its predecessor, with track width increased by 40 and 50mm front and rear respectively. For driver and passengers this translates into greater front and rear leg and shoulder room, while contributing to the car's excellent dynamic handling qualities.

With a drag coefficient of 0.27, the IS is one of the most aerodynamically efficient cars in its segment, a smooth airflow aided by the design of the door mirrors, a flush-fitting windscreen, a 'duck tail' profile over the bootlid and strategic underbody design elements.

Bodyshell stiffness is greater by 20 per cent, with weight reduced through the use of aluminium for the bonnet, suspension members and engine.

Lexus has focused on delivering class-leading NVH performance, achieved through a number of innovations. These include the world's first sound-absorbing sun visors, acoustic glass in the front screen and exceptionally close panel fit.

ENGINES AND TRANSMISSION

IS 250

The IS 250 is powered by a direct-injection 2.5-litre V6 petrol engine with dual VVT-i. It develops 205bhp at 6,400rpm and a maximum 252Nm of torque at 4,800rpm. This enables nought to 62mph acceleration in 8.1 seconds with manual transmission, 8.4 seconds in automatic versions. Top speed is 144mph manual, 141mph automatic. Combined cycle carbon dioxide emissions are 231g/km manual, 214g/km automatic. Fuel consumption in combined cycle driving is 28.8mpg with manual transmission, 31.0mpg with the automatic gearbox.

IS 220d

The Lexus IS 220d is equipped with Lexus's first diesel engine. The all-aluminium, four-cylinder, 2.2-litre common rail direct injection unit delivers the power and refinement demanded by Lexus, with 175bhp produced at 3,600rpm and 400Nm of torque at 2,600rpm. Nought to 62mph acceleration is accomplished in 8.9 seconds and the top speed is 135mph.

This performance has not been compromised by engine adjustments that have brought down CO₂ emissions and improved fuel economy. The IS 220d is well-established among the cleanest premium diesel models on the market, thanks to the application of Lexus Clean Diesel Technology. In 2009 CO₂ emissions were significantly improved, with output cut from 163 to 148g/km.

This reduction moved the IS 220d down two Vehicle Excise Duty bands and earned the model a lower, 20 per cent rating for Benefit-in-Kind company car tax calculations. Furthermore, companies can write down a larger proportion of the car's capital cost – 20 per cent – against Corporation Tax. In terms of its combination of high specification, value and tax efficiency, the IS 220d gained a clear advantage over key rival models from BMW, Audi and Mercedes-Benz.

Fuel economy also improved with a nine per cent reduction in combined cycle consumption, from 46.3 to 50.4mpg.

Transmission

A six-speed manual transmission is fitted to the IS 220d models. The IS 250 SE and SE-I grades are also manual with a six-speed automatic available as an option. Automatic is standard on the IS 250 F-Sport and SE-L grades. The close ratio automatic system returns superior fuel economy of 31.0mpg (combined cycle).

SUSPENSION AND STEERING

Double wishbone front and multi-link rear suspension systems with monotube shock absorbers deliver trademark Lexus ride comfort and excellent handling and dynamic performance. In keeping with their sportier appearance, F-Sport models have their suspension lowered by 10mm.

The speed-sensitive, electrically assisted power steering (EPS) system was also newly developed for the model.

SAFETY

All IS models are equipped with eight airbags, including knee airbags for the driver and front passenger. The passenger front airbag was the first in the world to use a twin-chamber construction, designed to disperse impact forces across the head and shoulders, instead of across the face as on a conventional airbag.

A full suite of electronic control systems is fitted as standard: ABS with Brake Assist System (BAS) and Electronic Brakeforce Distribution (EBD); Vehicle Stability Control (VSC); and Traction Control (TRC).

The IS 250 SE-L is available with the option of Adaptive Cruise Control (ACC), which maintains a safe, pre-set distance from the vehicle ahead, and Lexus's Pre-Crash Safety (PCS) system, which determines when a frontal collision is unavoidable and tensions the front seatbelts and prepares to engage emergency braking to help minimise impact. The systems are combined in a single package, controlled by the same millimetre-wave radar system, operating through a sensor mounted on the front grille.

F-Sport and SE-L versions are equipped with High Intensity Discharge (HID) headlamps with Lexus's Adaptive Front-lighting System (AFS). This adjusts the angle of the headlamp beams in line with vehicle speed and steering angle to improve illumination through bends and at junctions.

All IS models are fitted as standard with Lexus's Vehicle Dynamics Integrated Management (VDIM) system, which enhances the vehicle's performance, traction control and stability. Using comprehensive status data collected by sensors throughout the car, VDIM integrates the operation of the ABS, EBD, TRC and VSC systems with the electric power steering.

By applying integrated control of all the elements related to vehicle movement, including engine torque, brakes and steering, VDIM optimises and co-ordinates activation of the braking, stability and traction control systems.

GRADE STRUCTURE, PRICING AND EQUIPMENT SPECIFICATIONS

All versions of the IS are fitted with eight airbags, six-CD autochanger, smart keyless entry and push-button start, climate control air conditioning, alloy wheels and front and rear armrests.

The entry-level SE grade models feature Cellensia suede-effect upholstery, electrically adjustable door mirrors with integrated turn indicator lights, Bluetooth, eight-speaker audio system with USB and Aux sockets and 16-inch alloy wheels.

SE-I models are equipped as standard with leather upholstery with electrically adjustable, heated and ventilated front seats, cruise control, front and rear parking sensors and 17-inch alloy wheels.

F-Sport grade, introduced for 2010, takes its cue from the ultra-high performance Lexus IS F. Features exclusive to this version include a mesh front grille, rear bootlid spoiler, special-design 18-inch wheels, aluminium pedals, sports seats finished in Alcantara with leather bolsters and a sport steering wheel. An IS F-style shift lever is included on the IS 250 F-Sport automatic.

F-Sport models share a number of premium equipment features with SE-L grade, including rain-sensing wipers, HID headlights with AFS, and memory settings for the front seats and door mirrors. Items exclusive to SE-L grade include a power sunshade for the rear window, electric steering column adjustment with memory setting, wood interior trim, illuminated front scuff plates and a rear armrest with through-hatch to the boot .

The quality ambience of the interior is heightened by LED sequenced spot lighting. SE-L versions feature illuminated door sills and puddle lights are integrated into the door mirrors.

Audio excellence

SE, SE-I and F-Sport versions of the IS are equipped with an eight-speaker audio system with six-CD changer. An Aux-in socket and USB port allow owners to connect personal audio players, such as iPods, and additional system controls are provided on the multi-function steering wheel.

The 13-speaker audio system fitted as standard to the F-Sport and SE-L models has MP3/WMA compatibility, playing files stored on disc.

Two audio/navigation option packages are available, each using HDD (hard disc drive) technology to provide high navigation information capacity and rapid operation. The system

has a 40GB capacity, with 10GB available for use as an on-board “sound library” facility, storing tracks copied from CD.

The Full-map Satellite Navigation Package available for SE and SE-I models includes TMC (Traffic Message Channel) traffic update function, and a Rear Parking Assist Monitor. The Multimedia Package, offered as an option on the F-Sport and SE-L models, provides a 14-speaker Mark Levinson system with 5.1 surround sound and six-DVD changer. In addition to the HDD navigation system and Rear Parking Assist Monitor. A DAB module for receiving digital radio broadcasts is available as an option on all models.

Wheels and tyres

Five-spoke 16-inch rims are fitted to the SE models; 17-inch wheels on the SE-I grade ; and 18-inch wheels for the SE-L. F-Sport versions of the IS ride on bespoke design 18-inch rims.

Prices, insurance and VED

Current on-the-road prices, option prices, insurance groups and Vehicle Excise Duty (VED) bands for the Lexus IS range can be found at the Lexus media web site at www.lexusgb-press.co.uk.

LEXUS IS TIMELINE

YEAR	MONTH	EVENT
1999	May	The first generation IS is launched.
2001	October	IS 300 and IS 300 SportCross models join the range.
2002	October	The IS 200 SportCross is introduced in the UK.
2005	March	The second generation IS is revealed at the Geneva motor show.
	November	The new Lexus IS goes on sale in the UK.
2006	April	The IS range gains Lexus's first diesel-powered model, the IS 220d. The IS 250 Sport is also launched.
2007	January	Lexus unveils the high-performance IS-F sports saloon at the Detroit motor show, equipped with a 5.0-litre V8 engine and eight-speed automatic transmission.
2008	April	IS F goes on sale in the UK
	May	IS 250 SR model is added to the range.
	November	2009 IS launched with new SE, SE-I and SE-L grade structure. VDIM standard on all models. IS 220d emissions reduced to 163g/km. Sport and SR grades are deleted.
2009	January	IS 220d CO ₂ emissions further reduced to 148g/km.
	December	Minor changes for new model year, including new HDD navigation system and DAB-ready audio systems.
2010	January	IS range gains new F-Sport grade, focusing on new styling features inspired by ultra-high performance IS F model.

DESIGN

The IS was created according to the principles of the Lexus design philosophy L-finesse. L-finesse is rooted in Japanese culture, drawing on the heritage of ancient and modern design iconography. It informs every aspect of the IS, its detail reflected in the interior and exterior design and the strong visual synergies between the two.

The IS marries powerful, sweeping lines with contrasting convex and concave surfaces. The purity of the overall form is complemented by a substantial reduction in exterior component gaps, those between the bumpers and adjacent body panels having been cut to just 0.35mm.

At the front the wide track and prominent wheelarches combine with short front and rear overhangs to give the car a low centre of gravity and a broad, robust, but sophisticated appearance. The twin-barrel headlamp units sit on a higher plane than the grille, leading the eye to focus on the apex of the vehicle, strengthening the impression of speed and agility.

At the rear, flared wheelarches taper into a short rear overhang, topped with LED lamp clusters. The use of LED technology for the stop and number plate lights provides sharper, more refined illumination; the lights also last longer and use less energy.

The principles of L-finesse can also be seen in the IS's interior, which follows the pattern of the exterior in combining convex and concave surfaces. A combination of high quality slush moulding and vacuum forming production processes is used to create the upper and lower dashboard and the door trim panels. These soft-touch elements are finished in a scratch-resistant natural grain pattern. A black upper dashboard can be combined with a choice of three colours for the lower section: matching black, grey or ivory.

Precise fit and finish management has reduced, and in some cases eliminated gaps between interior components. Careful consideration has been given to the shaping and spacing of individual parts, with detailed coordination of interior illumination and finishes to touch surfaces, such as the chrome highlighting on the door handles, gear knob and starter button.

Brighter, more focused LED illumination is used in conjunction with conventional bulb lighting for the front and rear map reading lights, front passenger footwell and gear lever puddle light, creating an elegant after-dark ambience. SE-L versions feature blue LED illumination in the stainless steel front scuff plates.

On SE-L grade models the centre console is finished in bird's eye maple. Only one per cent of the world's supply of this wood meets Lexus's exacting standards. Sourced from sustainable plantations in Canada, it takes more than three weeks to select, process and finish. The finishing process is carried out by Yamaha's piano-building craftsmen. Yamaha has been preparing wood for automotive use since 1966, when the company supplied Toyota with its first real wood components. The bespoke, patented process involves a 20-step, multi-coating application of lacquers, resulting in a high-gloss, scratch resistant finish.

The front seats provide snug lateral support and a broad shoulder area. Rear seat leg room is significantly improved, thanks to the wheelbase being 60mm longer than on the previous IS. On F-Sport models sports front seats are fitted, providing extra bolster support.

The entry-level IS 250 and 220d SE are upholstered in beige, grey or black Cellensia suede-effect fabric, the SE-I and SE-L in semi-aniline leather. F-Sport versions feature a combination of Alcantara seat facings with leather bolsters.

Further examples of Lexus's great attention to detail can be found throughout the interior. For example, the grab handles above the doors have a twin-articulation axis design for flush-fitting and improved ergonomics. Front and rear door ends have black resin covers for the panel and attachment bolts, and the front seat rails are also covered for a smarter appearance and better safety for rear seat passengers.

BODY AND CHASSIS

The Lexus IS is wider and lower than its competitors, its low centre of gravity combining with a sophisticated suspension design and electric power steering to deliver dynamic performance without compromising the legendary Lexus ride quality.

Smooth bodywork with minimal panel gaps and numerous aerodynamic underbody elements promote high speed stability, reduce wind noise levels and contribute to improved fuel efficiency. And comprehensive measures to cut noise, vibration and harshness (NVH) levels ensure an ultra-quiet cabin environment.

BODYSHELL

The Lexus IS shares the same luxury saloon platform as the latest generation GS. It is 175mm longer and 75mm wider than its predecessor, with front and rear track increased by 40mm.

Torsional stiffness is 20 per cent greater, achieved through extensive use of high tensile steel and a brace located between the frontal attachment of the rear sub-frame and the front floor reinforcement. Transverse rigidity is further improved by means of a pipe brace between the new bracing members.

The bonnet, main engine components and several suspension elements are made of aluminium to reduce yaw moment and unsprung weight, thus enhancing agility.

AERODYNAMICS

The Lexus IS has a 0.27 drag coefficient, making it one of the most aerodynamically efficient cars in its segment. The sleek, flowing bodywork has exceptionally narrow gaps, minimal protrusions and flush bonnet, headlight and windscreen surface surrounds. Door-mounted mirrors reduce air turbulence around the A-pillars and at the rear a duck-tail lip to the trailing edge of the boot lid and an 'air-kick' detail moulded into the lamp clusters ensure a clean passage of air, further reducing drag and turbulence. This effect is more pronounced in the F-Sport models, which feature a bootlid spoiler like that used on the Lexus IS F.

High speed stability and low wind noise levels are aided by the deep front spoiler and side skirts, while beneath the vehicle front and rear tyre fairings and covers to the cabin floor, transmission, fuel tank and rear suspension create the smoothest and flattest surface possible. The engine undercover is designed to create a venturi effect, which generates downforce for a zero lift coefficient at high speeds. A rear floor diffuser with twin vertical fins

is fitted, like a racing car undertray, to reduce the rear lift coefficient and bolster high speed handling stability.

NOISE, VIBRATION AND HARSHNESS

Lexus paid special attention to reducing the intrusion of external noise and refining the acoustic qualities of the cabin. Sound absorbing and insulating materials are used extensively throughout the interior, including newly developed foam-asphalt sheeting that also contributes to the car's overall weight-saving gains. Rubberised underbody floor covers and sound absorbing felt and rubber resin wheelarch liners combat the noise made by water and gravel splatter. The interior carpeting has an absorption-insulation-absorption sandwich to help cut road noise disturbance.

The detailed design of external bodywork seals, weather strips and door and window frame mouldings, contributes to greatly reduced wind noise. Triple seals are used on all four doors, with additional door sill seals to prevent air ingress, and a rubber seal is fitted right around the rim of the bonnet. Wind noise is also reduced by the flush mounted mouldings for the windscreen and door glazing. The windscreen itself has a noise damping, acoustic inner film that leads to a reduction in cabin noise of up to 4dB at idle.

A further example of Lexus's attention to detail is the use of perforated, sound-absorbing sun visors. Their design yields a significant reduction in wind noise intrusion from the top of the windscreen and the A pillars.

SUSPENSION

The Lexus IS has double wishbone front and multilink rear suspension, which deliver ride comfort with excellent handling and dynamic performance. On F-Sport models the suspension is lowered by 10mm, giving a sportier appearance.

Front suspension

The front, high-mount double wishbone suspension system combines lightweight forged aluminium knuckles with a high tensile steel lower arm and hollow anti-roll bar to reduce unsprung weight.

This configuration has a 35 per cent higher camber angle than the previous generation IS, which improves steering wheel centering and the level of negative camber to the outside wheel when cornering. Steering feedback is also better. An 18 per cent modified kingpin angle improves straight line stability, a 10 per cent increase in caster trail promotes more stable steering feel, and a 22 per cent reduction in roll centre height provides better cornering stability with reduced body roll.

Precise steering control and straight line, high speed stability are also aided by the new forward-mounted power steering gear, allied to low toe variation along the suspension stroke.

Rear suspension

The rear suspension is an advanced multilink system with toe control arms and an aluminium rear axle carrier. It combines stiffer suspension component materials with a reduction in unsprung mass for excellent ride comfort and high cornering stability. The double-linked upper arm and integrated bearings and hub also deliver high rigidity and significant weight savings.

Using a multilink system enables a fine balance of handling, stability and ride comfort to be achieved. The upper arms contribute to a reduction in upward spring motion; the mid-arm helps reduce body roll; and the low arm provides an improved anti-lift/anti-squat ratio. Also, aligning the shock absorbers along the same lower axis as the coil springs avoids compromising the width of the boot.

Shock absorbers

The IS uses high performance monotube shock absorbers, designed to dissipate heat more efficiently and so deliver better control and less high-use fade.

A large, 45mm piston diameter gives sharper response to vertical wheel movement and a new fluid and oil seal design delivers greater damping force under smaller compression. A pyramidal valve stack design reduces damping force under high piston velocity, reducing impact shock when, for instance, the vehicle drives over a bump at high speed.

Large diameter, liquid-filled bushings to the lower suspension arm further reduce the transmission of vibration and rebound springs in all four shock absorbers control the roll angle in extreme situations.

ELECTRIC POWER STEERING

The IS uses a speed-sensitive, electrically assisted power steering (EPS) system. Compared to conventional hydraulic systems, it is more fuel efficient, noise-free and, with the steering gearbox located ahead of the front axle, gives smooth, linear feedback to the driver. Both the DC motor and the reduction mechanism are built into the ultra-compact steering gear housing.

The system's electric motor uses 42V AC current for quicker response to steering inputs. Unlike conventional steering systems, in which power assistance is determined solely by vehicle and engine speed, EPS additionally registers steering angle and torque in order to calculate the amount of assistance required at any time.

Key steering parameters were amended from the previous IS model to create a quicker, more direct steering feel. The number of turns lock-to-lock was reduced from 3.0 to 2.91, and the gear ratio has been simultaneously reduced from 14.5 to 13.5.

EPS is incorporated into the Vehicle Dynamics Integrated Management (VDIM) to promote smoother vehicle behaviour on the limit. Via the EPS actuator, VDIM will provide steering assistance to reduce torque steer under braking on surfaces with varying levels of grip. It will also deliver steering torque assistance to help counter both understeer and oversteer, helping the driver find the best front wheel steering angle and maintain vehicle stability with the least input. Unlike conventional stability control systems, which simply correct the vehicle's path when under or oversteer is detected, VDIM anticipates the car reaching its dynamic limit and intervenes smoothly and discreetly.

BRAKES

Powerful 296 x 28mm ventilated front discs and 291 x 10mm rear discs are fitted to all IS models. A pressure compensating system constantly monitors performance and reduces the effects of brake fade. Stiff brake hose material gives better braking feel, and high-grip coefficient brake pads further increase braking efficiency.

The IS deploys a comprehensive range of active safety braking functions: ABS, Traction Control (TRC), Vehicle Stability Control (VSC), Brake Assist System (BAS), Electronic Brakeforce Distribution (EBD) and Hill-start Assist Control (HAC). On models equipped with automatic transmission, HAC lets the vehicle pull away smoothly on a gradient without rolling backwards. This is achieved by maintaining brake pressure for five seconds after the brake pedal has been released.

WHEELS AND TYRES

The IS is available with a choice of 16, 17 and 18-inch alloy wheels. The 16-inch rims are fitted to SE models; the 17-inch versions to the SE-I; and 18-inch wheels to the SE-L versions. F-Sport models also use 18-inch rims in an exclusive design.

The 18-inch wheels are fitted with wider, 255/40R18 Dunlop SP Sport Maxx tyres at the rear, specially developed for the Lexus IS to provide superior grip on all road surface conditions.

POWERTRAINS

The IS is offered with a choice of two power units: a 205bhp 2.5-litre direct injection petrol V6 and Lexus's first diesel engine, a four-cylinder 175bhp 2.2-litre unit.

The IS 220d is mated to a six-speed manual transmission. The V6 is available with a six-speed automatic with sequential shift control or the six-speed manual.

2.5-LITRE V6 PETROL ENGINE

Lexus's chain driven DOHC 24-valve 2.5-litre V6 petrol engine has a compact design and is notably light, weighing in at 180kg (service mass). Weight-saving features include an aluminium die-cast cylinder block and intake manifold, a resin intake chamber, and water and oil pumps located within the chain cover.

The direct injection technology gives the engine the highest injection pressure among petrol engines, at 130 bar.

It develops 205bhp at 6,400rpm and 252Nm of torque at 4,800rpm, translating into performance figures of nought to 62mph in 8.1 seconds (8.4 seconds automatic) and a top speed of 144mph (141mph automatic). Combined cycle fuel consumption is 28.8mpg (31.0mpg automatic).

The adoption of D-4 direct injection reduces the intake mixture temperature, which allows for a higher compression ratio, which in turn results in both enhanced power output and fuel efficiency. Unlike conventional petrol engines, the Lexus V6 achieves greater injection precision through control of both injection timing and volume. In addition, compression stroke injection operates during cold engine starts to increase exhaust gas temperature and expedite catalyst warm-up. High pressure fan-nozzle slit injectors are used to achieve the best fuel-air mixture, and pent-roof combustion chambers with a shallow piston cavity deliver excellent combustion and anti-knock performance.

The V6 also uses an electrically activated, two-stage Acoustic Control Induction System (ACIS). This divides the intake manifold into two sections, with an intake air control in the bulkhead that opens and closes to vary the length of the manifold according to engine speed and throttle valve angle. This increases power output at all engine speeds.

Swirl Control Valves (SCVs) are installed in the intake manifold, one per cylinder. With optimised intake port diameter and length, these stabilise combustion at a low coolant temperature and allow high levels of torque to be generated at low engine revs.

The adoption of dual VVT-i (Variable Valve Timing – intelligent) on both intake and exhaust camshafts also significantly improves engine performance. Dual VVT-i can control the intake and exhaust camshafts through angles of up to 40 and 35 degrees respectively and allows a greater intake/exhaust overlap. This benefits low end and top end torque performance, as well as helping to reduce exhaust emissions and give better cold start performance.

The chain-driven valve system employs roller rocker arms, with a marked reduction in friction between the cam and sliding components helping to enhance fuel efficiency. In addition, a concave camshaft profile increases valve lift to boost output. The system requires no adjustment of the valve clearance during the vehicle's lifetime.

All exhaust components are fabricated in stainless steel. Using a dual-tube exhaust manifold construction improves resistance to corrosion and also reduces heat loss and noise.

2.2-LITRE DIESEL ENGINE

Lexus's first diesel engine is a four-cylinder, 2,231cc common rail unit. It meets Lexus's stringent standards for refinement, with special attention given to NVH performance, and has an aluminium block, which helps save weight and aids driving dynamics.

The engine produces 175bhp at 3,600rpm and 400Nm of torque from 2,000 to 2,600rpm. The IS 220d accelerates from rest to 62mph in 8.9 seconds and has a top speed of 135mph.

Lexus has progressively reduced carbon dioxide emissions from the engine, from an original 168g/km to 148g/km from January 2009. This reduction has brought significant savings in ownership costs: the IS 220d has moved down two bands for Vehicle Excise Duty (Band F) and for company car drivers the Benefit-in-Kind rating has dropped to 20 per cent. Companies are also able to write down 20 per cent of the car's capital cost against Corporation Tax.

At the same time as CO₂ emissions have been cut, fuel efficiency has been improved. Combined cycle consumption is down by nine per cent, from 46.3 to 50.4mpg.

The engine features third-generation common rail technology with piezoelectric fuel injectors, operating with an exceptionally high injection pressure of 1,800bar and one of the world's lowest compression ratios for a diesel, 15.8:1. The low compression ratio reduces the compression build-up and reduces noise and vibration from the combustion process.

The common rail system is equipped with high speed injectors with 10 holes and a 0.13mm nozzle diameter, enabling five separate injections per cycle.

Measures to reduce noise and vibration include the adoption of a balancer shaft, which reduces the level of engine booming noise between 2,000 and 3,000rpm. A urethane plastic cover and three-layer heat insulator work with urethane spacers on the upper surface of the inlet manifold and the rear of the oil cooler and oil pan to further reduce engine noise, and a variable backpressure system cuts down noise from the exhaust at low engine speeds. The exhaust also incorporates twin ball joints to reduce vibration and noise.

These NVH reduction measures give the Lexus IS 220d a particularly quiet cabin environment., superior to many petrol-powered vehicles.

The diesel engine is equipped with Lexus Clean Diesel Technology, a package of innovative features that work to reduce exhaust emissions. Central to the technology is the Diesel Particulate NOx Reduction (DPNR) four-way catalytic converter, the only catalyst in the world which simultaneously reduces nitrogen oxides (NOx) and particulate matter (PM), achieving emissions levels respectively of 0.159 and 0.0019g/km.

TRANSMISSIONS

Both diesel and petrol IS models use a compact and precise six-speed manual transmission. The unit features a multi-cone synchroniser to reduce shift effort; slide ball bearings in the gear lever shaft and fork shaft to improve shift efficiency; a triple-synchro mechanism from first to third to enhance shift feel; and a shift guide plate to reduce the amount of play in the transmission after a shift has been made.

The IS 220d features a quiet, durable driveline with a liquid-filled differential mount for better vibration damping. Sport models use a shorter differential gear ratio, which improves in-gear acceleration by an average 30 per cent.

The IS 250 is also available with a six-speed automatic transmission (standard on SE-L and F-Sport models). This system also offers manual sequential gear range selection, which effects faster downshifts than the fully automatic mode enabling the driver to enjoy greater involvement and exploitation of the IS's dynamic qualities.

The automatic transmission has three planetary gear units, four clutches and four one-way clutches.

A new clutch-to-clutch shift control operates between fifth and sixth gears, eliminating the one-way clutch between them, saving weight and allowing a more compact design to be used.

Artificial Intelligence control (AI SHIFT) automatically changes the gear shifting pattern according to road conditions and driving style.

An improved lock-up timing control can improve fuel consumption in fifth and sixth gear driving and further economy during cold starts is achieved by means of an automatic transmission fluid warmer.

SAFETY

ACTIVE SAFETY

The Lexus IS range is equipped across the board with ABS with Electronic Brakeforce Distribution, Brake Assist System (BAS), Traction Control (TRC) and Vehicle Stability Control (VSC).

Pre-crash safety (PCS)

The IS 250 SE-L is available with an optional sophisticated Pre-crash Safety system (PCS), which detects when a collision is inevitable and coordinates safety systems to help reduce the impact. A millimetre-wave radar sensor is fitted to the front of the vehicle, which scans through 20 degrees and 100 metres ahead to detect other vehicles or obstacles, even when the car is cornering. Through a network of sensors, the system's computer constantly checks data including vehicle speed, steering angle and yaw rate to determine in advance if a collision is unavoidable.

If PCS calculates that a crash will happen, it triggers pretensioners to take up any slack in the front seatbelts and simultaneously adjusts the Brake Assist System to deliver maximum braking power as soon as the driver presses the brake pedal. PCS will also operate if severe under or oversteer is experienced or during emergency braking, if the vehicle is travelling at more than 10mph (15km/h).

Adaptive Cruise Control (ACC)

Adaptive Cruise Control (ACC) is a system that is complementary to PCS and included in the same equipment option for the IS 250 SE-L with automatic transmission. ACC operates in two modes: constant speed control and vehicle-to-vehicle distance control.

The first mode works like a conventional cruise control system, while the second uses the PCS millimetre-wave radar sensor, linked to a constant speed decelerator, to monitor the distance from the vehicle in front and automatically slow the car to maintain a safe gap. Once the road ahead is clear, ACC accelerates back to the selected cruising speed.

The driver can select the preferred minimum vehicle-to-vehicle distance – long, middle or short – by using a switch on the steering wheel. The system's control settings are shown on the multi-information display.

Vehicle Dynamics Integrated Management (VDIM)

The IS is equipped with Lexus's Vehicle Dynamics Integrated Management system, which enhances the vehicle's performance, traction control and stability. Using comprehensive status data collected by sensors throughout the car, VDIM integrates the operation of the ABS, Electronic Brakeforce Distribution (EBD), Traction Control (TRC) and Vehicle Stability Control (VSC) with the Electric Power Steering (EPS).

By applying integrated control of all the elements related to vehicle movement, including engine torque, brakes and steering, VDIM not only optimises activation of the braking, stability and traction control systems, it also further improves the vehicle's overall dynamic performance.

More than that, whereas conventional active safety systems are only activated immediately after a vehicle reaches the limit of its performance, VDIM engages control before that limit is reached. As a result, the IS's dynamic threshold is expanded and the vehicle behaves more smoothly on the limit, thanks to the less obtrusive intervention of the control systems.

For example, when braking in a corner, a loss of rear tyre grip can result in oversteer. Through the Electronic Brakeforce Distribution function, the use of linear brake actuators makes it possible for control to start before the vehicle reaches its limit. The VDIM system apportions the appropriate braking force to each wheel, ensuring continued vehicle stability by pre-emptively restraining the tendency for wheelspin, while also contributing to superior braking performance.

Even harder braking in a corner can provoke front-wheel lock-up and a loss of grip, causing understeer. Once again, by independently controlling the braking force to all four wheels via EBD, VDIM helps prevent lock-up and regain vehicle balance, providing seamless control until the conventional ABS and VSC functions come into play.

Moreover, by means of the EPS actuator, VDIM augments VSC operation, providing steering assistance to reduce torque steer on surfaces with varying levels of grip. It will also introduce steering torque assistance in both understeer and oversteer conditions, helping the driver optimise the steering angle of the front wheels and maintain vehicle stability with minimum input.

Intelligent Adaptive Front-lighting System (AFS)

The IS is fitted with an intelligent Adaptive Front-Lighting System, which swivels one projector (both on high and low beam) of the bi-xenon headlamps through up to 15 degrees, helping to illuminate a bend as the driver steers into it. The headlights have four high-beam bulbs, widening the high beam illumination pattern from mid to long range.

PASSIVE SAFETY

Body structure

The highly rigid bodyshell features numerous structural reinforcements to enhance its performance in a collision.

Compared to the previous generation IS, an octagonal section front side member crash box improves energy absorption within a shorter front overhang. The inner door reinforcements have been strengthened and the gap between the inner door panel and the B-pillar has been reduced. This directs the impact load to the door belt line reinforcement more effectively, reducing the load on the pillar in the event of an offset frontal collision.

To improve side impact protection, the B-pillar itself has been reinforced, while the use of high tensile steel for the both the bulkhead inside the rocker and the cross-member reinforcement further increases structural stiffness. Further strategic reinforcements help disperse side impact forces and prevent vehicle body deformation.

Airbags

The IS was the first car in the world to feature a dual-chamber front passenger airbag, a design later introduced on the Lexus LS 460 and LS 600h models. Its advanced shape is based on the Lexus Omni-Support concept: once inflated, the twin chambers create a depression in the centre of the airbag, effectively cradling the passenger's face, while allowing the physical impact of the bag to be dispersed across other parts of the head, shoulders and upper body.

The IS introduced driver and passenger knee airbags to its market segment and is also equipped with large, seat-mounted front side airbags. These Torso Abdomen Pelvis (TAP) airbags provide superior protection, being 30 per cent bigger than previous designs. Curtain airbags that run the length of the interior are also fitted.

In total, eight airbags are fitted as standard to all IS models.

Car-to-car compatibility and roll-over tests

The IS was the first model to be developed according to Lexus's own more stringent car-to-car compatibility and roll-over crash test standards. These include frontal, side and rear collisions with a two-tonne vehicle at 34mph (55km/h, 50 per cent overlap).

This programme ensures the IS provides class-leading passive safety protection across a comprehensive range of real-world crash scenarios.

Whiplash Injury Lessening (WIL) seats

The IS features second-generation Whiplash Injury Lessening seats, with a new seatback structure and a headrest designed to sit as close as possible to the occupant's head during normal use. In the event of a rear impact, the lower seat back pushes backwards, closing the gap between the passenger's head and the headrest and significantly reducing the risk of whiplash.

INTERIOR REFINEMENT AND TECHNOLOGY

The IS is offered in four grades: the entry SE grade, SE-I, F-Sport and SE-L. All come equipped as standard with an excellent range of equipment, but owners can take advantage of high-tech options that deliver exceptional performance in satellite navigation and on-board entertainment.

SE models feature:

- Driver and front passenger front, side and knee airbags
- Front and rear Curtain Shield airbags
- ABS with Brake Assist System (BAS) and Electronic Brakeforce Distribution (EBD)
- Traction Control (TRC)
- Vehicle Stability Control (VSC)
- Vehicle Dynamics Integrated Management (VDIM)
- Climate control
- Smart keyless entry system
- Push-button start
- Cellensia upholstery
- 16in alloy wheels
- Optitron instrumentation
- LED sequenced interior lighting
- Multi-Information Display
- Eight-speaker sound system with in-dash six-CD autochanger, MP3 compatibility and AUX socket and USB port for connecting personal music players
- Electrically adjustable folding and heated door mirrors

- Steering wheel controls for audio and Multi-Information Display
- Folding rear headrests
- UV-reducing tinted side and rear windows

SE-I models add: (to SE specification):

- 17-inch alloy wheels
- Cruise Control
- Leather Seating Pack (leather upholstery, heated and ventilated front seats, eight-way electric front seat adjustment)
- Front and rear parking sensors

F-Sport models add (to SE-I specification):

- Exclusive design 18in alloy wheels
- Mesh grille
- IS F-style bootlid spoiler
- Lowered suspension
- Sports front seats
- Alcantara and leather upholstery
- Aluminium pedals
- F-Sport steering wheel
- IS F-style shift lever (IS 250 auto only)
- 13-speaker audio system
- Rain-sensing wipers
- Auto-dimming rear view and door mirrors
- Electrically adjustable steering column
- High Intensity Discharge headlamps with Adaptive Front-lighting System (AFS) and washers

SE-L models add (to SE-I specification):

- 18-inch alloy wheels
- Rear armrest with storage box hatch through to boot
- Electric rear window sunshade
- 13-speaker audio system
- Illuminated front scuff plates
- Bird's eye maple wood trim
- Electrically adjustable steering column
- Memory settings for steering wheel, front seats and door mirrors
- Rain-sensing wipers

- Auto-dimming rear view and door mirrors
- High Intensity Discharge headlamps with Adaptive Front-lighting System (AFS) and washers

SMART KEYLESS ENTRY SYSTEM

All IS models benefit from Lexus's third-generation smart keyless entry system. To gain entry to the vehicle and start the engine using the push-button, the driver simply needs to have the smart key on their person.

When the smart key comes within 0.7 to 1.0 metres of the locked vehicle door, it communicates with a transmitter built into the door handle and matches identity codes. A touch of the handle is then all that's needed to unlock the door, or, when leaving the vehicle, to lock it.

The key also automatically activates the IS's sequential entry lighting: first the puddle lights integrated into the door mirrors; followed by the main interior dome light.

Once inside the vehicle, the smart key identity is automatically recognised, allowing the driver to switch on the engine simply by pressing the push-button control on the dashboard.

Two smart keys are provided for each IS for different drivers to use. These can be programmed with individual preferences for driver's seat and steering wheel position on SE-L models.

The key's ECU can also be programmed to unlock one, two or all four doors in a single action. The IS cannot be locked if the smart key is detected in the cabin or boot and, should the battery run low, a warning message is displayed on the Multi-Information Display.

ELECTRONIC CLIMATE CONTROL

The climate control air conditioning system, fitted as standard to all IS models, uses a variable-displacement compressor for quiet and efficient operation. It provides independent left and right side temperature controls and automatic control of the upper and lower cabin air zones, a humidity sensor and automatic cool air bypass control.

The air intake is isolated from the engine compartment to reduce the intrusion of engine noise. On IS 250 models the system incorporates an automatic recirculation mode, triggered by a clean air sensor, to prevent exhaust gases being drawn into the cabin. There is also a switchable pollen filter for the face vents, which operates with 97 per cent efficiency.

OPTITRON INSTRUMENTATION

The sculpted instrument binnacle employs second-generation Optitron technology for the white, backlit display. The rev counter and speedometer needles have progressive illumination and activate with a full dial-sweep. They are backed by secondary amber sweep rings that show the manual settings for the speed limiter and optimum gear shift revs. If the engine speed reaches the rev limit, a red ring light illuminates in the tachometer.

PREMIUM AUDIO SYSTEMS

The standard audio package for the Lexus IS is an eight-speaker system with a six-disc CD changer, capable playing WMA and MP3 digital files from disc. Provision of an Aux socket and USB port allows for easy connection of iPods and other portable digital music players and auxiliary audio controls are provided on the steering wheel. A DAB module is available as an option on all models for digital broadcast reception.

A 13-speaker audio system is featured in the F-Sport and SE-L grade models, again with a six-CD in-dash autochanger and auxiliary controls located on the steering wheel.

The speaker array includes a slim subwoofer mounted in the parcel tray and each door houses a three-way configuration, comprising tweeter, woofer and mid-range unit, to deliver full-range sound reproduction throughout the interior.

OPTIONAL FULL-MAP NAVIGATION AND MULTIMEDIA PACKAGES

SE and SE-I versions of the Lexus IS can be specified with an optional Full-Map Navigation Package, which includes a pan-European navigation system controlled via a seven-inch VGA full colour display with touch screen. The pack also provides Bluetooth connectivity and a Rear Parking Assist Monitor.

For the 2010 model year, the navigation system uses a HDD (hard disc drive) with 40GB capacity, allowing for more information to be stored and for faster operation. Adopting HDD allows also for a 10GB on-board "sound library" for storing tracks copied from CD. The system also introduces a TMC (Traffic Message Channel) function for receiving up-to-date traffic updates.

Mark Levinson audio system

A more sophisticated Multimedia Package, comprising a bespoke 14-speaker Mark Levinson sound system, and a six-disc CD/DVD changer, is available for F-Sport and SE-L models, again using the HDD navigation technology featured in the Full-Map Navigation Package, and the Rear Parking Assist Monitor.

Lexus has continued its exclusive relationship with world-leading audio designer Mark Levinson to create a system designed specifically for the IS. The result is an exceptional 14-speaker, 300 watt package that fully exploits the excellent acoustic of the IS's cabin and delivers the segment's first complete, discrete 5.1 home theatre entertainment experience.

The system can play MP3 and WMA digital music files stored on CD or DVD, and, through an Aux socket and USB port in the centre console box, can link to personal audio equipment such as an iPod. An in-dash, six-disc CD and DVD player is also provided.

When the vehicle is stationary, music videos on disc and DVD films can be played via the seven-inch high-resolution Electro Multi Vision (EMV) display.

Bluetooth connectivity

Bluetooth connectivity is standard to all models, allowing hands-free use of compatible mobile phones via touch controls on the display screen, voice commands or buttons on the multi-function steering wheel. Up to 1,000 numbers can be stored. For the 2010 model year, Bluetooth can also be used for audio streaming.

Rear Parking Assist Monitor

The Rear Parking Assist Monitor features a miniature camera mounted in the rear number plate surround, which projects a real-time full colour view of the area behind the vehicle to the EMV screen in the centre console. To help execute reverse parking manoeuvres, guidelines can be generated, showing the prospective path of the vehicle based on the current steering angle.

F-SPORT – INSPIRED BY THE LEXUS IS F

For 2010 Lexus introduced a new F-Sport grade to the IS range, inspired by the ultra-high performance IS F.

Positioned in the line-up between the SE-I and SE-L grades, it provides a range of sports-themed exterior and interior features. These include exclusive-design 18-inch alloy wheels, lowered suspension, a mesh front grille and IS F-style bootlid spoiler. In the cabin there are supportive sports front seats and Alcantara and leather upholstery. Aluminium sports pedals are fitted, together with an F-Sport steering wheel and (on the IS 250 automatic) an IS F-style shift lever.

LUXURY SPECIFICATIONS

SE-I and SE-L versions of the IS are fitted with a Leather Seating Pack. This includes full leather eight-way electrically adjustable front seats with heating and ventilation functions. In

ventilation mode, two fans silently draw air through the perforated seat back and cushion for extra comfort. Front and rear parking sensors give extra assistance when manoeuvring in tight spots, showing the position and proximity of any obstacles on the EMV screen and sounding a warning buzzer intermittently, then continuously, as the gap from the vehicle decreases.

On SE-L models further sophistication is provided with an electrically adjustable steering column and three memory settings for the steering wheel, front seats and door mirrors.

F-Sport and SE-L grades also provide electrochromatic rear view and door mirrors, which automatically adjust to avoid glare from the headlights of following vehicles. The door mirrors tilt downwards when reverse gear is selected, to give a better view of the kerb when parking.

Other features unique to the SE-L grade include dark bird's eye maple wood trim details, illuminated front scuff plates and an electrically operated sunshade for the back window. The sunshade automatically retracts when reverse gear is engaged, then redeploys once vehicle speed reaches 10mph (15km/h)

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