

Press Release

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ALL-NEW VOLVO S60

OVERVIEW

- The most dynamic driving Volvo to date
- Sporting four-door coupé-like styling
- All-new model - faster, more involving to drive, more stylish and more economical than the previous Volvo S60
- Driver-oriented car with the chassis tuned on UK roads
- World safety first - Pedestrian Detection with Full Auto Brake
- World's first saloon car with City Safety as standard, which reduces the risk of low-speed rear-end accidents
- Driver-focused cabin that is finished in premium materials and remains very intuitive
- Powerful T6 engine offered in S60 range for first time, produces 304 PS and gives 155mph top speed
- 1.6D DRIVe version delivers 65.7mpg and under 115g/km CO₂ (preliminary figures). On sale in 2011
- Competes in premium compact executive saloon segment, one of the world's most competitive markets
- Three engines are available from launch including the D3 and D5 five-cylinder diesels and the powerful T6 petrol

Engines

Engine:	D3	D5	T6 AWD Auto
Type	1984cc, Transverse 5cyl, 20v	2400cc, Transverse 5cyl, 20v	2953cc, Transverse 6cyl, 24vl
Fuel	Diesel	Diesel	Petrol
Power	163 PS	205 PS	304 PS
Torque	400 Nm at 1400-2850 rpm	420 Nm at 1500-3250 rpm	440 Nm at 2100-4200 rpm
0-60mph (sec)	8.7 Manual 8.7 Auto	7.4 Manual 7.4 Auto	6.2
Top speed (mph)	137 Manual 134 Auto	146 Manual 143 Auto	155
CO ₂ (g/km)	139 Manual 154 Auto	139 Manual 166 Auto	231
Mpg: Urban	39.2 Man (35.3 Auto)	40.9 Man (31.0 Auto)	19.5
Extra-Urban	67.3 Man (61.4 Auto)	65.7 Man (60.1 Auto)	38.7
Combined	53.3 Man (47.9 Auto)	53.3 Man (44.8 Auto)	28.5

Pricing

All-new Volvo S60	Prices (OTR)
ES	
D3 (163 PS) ES	£23,295
D5 (205 PS) ES	£25,950
SE	

D3 (163 PS) SE	£25,295
D3 (163 PS) SE Premium	£27,295
D5 (205 PS) SE	£27,950
D5 (205 PS) SE Premium	£29,950
T6 AWD (304 PS) SE Geartronic Premium	£35,695
SE Lux	
D3 (163 PS) SE Lux	£27,095
D3 (163 PS) SE Lux Premium	£28,345
D5 (205 PS) SE Lux	£29,750
D5 (205 PS) SE Lux Premium	£31,000
T6 AWD (304 PS) SE Lux Geartronic Premium	£36,745

Benefit in Kind

Model	Transmission	CO ₂	P11D price	% of P11D	Annual tax payable	
					20%	40%
2.0 D3 ES	Manual	139g/km	£23,130	19%	£879	£1,758
2.0 D3 SE	Manual	139g/km	£25,130	19%	£955	£1,910
2.0 D3 SE	Geartronic	154g/km	£26,580	22%	£1,170	£2,339
2.4 D5 ES	Manual	139g/km	£25,830	19%	£982	£1,963
2.4 D5 SE	Manual	139g/km	£27,830	19%	£1,058	£2,115
2.4 D5 SE	Geartronic	154g/km	£29,280	25%	£1,464	£2,928
3.0 T6 AWD SE	Geartronic	231g/km	£34,890	35%	£2,442	£4,885

SHORT STORY

The all-new Volvo S60 is the most dynamic and safest Volvo ever. This stylish sports four-door saloon boasts a coupé-like design, with a steeply raked rear screen and rear pillars flowing into the tail-lights. As design director Peter Horbury points out: 'You are almost surprised to see that it has rear doors.'

Yet it is also a practical, comfortable four-door saloon that pioneers a major safety innovation - Pedestrian Detection with Full Auto Brake. A digital camera and radar are used to scan the road ahead. If they sense a pedestrian moving into the path of the car, and the driver fails to respond to warnings, the car will brake itself.

The all-new S60 is, at its heart, a driver-oriented car - more than any previous Volvo. It is designed to be enjoyable to drive, have a commanding road presence and be totally predictable in its behaviour. Irrespective of road conditions, the driver should always be in control. Engines range from the powerful British-built T6 - the first time the T6 has been used in the S60 range- to a 1.6-litre DRIVE that offers outstanding economy (65.7 mpg on EU combined cycle, preliminary figure). The DRIVE version of the Volvo S60 goes on sale in early 2011.

'Volvo is renowned for making practical and comfortable cars,' says CEO and president of Volvo Car Corporation, Stephen Odell. 'But we increasingly have to attract enthusiasts who want cars that are fun to drive and want emotionally satisfying vehicles. The S60 dials up driving dynamism and emotion. Yet it is a true Volvo - with innovating safety, comfort and space. The driver always feels in command. It is a car that is totally predictable from icy Scandinavian roads, to British B-roads, to hot Californian freeways. It's a fun car - in a very Swedish way.'

Apart from the new Pedestrian Detection with Full Auto Brake, the Volvo S60 has a suite of other advanced safety technology. These include City Safety - which reduces, and can entirely avoid, low speed impacts up to 30 km/h (19mph), Driver Alert Control (DAC) to alert drivers who have become tired or distracted, Blind Spot Information System (BLIS) which helps detect vehicles in the rear blind spots on both sides of the car, Lane Departure Warning (which alerts drivers if the vehicle runs across the lane markers without the turn indicator being used), Active Bi-Xenon lights that 'see around corners' and numerous secondary safety features including seat-mounted side airbags, improved inflatable curtains and Volvo's patented whiplash protection system (WHIPS).

Peter Janevik, Volvo's manager of active safety functions, says emphatically, 'All round, this is the safest Volvo ever.'

Two five-cylinder diesel models, the 163 PS D3 and 205 PS D5, and the top-range 304 PS T6 petrol, are offered at UK launch. Within the first year, the model range will grow, to include 115 PS diesel DRiVe and three new petrol models - the 240 PS T5, 180 PS T4 and 150 PS T3.

The petrol engines are new four-cylinder GTDi (gasoline turbo direct injection) units. The 2.0-litre variant is the first engine in the world to use a sheet-steel rather than the more conventional cast-iron turbocharger. Steel is lighter and has lower heat radiation, improving efficiency. Commenting on the new 2.0 four-cylinder GTDi, Volvo's vice-president of power train engineering Derek Crabb says: 'If you'd come straight from a straight-six engine, you'd feel at home.' The GTDi engines will be available with a six-speed Powershift dual-clutch semi-automatic gearbox as well as a six-speed manual transmission.

No matter how sporty the engine and styling, neither is much good without a responsive and agile chassis. The all-new Volvo S60 has a totally re-engineered chassis from the outgoing model. Agility and responsiveness were paramount yet without losing Volvo's legendary ride comfort.

'We went through every area of the chassis, from steering to dampers to the tyres, to make sure that this was the most dynamic driving experience ever offered by Volvo,' says Egbert Bakker, technical expert responsible for vehicle dynamics. Improvements over the old S60 include a smaller steering wheel, stiffer steering column, faster steering ratio, stiffer steering bushes and much stronger damping and control of the suspension.

'It's the sportiest suspension we have ever offered,' says Bakker. 'The ride is firmer and yet it is much better controlled. I would say comfort has actually been increased.' Damper development was done in the UK, on B-roads renowned for their bumpiness and camber changes. 'These are the most challenging driver roads in the world. If your car rides well and handles well there, it can do so anywhere. That's why we came to Britain.'

Advanced electronic controls further improve handling and the driving experience. These include Corner Traction Control, which boosts agility by automatically braking the inner driven wheel as extra power is applied to the outer wheel. This 'torque vectoring' improves turn-in, thus reducing understeer.

The all-new Volvo S60 has one of the world's most advanced stability control system - part of Volvo's high-tech DSTC (Dynamic Stability and Traction Control) - reducing the likelihood of wheel slip or skidding. In addition, Volvo's optional FOUR-C active suspension has been modified and improved for the S60. This state-of-the-art self-adjusting system boosts handling and ride comfort. The driver can also manually select their preference, from Comfort, Sport or Advanced.

The cabin is designed around the driver. Yet it is a simple, tastefully finished interior, devoid of unnecessary complication. Design director Peter Horbury notes, 'There's nothing worse than getting in a car and thinking it's more intelligent than you are. This premium yet tastefully simple style is very Swedish', says Horbury. Sophisticated materials, including leather and wood, are used. 'Trim quality, and fit and finish, are the best-ever for Volvo', says Horbury. Rear legroom is better than the old S60's, and the boot aperture is bigger, making loading easier.

'We believe the all-new S60 is a benchmark for Volvo,' says Stephen Odell. 'It is the safest car we've made and features a major new safety innovation, Pedestrian Detection with Full Auto Brake. It is also the most dynamic, most emotionally involving car we've ever manufactured, a striking sports saloon that shows Volvo's passion for cars. Yet it is very much a true Volvo.'

And finally, a car competing in the most competitive segment of the car market, the compact executive segment, needs competitive residual value predictions, and the new Volvo S60 doesn't disappoint. According to industry experts CAP, based on the normal three years / 60,000 mile yardstick, the new S60 will retain 35 per cent of its original purchase price. This is exactly the same residual value as the Audi A4 2.0TDI 143 and 170, and also the same as the BMW 320d SE. It is substantially better than the 30 per cent quoted for the Volkswagen Passat 2.0TDI Highline and 31 per cent for the Lexus 220d SE-I. It is also well above the mid-to-late 20 per cent predictions for the volume Vauxhall and Ford models in the segment.

DESIGN CONCEPT

- Coupé style fused with four-door saloon practicality
- Striking design represents a major step forward in Volvo design language
- Confident and assertive styling, most extravert Volvo saloon ever
- Promises a great drive
- 'Double wave' side profile makes the car look sleek and low

'The all-new Volvo S60 has been sculpted to move you,' says Design Director Peter Horbury. 'Every single line in its design is there to transport you both physically and emotionally. Its profile radiates so much coupé feeling that the rear doors come as something of a pleasant surprise when you examine the car close-up.'

'The premium sports saloon market is full of (mostly German) cars full of extravert character - such as a hunkered-down stance, big wheels, large badges and a sporty styling character. Horbury adds: 'There's little point playing the polite Englishman or reserved Swede if you want to make a lasting impression. Translated into a car market packed with extravert models from all the leading makers, this means that you have to sharpen your design pencil like never before if you want to be seen. That's why it's so important for the all-new Volvo S60 to be more daring than our previous models.'

'The front is a good example. It was a bit too minimalist in the previous model. The grille, the large iron mark and the front position marker lights in the all-new Volvo S60 are immediately noticeable in your rear-view mirror. The attitude is proud and self-confident but without appearing too aggressive. There is no doubt which car is behind you.'

All-new Volvo S60: a great evolutionary leap

The all-new Volvo S60 was designed under the directorship of Steve Mattin while Peter Horbury was working for Ford in America. Horbury, who served as Volvo design director from 1991-2002 and is responsible for the modern Volvo design language - says he has 'nothing but praise' for the work done in his absence.

'I call the design of the S60 a great evolutionary step. If you look back at the previous generation S60 [launched in 2000], the lineage is clear: the rounded nose, the fastback rear, and the sporty proportions. That S60, and the S80 that went before, began the current Volvo styling direction, which took classic Volvo cues but made them more modern. The all-new S60 takes that styling treatment to a much higher level of sportiness. This is a big step forward.'

Sportier and more distinct than any previous Volvo

Örjan Sterner was responsible for the exterior design of the all-new Volvo S60. For him, the direction was crystal-clear from the outset: 'In overall shape, the all-new S60 is a coupé, sportier and more distinct than any previous Volvo. Virtually all the lines were penned to carve out the correct wedge profile. It carries a sporty appeal that promises great driving pleasure before you even get behind the wheel.'

The rear pillar stretches all the way to the tail lamps - and the slim coupé-like roofline is accompanied by a new contour on the shoulders, creating a gentle yet powerful double wave from the headlamps at the front to the tail lamps at the rear.

'The dip in the middle of the double waves visually pushes the car down and puts focus over the wheels. This enhances the stance and makes the car look sleeker and lower. The sculpted bonnet and the short overhangs front and rear also emphasise the sports car feel.'

The design dynamism is enhanced by what Volvo's design team calls the 'racetrack' design. The car's lines do not end abruptly but instead continue to flow organically, continually, echoing the smooth shapes of a racetrack.

Adds Sterner: 'It's confident and assertive. We worked a lot on its stance, the way it sits on its wheels. That is the key design quality of any sporting car. It must look as though it hugs the road.'

Organic Scandinavian design

'The design is also very Scandinavian,' says Sterner. 'It is very clean with clear distinct forms and shapes. Scandinavian design is never just about aesthetics. It's also about deeper questions, such as the environment or caring for the people around you.' Note, for instance, the soft surfacing on Volvo exterior corners: it is safer for pedestrians.

Volvo's design language has undergone dramatic change over the past decade - without compromising in any way the core values that have made the brand one of the strongest in the automotive world.

LED technology adds to styling character

Volvo's designers have used LED (Light Emitting Diode) technology to create distinctive, yet fluid, light streams front and rear. The vertical position lights at the front, the eyebrow-like side marker lights, the turn indicators in the door mirrors and the position lights in the tail lamps all help give the new S60 an unmistakable profile, even at night. Parts of the rear lamp units are also integrated into the boot lid, creating a horizontal light pattern that helps make the car look even sleeker, lower and broader.

The all-new Volvo S60 is being launched with a range of bold exterior colours to match its more extravert personality. Among the 15 colours are Vibrant Copper and Electrum Gold. Says Anders Sachs, responsible for colours and materials: 'Colour helps you to express your personality. We look at trends in fashion, design and architecture. Copper and gold are important colours right now, colours that give an aura of sportiness and exclusivity.'

Aerodynamic design shows it's not just a pretty face

The style of the S60 is not only designed to add emotion, and sports appeal. Being a Volvo, there is a functional benefit. The drag co-efficient is a slippery 0.28, making the S60 one of the most aerodynamic cars in its class.

A large number of options and accessories, including an exterior styling kit, allow owners to personalise the S60. The kit features front and rear skid plates, side scuff plates, exhaust tailpipe finishers and 18-inch alloy wheels. Other optional extras include a rear spoiler, and a choice of 16-, two different 17- and three styles of 18-inch alloy wheels.

Adds Peter Horbury: 'The all-new S60 is sportier and more dynamic than any previous Volvo. But it is still an unmistakable representative of Scandinavian design at its best. Flowing organic shapes go hand-in-hand with user-friendly functionality, as well as a car aiming to be the safest in the world.'

INTERIOR DESIGN

- Driver-focussed cockpit
- Sports touches include small thick-rimmed leather steering wheel
- Major controls and instruments angled to the driver
- Premium materials include wood, leather and aluminium
- Intuitive controls designed to be easy-to-use
- Simple, premium, elegant Swedish design
- The best crafted Volvo cabin ever, with excellent fit and finish
- More technology than any previous Volvo cabin
- More spacious than outgoing S60, including more rear leg room

'This is the most stylish, distinctive and best-finished Volvo cabin. Of course, being a Volvo, it is also highly rational and functional. I think we have also added some playfulness to the rational simplicity of Scandinavian design tradition,' says Jonathan Disley, head of interior design.

For Disley, the interior is the most important part of any car. 'It's where the owner spends his or her time.' According to Disley, the S60's interior grew from the S80, 'a car we are immensely proud of. It captures the Scandinavian feeling of being a home away from home. Our challenge was to take this and to give it a sportier, driver-oriented feeling. It's serene, like a spa, and at the same time it communicates a sense of being in command.'

'Every detail looks like it's in motion'

The spa analogy is doubly relevant. While Disley was sketching spirals, a colleague commented that the drawings looked like the famous Spa racing circuit in Belgium. 'That was a eureka moment,' says Disley. 'This racetrack line ran around the cabin and held everything together. It also gave the continual expression of movement.'

Interior designer Tony Hunter adds: 'It's a trick that a lot of artists use - from Da Vinci to Kandinsky. They have a visual line that draws all the elements together, that you subconsciously follow with your eyes.'

Says Disley: 'Every detail looks like it's in motion. All these lines "embrace" the driver's cockpit. The instruments and centre stack are angled towards the driver to create a sensation of focus and control. The new dynamic three-spoke steering wheel and the new sports seats with extra side supports are standard. You also sit lower than the Volvo norm, and lower than in the outgoing S60.'

Driver focused - but does not exclude the passengers

The interior of the S60 is a full five-seat configuration and offers comfortable space for all occupants and well as being unashamedly driver-oriented. The sculpted outer rear seats give the passenger in the middle welcome side support. Knee space in the rear seat has increased by 30 mm compared with the previous-generation S60.

'Sports saloons typically have a very "me" feel,' comments Tony Hunter. 'They are designed around the driver. While the S60 is very driver focused, we are a "we" brand. We care about all occupants. We didn't want any passenger to think we'd forgotten about them. That would have been a very un-Volvo thing to do.'

So, although the binnacle does wrap around the driver, and the centre console is also angled to the driver, the front seat passenger also has easy access to key controls. The top of the dashboard is also horizontal, and inclusive.

The floating centre stack, a Volvo design initiated on the C30 Coupé, was inspired by Swedish furniture and its tendency to 'bend wood'. The thinness of the stack gives the effect that it 'floats'.

Big on functionality not gadgetry

The cabin feel is very Swedish. 'It's simple and uncluttered with no unnecessary gadgetry,' says Hunter. 'It's very intuitive, and very Swedish.' Adds Peter Horbury: 'It's quite unlike some complicated German interiors. The impression with these cars can be that the technology is taking over the car. There's nothing worse than getting in a car and thinking it's more intelligent than you are.'

Examples of the class-leading functionality include a front passenger seat in which the backrest folds forward - it helps rear seat carrying capacity - and a split folding (60: 40) rear seat, ideal for carrying long loads in the boot. Again, this is an unusual quality in a sports saloon. The boot opening is 107 mm wider than on the previous S60.

The S60 represents a significant step forward in quality and craftsmanship. Horbury says it is 'the best interior Volvo has ever done'. Fit and finish is improved, and so is the quality of materials. They look better and feel better. The wood inlay, when specified, is, of course, real wood as you'd expect given Volvo's Scandinavian roots.

Anders Sachs, responsible for colour and trim, says that Volvo has always been good with textiles. 'Sweden has a long tradition in high-quality fabrics. At first glance, the upholstery looks understated, classic and elegant. Take a closer look and you see an asymmetric line pattern. You may not notice it at first but when you do, it's a feel-good moment.' Inspiration came from English designer Paul Smith, famous for his 'classic with a twist' style.

Swedish design is famous for its light shades. Of course, the S60 offers black upholstery and charcoal trim but there are also some more typically Scandinavian hues such as soft beige or Beechwood upholstery and sandstone beige interior.

Most high-tech Volvo cabin ever

The cabin is full of useful, easy-to-use technology. An all-new infotainment system, combining audio, navigation, mobile phone and other functions, is presented within a five- or seven-inch colour screen in the upper part of the centre console. Its height is designed to make it easier for the driver to keep his or her eyes on the road. All functions can be controlled from the steering wheel, or by controls directly below the screen.

The human-machine interface is a crucial quality of any Volvo. The controls are so intuitive that Volvo's goal was to make reading the instruction manual unnecessary.

Voice controlled navigation is available and Bluetooth can connect the driver's own mobile phone to the infotainment system.

DRIVING DYNAMICS: ENGINES

- First Volvo S60 to get a powerful T6 version
- Top-range 304 PS T6 offers 155mph performance
- Revised D3 and D5 engines offer better performance than outgoing 2.4D and D5 models, yet deliver 20 per cent better fuel economy and 20 per cent lower CO₂ emissions
- DRIVe version offers 65.7mpg and under 115g/km CO₂

The S60 goes on sale in the UK with two five-cylinder diesel engines and the powerful petrol T6. All three engines are modern state-of-the-art units. The D3 is a new version of the outgoing 2.4D. The D5 was unveiled (in the XC60) in spring 2009 and is further improved for the S60. The T6 engine has also been upgraded and is now more powerful, and more economical, than ever.

Engine:	D3	D5	T6 AWD Auto
Type	1984cc, Transverse 5cyl, 20v	2400cc, Transverse 5cyl, 20v	2953cc, Transverse 6cyl, 24vl
Fuel	Diesel	Diesel	Petrol
Power	163 PS	205 PS	304 PS
Torque	400 Nm at 1400-2850 rpm	420 Nm at 1500-3250 rpm	440 Nm at 2100-4200 rpm
0-60mph (sec)	8.7 Manual 8.7 Auto	7.4 Manual 7.4 Auto	6.2
0-62mph (sec)	9.2 Manual 9.2 Auto	7.8 Manual 7.8 Auto	6.5
Top speed (mph)	137 Manual 134 Auto	146 Manual 143 Auto	155
CO ₂ (g/km)	139 Manual 154 Auto	139 Manual 166 Auto	231
Vehicle Tax Band	E Manual G Auto	E Manual H Auto	L
First Year Vehicle tax	£110 Manual £155 Auto	£110 Manual £250 Auto	£750
Subsequent Years Vehicle Tax	£110 Manual £155 Auto	£110 Manual £180 Auto	£425
Emission Level	Euro V	Euro V	Euro V
Mpg: Urban	39.2 Man (35.3 Auto)	40.9 Man (31.0 Auto)	19.5
Extra-urb	67.3 Man (61.4 Auto)	65.7 Man (60.1 Auto)	38.7
Combined	53.3 Man (47.9 Auto)	53.3 Man (44.8 Auto)	28.5

During 2010 and 2011, other engines will be launched, including the super-economical 1.6 DRIVe and new GTDi (gasoline turbo direct injection) four-cylinder petrol engines.

D3 and D5 diesel engines

The 2.0-litre D3 turbo diesel will be the best-seller in the UK. It is based closely on the outgoing S60's 2.4D unit. The major change is the reduced cylinder capacity, from 2400cc to 1984cc, owing to a shorter stroke. This has been done primarily to improve fuel consumption and reduce CO₂ emissions. Yet maximum power is the same - 163 PS - and torque has actually improved over the old S60 2.4D (400 Nm compared with 340Nm).

Performance is exceptionally strong - 0-60mph in 8.7 seconds (manual transmission) and top speed of 137mph (manual) (Outgoing 2.4D: 0-60 in 8.9 seconds, top speed 130mph). Fuel consumption (EU combined) is a competitive 53.3mpg (manual) while CO₂ emissions are 139g/km (2.4D: 42.8mpg, 174 g/km CO₂).

A new type of piezoelectric fuel injector is used, to boost economy, and the single turbocharger has been fine tuned to boost low-end torque. Maximum torque is delivered at only 1400 rpm all the way through to 2850 rpm. The D3 is available with front-wheel drive only and comes with a choice of six-speed manual or six-speed automatic gearboxes.

The high-performance D5 engine has twin turbochargers of different sizes that operate in sequence to provide added power over a broad rev range. The result is an immediate response from the lowest engine revs without any perceptible turbo lag. It also offers rapid acceleration at all

speeds, with smooth power delivery between the power bands of both turbocharger ranges.

The D5 engine also uses the advanced piezoelectric fuel injector technology. This provides precise distribution of the atomised fuel in the combustion chamber, resulting in efficient combustion and low emissions.

The six-speed manual version of the D5 has a top speed of 146mph and 0-60mph acceleration in only 7.4 seconds (Outgoing S60 D5: top speed 143mph, 0-60 in 7.6 sec.). Yet on the combined cycle it delivers 53.3 mpg, or 139 g/km CO₂ (Outgoing D5: 42.8mpg, CO₂ emissions 174g/km). A six-speed Geartronic automatic is also available.

Both D3 and D5 diesel engines with manual gearboxes - and the D3 in automatic transmission guise - are well under the 160g/km CO₂ company car tax break, which helps in the 'writing down allowance' - a statutory tax deduction for depreciation.

The five-cylinder diesels have aluminium block and head construction for light weight, four valves per cylinder for optimal breathing and twin overhead camshafts for efficient valve actuation. A maintenance-free particulate filter traps 95 per cent of the soot particles.

High-performance T6

The British-built T6 engine has been improved for the S60. Both power and torque are improved over any previous T6 engine (304 PS/440 Nm) while fuel consumption has been cut by 10 per cent, to 28.5mpg (EU combined). This is the first time that the T6 has ever been fitted to the S60, commensurate with Volvo's desire to make the all-new S60 the sportiest Volvo yet.

Designed by Volvo in Sweden but built in Bridgend, Wales, the SI6 (short in-line 6) is powerful and extremely compact. It is also very clean, easily meeting the latest Euro 5 exhaust emission standards.

In 3.0-litre (2953cc) T6 turbocharged guise, as used in the S60, it produces maximum torque over a very wide rev band (2100rpm-4200rpm). This enables the car to be driven at low revs, economically, and yet can still deliver enormous urge.

The turbocharger is an unusual twin-scroll device that allows for excellent low-rev pick-up, eliminating traditional turbo 'lag', and yet also delivers enormous thrust when maximum performance is desired. The twin-scroll technology allows the turbo to operate in two stages. The inflow is divided into two lots of three cylinders, allowing for swifter response and a smaller turbo unit. Ever after 4800rpm, there is only a small drop-off in torque.

There are twin overhead camshafts and 24 valves (four per cylinder) to provide optimal engine breathing. A Variable Intake System (VIS) - which varies both intake tract length and, more unusually, plenum volume through two throttle flap valves - boosts low-end torque and high-end power, further helping the breathing capability of the engine. For instance, 80 per cent of the vehicle's maximum torque is available across the entire rev range.

Unusually in this sector, the six-cylinder engine is a straight-six not a V6, which is normally easier to package. A straight-six engine, as used on the T6, is intrinsically the smoothest and most refined of all engine configurations.

The biggest problem with a straight-six is that they're long and difficult to package transversely. 'Transversely mounted engines are safer - that's why we use them,' says Derek Crabb. 'They reduce the risk of an engine penetrating the passenger load space and also can be designed with more crumple space in front and behind, allowing the safety systems to work more effectively.'

Most straight-six engines would not fit into a car's engine bay crossways; they're too long. Volvo engineers overcame this problem by making the new SI6 engine extremely compact and much shorter than the straight-six norm.

The key was a new and innovative drive system known as READ - Rear End Ancillary Drive. All ancillaries, such as the air-conditioning compressor, are driven by gears at the rear end of the crankshaft in the space above the gearbox. The alternator is direct-driven and fitted on the engine block. The flywheel damper, which compensates for vibrations in the six-cylinder engine's relatively long crankshaft, is inside the engine block.

The result is an extremely short engine, of just 625mm - only 3mm longer than Volvo's five-cylinder engine. This substantially increases engine bay space, so the straight-six can be fitted crossways and the excellent crash structure can be configured around it. The S16 has an aluminium block and head, and both are structurally optimised to balance low weight and stiffness. Even the camshaft cover is structural, allowing it to incorporate the camshaft bearing caps for further weight reduction.

On the S60 T6, a six-speed Geartronic automatic gearbox and all-wheel-drive (AWD) are standard.

New-generation GTDi engines

During the first year of S60 production, an all-new four-cylinder GTDi (gasoline turbocharged direct injection) will be added. In the UK, this will come in three guises - T5 (240 PS/ 320 Nm of torque), T4 (180 PS/240 Nm) and T3 (150 PS/240 Nm).

This new engine motor replaces Volvo's previous five-cylinder petrol variant, the 2.0T. Direct fuel injection improves performance, response, economy and emissions. The choice of using four- rather than five-cylinders reduces friction, boosting economy. Yet, commenting on the 2.0 version, power train head Derek Crabb says, "If you'd come straight from a straight-six engine, you'd feel at home.'

The 2.0 GTDi, as used in the new T5, has an aluminium block and head, and uses twin variable camshafts, operating 16 valves. A world first is the use of sheet steel, rather than cast iron, for the turbocharger. Using sheet steel for both the exhaust manifold and the turbocharger reduces weight and improves heat control, boosting efficiency. The turbo is unusually small - the market's smallest in relation to engine output. A small turbo boosts engine response and cuts consumption. The new T5 has 33 per cent more power than the outgoing five-cylinder 2.0T, 33 per cent more torque and yet gives substantially percent better fuel economy. Full details will be revealed nearer launch.

The GTDi engine comes in 1.6-litre (T3 and T4) and 2.0-litre (T5) capacities. The 1.6 engines have different architectures from the 2.0 and use cast iron rather than sheet steel turbos.

'Engine downsizing is one of the big industry trends,' says Derek Crabb. 'Engines are getting smaller in capacity but this is balanced by the use of turbochargers to maintain, or boost, performance.'

Sharp engine response is a key quality of a sporting car, and Crabb says Volvo has worked hard to give all the engines - not just the new GTDi - sprightly performance. 'It's an area where we sometimes get criticised. The engines have often been very powerful but sometimes not as responsive as rival sports saloons. All the S60 engines are either new, or upgraded, and a key goal has been to give them greater response through the engine range. We have done this by reworking the bottom ends, reducing friction and improving the breathing. It's not just engines - we have also overhauled the transmissions. The highest levels of performance were an absolute priority for the all-new S60.'

The GTDi models come with a choice of six-speed manual transmission or six-speed Powershift dual-clutch gearboxes. (See Transmission section for more details.)

1.6 DRIVE

This is the most economical engine in the range and likely to be a big seller in Europe (including the UK). Sales begin in early 2011. CO₂ emissions will be below 115g/km, extraordinarily low for a car of this size and ability. EU combined fuel economy is 65.7mpg (preliminary figures). That's better than most small hatchbacks!

The 115 PS/270 Nm unit is a diesel of 1.6 litres capacity and will only be available with a six-speed manual gearbox.

Further details of the DRiVe engine will be published nearer launch.

Transmission - Three six speed gearboxes

The T6 model is mated exclusively to Volvo's six-speed Geartronic gearbox, which offers both full automatic and manual clutch-less changes. The D3 and D5 engine choices are available with Geartronic as an option, and come with a six-speed manual gearbox as standard.

The modern Geartronic transmission can be used either as a full automatic or as a clutch-less manual. In automatic mode, gear changes are so smooth as to be almost imperceptible. The sports button allows higher revs before each gear change, slightly faster shifts and also sharpens kick down.

The six-speed manual improves both performance and fuel economy, and is a smooth-shifting clutch-and-stick shift aimed at those who prefer changing gear themselves.

The upcoming GTDi engines, on sale from next year, will come with a choice of twin-clutch semi-automatic Powershift transmission or a six-speed manual gearbox. The Powershift uses two clutches to offer fast gear changes. It can also be used as a full automatic but because drive is continually engaged, it offers excellent fuel economy.

The DRiVE model is on sale next year and will use a six-speed manual gearbox as standard.

All-Wheel Drive

The AWD (All Wheel Drive) system - standard on T6 - improves the handling and road holding by apportioning torque to all four wheels. The computer-controlled set-up automatically sends torque to the wheels with most grip, ensuring maximum possible traction and primary safety. The front-to-rear torque split changes constantly - from zero to 100 per cent, front or rear. The sophisticated electronics control a hydraulic clutch that determines the most effective distribution of torque.

Sensors monitor the road surface and the positions of the steering, brake and accelerator. In normal conditions on a dry tarmac road, almost all the power is distributed to the front wheels. However, as soon as slippage occurs, torque is diverted to the rear wheels to boost grip.

This system also features Volvo-patented Instant Traction that detects loose or slippery surfaces and switches drive from front to rear (or vice versa) to help with standing starts.

AWD not only improves traction on slippery surfaces, such as gravel, mud or ice, but also improves the handling balance of the car. The powerful T6 engine, in particular, presents a problem for a front-drive chassis. Torque steer can occur as the steering has difficulty controlling the powerful driven wheels. Four-wheel drive improves steering feel on such a powerful car, as well as improving traction and handling balance.

DRIVING DYNAMICS: CHASSIS

- The most dynamic driving Volvo to date
- Ride and handling developed on UK roads
- Benchmarked against the BMW 3-Series and Audi A4
- Volvo's Active Four-C suspension available as an option
- New Advanced Stability Control, part of the Dynamic Stability and Traction Control (DSTC) system

The all-new S60 has a fully independent coil sprung suspension, specially tuned for responsive, agile behaviour. Front suspension is by MacPherson struts and rear is by multi-link.

'Our benchmark was the BMW 3-Series and the Audi A4', says Egbert Bakker, technical expert responsible for vehicle dynamics. 'But the S60 is different from those cars. It must be agile, responsive and great fun to drive. In addition, it must offer extraordinary security even in the most difficult conditions. A Volvo must be poised and predictable in Sweden on an icy winter's road, on a Californian country road at the height of summer, and on a tight British B-road. We have our own chassis DNA. It's fun but always with security. That's one reason why we only offer front-wheel drive or all-wheel drive. It gives greater predictability.'

The platform is similar to the latest S80, V70 and XC60. On the all-new S60, the suspension has been tuned for greater responsiveness and dynamism. 'It's not just the suspension,' says Bakker. 'We have gone right through the chassis - from steering right through to tyres - always with the goal of providing maximum driving enjoyment combined with safety.'

Ride and handling developed in UK

The damper tuning for the all-new Volvo S60 was mostly done in England.

Says Bakker: 'The UK is not only one of our biggest markets [third biggest worldwide in 2009] but also has uniquely challenging roads. Its B-roads are winding, narrow, badly surfaced and have

many camber changes. They are very demanding and were the ideal surface on which to test the S60. Get those roads right, and you get the suspension right.'

Former British Touring Car champion and current Volvo dealer, John Cleland, also played an instrumental role in the development of the new dynamic chassis. His race winning motor sport experience and Volvo knowledge meant he was best placed to evaluate and advise on the new dynamic performance which proved invaluable throughout the cars' development.

Sportier - but more comfortable

The suspension is firmer, and provides more communication than the outgoing S60. 'The ride quality is much more controlled,' says Bakker. 'The old S60 offered a slightly softer ride but the new S60 is much more precise and body movement is more poised. The new S60 delivers a much more compliant ride than a typical German sports saloon. Yet the S60 always feels in control. It's a different sort of comfort compared with the old S60 but, on balance, I would say that the all-new S60 is certainly more agile and responsive, and also more comfortable.'

From steering to tyres: the goal was a sportier drive

'We went through the whole car - from steering wheel to tyres and everything in between - to give a sportier drive,' says Bakker. 'We kept asking: how could we make it stiffer, sportier, and more dynamic? The steering wheel is smaller than the old S60's to make the driver feel more connected to the road. The steering column has double the torsional rigidity and is better isolated with stiffer bushes and top mounts. The steering ratio is sharper, by 10 per cent. The dampers in the suspension are firmer, and so are the springs. There is much more communication from chassis to driver and much more of a feeling of direct contact between the tyres and the road.' The front and rear subframe bushes are also twice as stiff as before.

FOUR-C as option

Volvo's FOUR-C 'active' suspension, in which the dampers are automatically adjusted to suit the immediate driving situation, is optional on all versions of the S60. The FOUR-C system has been completely retuned for the new car. 'The settings are changed to give a clearer difference', says Egbert Bakker. 'But we still offer some sportiness in the Comfort setting and comfort in the sportiest Advanced setting'.

Electronic sensors continually monitor the car's behaviour. The dampers then re-adjust in a fraction of a second to offer optimal handling and ride. This technology reduces the car's tendency to squat, dip or roll under firm acceleration, hard braking or fast steering manoeuvres.

The advanced multiplex control systems update the suspension settings 500 times every second. The system is especially useful when the car's handling balance is naturally upset - for example during fast acceleration (with FOUR-C, the rear dampers are set to maximum stiffness to reduce squat and optimise front-end traction), during hard braking (the front dampers are stiffened to reduce nose dive) and when cornering (outside dampers are stiffened to reduce roll and improve road holding).

Dampers also automatically stiffen as speed increases. The driving behavior is improved in all situations. It boosts safety as well as entertainment.

Though dampers are adjusted automatically, drivers can also programme their desired settings. The three chassis settings are selected by the touch of a button. They are:

- Comfort - which provides the most comfortable ride with smooth and gentle body movements
- Sport - for more tightly controlled body movements and a firmer 'hunkered down to the road' feel. Steering response is sharpened, body roll is reduced
- Advanced - the maximum sports choice that noticeably firms up dampers and would be the desired setting for brisk drives on smooth winding roads

In an emergency situation, when the driver needs maximum control, the ingenious FOUR-C system overrides the personal settings to deliver maximum stability and traction. Equally, as the speed builds, the dampers automatically become firmer to improve handling, response and safety.

Corner Traction Control for improved turn-in

Volvo's new Corner Traction Control (CTC) further sharpens the driving experience. A refinement of the Dynamic Stability and Traction Control (DSTC) system, it uses torque vectoring to improve turn-in.

When taking a corner, the inner driven wheel is braked at the same time that extra power is fed to the outer driven wheel. This not only improves agility and precision, it also reduces the tendency to understeer - a characteristic of powerful front-wheel drive cars.

In addition, CTC makes it easier to maintain your line on a winding road, in keeping with Volvo's desire to maximize the poise and predictability of the new S60. It also reduces the 'snatch' sometimes found in front-drive cars when you need to accelerate hard from a small side road and merge with traffic.

Advanced Stability Control boosts driving pleasure and safety

The S60 has a new Advanced Stability Control, part of the Dynamic Stability and Traction Control (DSTC) system, that Volvo believes is the world's most sophisticated. A new roll angle sensor identifies any possible loss of traction at an early stage.

DSTC is standard on all Volvos and has been further refined for the S60. This electronic stability and traction system stops skids and slides using sensors to detect if any of the wheels loses traction or grip. If so, power is cut to the relevant wheel. If the sensors detect early signs of a skid, the system automatically brakes the relevant wheel to reduce speed and regain control. It's an important primary safety aid.

If the driver wants to use the vehicle in a more spirited manner, DSTC has a sports setting on the all-new S60 that disables the electronic intervention.

The S60 also features Engine Drag Control that prevents the wheels from locking during engine braking on a slippery surface.

Another active safety technology is Trailer Stability Assist (TSA), first showcased on the Volvo XC60. TSA dampens the swaying 'snaking' motion that can occur when towing, which can sometimes lead to serious accidents. TSA operates with the DSTC system to stabilise the trailer by braking one or more wheels while at the same time restricting the engine's torque. When an accessory tow bar is ordered, the TSA forms part of the cost of the tow bar.

DRIVING DYNAMICS: STEERING, BRAKES AND TRANSMISSION

- Quicker ratio rack-and-pinion steering for greater precision
- Four wheel disc brakes provide great stopping power
- ABS anti-lock brakes combines with HBA (Hydraulic Brake Assist) and RAB (Ready Alert Brakes) to give maximum braking ability in all conditions
- Choice of six-speed manual, six-speed automatic or, in GTDi engine, dual-clutch semi-auto Powershift transmission
- All-wheel drive (AWD) is standard on top-range T6

Sporty cars' most obvious qualities tend to be powerful engines and striking style. But steering, brakes and transmission are just as important for a total dynamic experience. That's why Volvo spent a great amount of time perfecting the total driving experience.

Sharper more agile steering

The rack-and-pinion steering ratio is 10 per cent faster than the old S60's, the steering column has greater torsional rigidity and the steering column mounts are also stiffer. The steering wheel, chunky and leather rimmed as standard, is smaller than the old S60's wheel to make the driver feel more connected to the road. The whole steering system has more response, more feel and helps give the vehicle more natural poise,' says Egbert Bakker. (See Driving Dynamics: Chassis for more information).

Speed dependent power steering available

All S60s get power-assisted steering, but Volvo's new sports saloon can also be ordered with speed-dependent power steering. This provides extra assistance at low speeds making parking simpler. The power assistance gradually declines as road speed increases, disappearing entirely at high cruising speeds. To give all drivers their own optimum road feel, the level of steering servo assistance can be adjusted via the car's set-up system. Power steering assistance can be set at one of three levels, depending on personal taste.

Strong, progressive brakes featuring advanced electronic controls for improved safety

The S60 has powerful anti-lock (ABS) four-wheel disc brakes - ventilated at the front - to give excellent low-fade stopping power. But the naturally effective disc brakes are supplemented by a

host of advanced electronic controls, to maximise braking power. They include:

- Hydraulic Brake Assist (HBA). This is an update of Volvo's previous EBD (Electronic Brake Distribution) and EBA (Emergency Brake Assist). This new generation system, first shown on the S80, helps the driver to stop in the shortest possible distance in emergency situations. Unlike the previous system, which only used vacuum assistance to boost braking strength, HBA reinforces brake pressure hydraulically. In an emergency, when the driver does not press the pedal sufficiently firmly or quickly, HBA ensures that maximum braking pressure is applied, always giving the driver the greatest chance to reduce the likelihood, or seriousness, of an accident.
- Optimised Hydraulic Brakes (OHB). In heavy braking, vacuum pressure in the brake servo can become low, reducing braking effort. OHB compensates by using hydraulic pressure to boost braking effort.
- Ready Alert Brakes (RAB). If the accelerator is released suddenly or the adaptive cruise control registers an obstacle in front of the car, RAB is deployed. The brake pads are instantly positioned very close to the discs, reducing braking response time and braking distance.
- Fading Brake Support (FBS). In long, hard braking, such as on a lengthy, mountainous descent, there is a risk of brake fade. FBS uses the hydraulics to gradually build brake pressure, maintaining pedal feel.

The all-new Volvo S60 is fitted with an electronic parking brake as standard.

SAFETY - THE BENCHMARK

- Pedestrian Detection with Full Auto Brake is a world-first safety technology
- City Safety offered as standard for the first time on a saloon car
- Engineered to be the safest car in its class and the safest Volvo ever
- Airbags include curtain side airbags and dual-stage side airbags
- Five three-point seat belts
- Advanced electronic primary safety measures - including DSTC (Dynamic Stability and Traction Control) - gives owners every chance of avoiding accidents

Ever since the first Volvo was built in 1927, the overriding priority has been to develop cars that help prevent accidents and, if the accident does happen, to offer maximum protection. 'Cars are driven by people,' declared co-founders Assar Gabriellsson and Gustaf Larson. 'Therefore the guiding principle behind everything at Volvo is, and must remain, safety.'

Volvo has been a safety pioneer ever since the company was founded. Innovations include the three-point seat belt (1959) - the greatest advance in car safety of all time, according to many safety experts. They also include the safety cage (1944), padded instrument panel (1960), rear seat belts (1966) and side impact airbags (1994). To this roll call of safety milestones can now be added two more, both offered on the S60: Pedestrian Detection with Full Auto Brake, and City Safety.

Pedestrian Detection with Full Auto Brake

This is a world first safety technology - the first time that any car maker has offered a feature that specifically avoids a collision with a pedestrian. The radar- and camera-based system can detect pedestrians in front of the car, warns the driver, and then automatically activates the brakes if the driver fails to respond in time.

Unfortunately pedestrian accidents are regular occurrences. In Europe, 14 per cent of all traffic fatalities are pedestrians. In the USA it is 11 per cent and in China, the proportion rises to 26 per cent.

'At Volvo we have always led the way when it comes to protecting the occupants in our cars,' says Thomas Broberg, senior safety advisor. 'In recent years, we have adopted groundbreaking initiatives that help the driver avoid and mitigate accidents with other vehicles. Now we are taking a giant stride forward with technology that can contribute to increased safety for unprotected road users as well.'

Pedestrian Detection with Full Auto Brake uses a newly developed radar unit integrated into the car's grille, a camera fitted in front of the interior rear-view mirror, and a central control unit. The radar detects any object in front of the car and determines the distance to it. The camera determines what type of object it is.

Thanks to the newly developed dual-mode radar's much wider field of vision, pedestrians about to step into the road are detected. The system can detect pedestrians who are 80cm tall and upwards - so that includes older children.

If a pedestrian is detected, the driver firstly receives an audible warning combined with a flashing light in the windscreen's head-up display. At the same time, the car's brakes are pre-charged. If the driver does not react to the warning and an accident is imminent, full braking power is automatically applied.

Volvo has worked for five years on the development of Pedestrian Detection with Full Auto Brake. Test cars have been in operation all over the world to 'learn' all possible variations of traffic behaviour, road condition and climate. 'We've driven more than half a million test kilometres in real traffic to 'train' the system to recognise pedestrians' patterns of movement and their appearance in different countries and cultures,' explains Thomas Broberg.

Avoids impacts at speeds below 35 km/h (21mph)

Half of all pedestrian accidents occur at speeds below 25 km/h (15mph). Pedestrian Detection with Full Auto Brake can avoid a collision with a pedestrian at speeds up to 35km/h (21mph) if the driver does not react in time. At higher speeds, the focus is on reducing the car's speed as much as possible prior to the impact, reducing the likelihood of serious injury or death.

'The proportion of pedestrian fatalities is too high today and our technology will play a major role in reducing it,' says Broberg.

Collision Warning with Full Auto Brake

Pedestrian Detection is a development of Volvo's Collision Warning system, which uses the nose-mounted radar and camera to warn drivers if they're about to hit another vehicle, and apply the brakes automatically if necessary.

Unlike Pedestrian Detection, and City Safety, this automatic braking technology is designed for higher speed, such as that encountered on motorways. A radar sensor fitted behind the grille, and a digital camera behind the windscreen, automatically monitor the distance to the vehicle in front. If the vehicle in front suddenly brakes, or is stationary, or you are travelling too close to it, a red warning light flashes on the windscreen and a warning buzzer sounds. The braking system is also automatically pre-charged to prepare for panic braking: the pads move very close to the discs and the hydraulic brake pressure is increased. If the driver does not react to the warnings and a collision is imminent, automatic braking is applied to reduce the severity of the accident.

As with Pedestrian Detection, this can avoid collisions up to 35 km/h (21mph) and reduce the severity of the impact at speeds over that.

Automatic braking is only applied as a last resort. 'We give the driver ample warning,' says Broberg. 'It's only when they don't respond, or it's too late, will automatic braking take over.'

City Safety prevents, or mitigates, low speed urban accidents

City Safety, a technology first shown on the XC60 and now featured as standard on the S60, avoids low speed accidents. Statistically, they are the most common types of crash. These accidents typically happen in towns and they typically involve tailbacks of traffic. City Safety either eliminates such accidents or reduces the severity of the impact.

'The biggest safety benefit is to reduce whiplash,' says Thomas Broberg. 'We are also reducing the damage to the cars involved and probably preventing accidents further down the line of traffic.'

City Safety has already won the Technology category at the 'Fleet World Honours Award 2008' and 'BusinessCar Techies Awards 2009' and the American 'Traffic Safety Achievement Award' at the 2008 international traffic safety symposium in New York.

City Safety works at speeds below 30 km/h (19 mph). A laser sensor, fitted behind the rear-view mirror and looking through the windscreen, keeps an eye on traffic in front of the vehicle. It can detect vehicles and other objects up to six metres (approximately 30 feet) in front of the car's front bumper. City Safety reacts to vehicles in front of the XC60 that are either stationary or moving in the same direction.

Based on the gap to the vehicle in front and the car's own speed, the system makes 50

calculations per second to determine what braking force would be needed to avoid a collision. If the calculated braking force exceeds a certain level without the driver responding, the system determines that the risk of a collision is imminent.

City Safety helps either avoid or reduce the severity of the collision by automatically braking the car and reducing the throttle opening. At the same time, the brake lights are automatically activated to warn other traffic.

According to Thomas Broberg: 'City Safety automatically brakes at the last possible moment - at the point of no return. This is the point where, if City Safety were not activated, there would be an accident. Our studies show that if the speed difference with the car in front is under 15 km/h (9mph) then City Safety should avoid an accident entirely. If the speed difference is greater, then an accident will probably happen, but the severity will be substantially reduced.'

The Volvo S60 is the first saloon in the world to be offered with City Safety, and only the second vehicle after the XC60.

Adaptive Cruise Control with Distance Alert

To help the driver maintain a safe distance from the car in front, Volvo has developed Adaptive Cruise Control (ACC). It uses a radar sensor to continuously measure the distance to the vehicle in front and automatically adapts the speed of the car to help ensure the distance is not too short. This technology also forms the basis of several of Volvo's advanced driving and support systems, including Collision Warning, and Pedestrian Detection, with Auto Brake.

The driver activates the cruise control, setting the desired maximum speed at between 18 and 125mph, and chooses the minimum time interval to the cars in front. There are five different time intervals to choose from.

Distance Alert is another feature included in this option. The system helps the driver maintain a safe distance to the vehicle in front even when Adaptive Cruise Control is not in use. Activated via a button on the centre console, the driver can choose between five settings. If the time gap to the car in front gets shorter than the selected speed, the driver gets visual information in the head-up display on the lower section of the windscreen.

Active Bending Lights 'see around corners'

Compared with conventional halogen headlights, Volvo's active bending lights - using dual xenon technology - more than double the driver's range of vision. The lamps are motorized, and can turn up to 15 degrees in either direction, as they follow the direction of the steered wheels. Thus, they help the driver to 'see around corners'. The headlights also self-adjust, always maintaining the correct angle to the road, maximizing illumination and avoid dazzling oncoming motorists.

Side Impact Protection System (SIPS), including dual-stage airbags

Volvo has further developed its SIPS side impact protection system. The body's entire side structure is both strong and light thanks to a well balanced combination of high-tensile steel of different grades (High Strength Steel, Extra High Strength Steel and the extremely strong Ultra High Strength Steel). The various components and grades of steel interact to reduce penetration into the passenger compartment.

Dual-stage seat-mounted side airbags further protect occupants from side intrusion. These side airbags get two separate chambers: one for the hip section and one for the chest. The hips can withstand greater force than the chest, so the lower chamber inflates with up to five times more pressure than the upper section. The side impact airbags interact with the inflatable curtains, which offer excellent head protection for children and adults alike. The inflatable curtains can now also be deployed outside of the passenger compartment, extending the range of protection. The gyro measuring the vehicle's yaw rate (part of the DSTC), along with the various accelerometers in the vehicle, can provide early activation of the inflatable curtains.

The S60 naturally offers dual-stage driver and passenger airbags as well. All airbags are standard across the range.

Whiplash Protection System (WHIPS)

WHIPS reduces the risk of neck injuries in a rear-end collision. The front seat backrest accompanies the passenger's initial body movement and dampens the incoming force rather like one's hand does when catching a ball.

The S60 features the same generation of WHIPS mechanism as was launched on the latest S80. This latest generation WHIPS ensures that the damping motion is gentle and provides good contact between the head and head restraint throughout the impact sequence.

WHIPS is a highly effective technology avoiding one of the most common injuries suffered in motor accidents.

Alerting Tired Drivers - and avoiding distraction

The Volvo S60 is full of solutions to keep drivers alert and reduce distractions. These include:

- Driver Alert Control (DAC). A unique technology to alert tired and distracted drivers, DAC monitors the car's progress between the lane markers and warns the driver if his or her driving pattern changes in a random or uncontrolled way.
- Blind Spot Information System (BLIS) helps detect vehicles in the offset rear blind spot on both sides of the car. A warning lamp beside the relevant door mirror comes on to alert the driver to the danger.
- Lane Departure Warning (LDW) alerts the driver if the car runs across the lane markers without the turn indicator being used.
- IDIS (Intelligent Driver Information System) is an electronic information system that helps prevent the driver from becoming distracted by irrelevant information in busy situations. By continuously monitoring certain functions in the car, such as brake application and movements of the steering wheel, accelerator pedal and turn indicators, IDIS can assess the complexity of the driving situation. The information is processed and at a certain level of complexity, any information that is not essential to safety is delayed, for instance incoming phone calls or SMS text messages.

Emergency Brake Light

EBL (Emergency Brake Light) knows the difference between normal and emergency braking. In an emergency stop, the brake lights flash at four times a second. Once speed drops below 30 km/h (19mph), the brake lights stop flashing and the hazard lights flash instead.

The safest Volvo of all

'No previous Volvo model has ever had such advanced safety technology as the all-new Volvo S60,' says Thomas Broberg. 'It is a worthy representative of our aim to build the world's safest cars - and it marks yet another step towards our goal of no fatalities or serious injuries in a new Volvo car by the year 2020.'

QUALITY AND EQUIPMENT

- Very high level of standard equipment includes City Safety, power adjustable heated door mirrors, 16-inch alloy wheels and cruise control
- Premium Swedish design
- Allergen free high quality cabin materials and pollen filter
- High-quality in-car entertainment
- Choice of ES, SE, SE Lux and Premium model lines
- Three year/60,000 mile warranty

Volvo has a well-established reputation for equipping its cars generously, unlike many rivals on which 'options' can be expensive. The S60 is no different.

The new Volvo S60 ES

It's the entry-level model, but it's far from basic. The ES has Volvo's award-winning City Safety technology as standard, as well as the suite of other safety systems - including DSTC (Dynamic Stability Traction Control), dual stage driver and passenger airbags, SIPS (Side Impact Protection System, including airbags), inflatable curtain airbags and three-point seat belts all round. Design director Peter Horbury commented: 'Safety is the cornerstone of all Volvos. That's why this safety equipment is standard.'

The ES model also offers, as standard, a headlamp levelling system and home safe and approach lighting (see Security section).

Sixteen-inch alloy wheels are standard (with locking wheel nuts) and so are power adjustable and heated door mirrors.

Cruise control is also standard - rare in this class - and so is a full electronic climate control

(ECC) system, including pollen filter. Vanity mirrors are illuminated, and a leather-spoke steering wheel and leather gear knob are also part of the specification. The folding front passenger seat and folding (60: 40) rear seats are unusual touches in a saloon but add to the car's functionality and versatility. A high-quality Performance Sound Audio system is offered (4 x 20W amplifier, aux input for MP3 player, six speakers) and so are remote controls on the steering wheel.

S60 SE

The SE version adds sportier trim and greater convenience, in the shape of rain sensor for the windscreen wipers, rear park assist and the auto folding door mirrors with ground lights, for night illumination. Volvo's advanced Tylosand T-Tec/Textile upholstery finish is modern yet comfortable. The trim is shimmer graphite aluminium, which looks both sporty and high-tech.

The rear-view mirror dims automatically and there's a Bluetooth hands-free kit and larger and sportier 17-inch alloy wheels, using low-profile sports 215/50R17 tyres. Volvo's innovative Interior Air Quality System (AQS) monitors air quality coming into the cabin and automatically closes the vents if pollution levels are high. A higher specification audio system - the High Performance Sound Audio System - is offered, featuring 4 x 40W amplifiers, USB input and Bluetooth.

S60 SE Lux

This is the most luxurious Volvo S60. Over and above the SE spec, the SE Lux gets leather upholstery, a power adjustable driver seat including memory, 'active' bending lights that can see 'around corners' and headlight cleaning.

S60 Premium

The ultimate Volvo S60 upgrade, the Premium specification adds leather upholstery, plus satellite navigation, a DAB (digital audio broadcasting) radio and the High Performance Multimedia Audio System (DVD player, 4 x 40W amplifiers, Bluetooth, USB, MP3 compatibility, nine speakers and 7-inch colour screen display). Premium is available on all engines in SE and SE Lux variants.

Further Options and accessories

The Volvo S60 is designed to complement an owner's lifestyle, so a huge number of options and accessories are available to personalise the car. These include:

- A choice of 17-inch 'Njord' (235/45R17 tyres) or 18-inch 'Sleipner' (235/40R18 tyres) or 'Freja' sports alloy wheels
- Park Assist front and rear
- Rear park assist camera
- Active FOUR-C chassis
- Power glass tilt and slide sunroof
- 'Urbane' wood cabin trim
- Heated front seats
- Heated rear seats
- Satellite navigation with RDS-TMC and Europe DVD map
- Rear seat entertainment system, with integrated 8-inch widescreen displays
- Leather steering wheel with silk metal inlays
- Dual colour leather steering wheel with chrome trim

Audio and DVD systems

The Volvo S60 comes standard with the excellent Performance Sound Audio system and benefits from a CD and radio, four 20W amplifiers, auxiliary input jack for MP3 player and six speakers. Remote radio controls are fitted to the steering wheel.

A DAB (Digital Audio Broadcasting) radio is optional.

The optional High Performance Sound system offers CD, radio, four 40W amplifiers, auxiliary input jack for MP3 players, a USB port and eight speakers.

The High Performance Multimedia Sound audio system boasts a DVD and seven-inch colour display screen, four 40W amplifiers, Bluetooth, USB, auxiliary input jack for MP3 players and eight speakers.

The top-of-the-range Premium Multimedia Sound audio system has Dolby Pro-Logic II surround sound and Dolby Digital 5.0 Cinema Edition, a DVD and seven-inch screen, 5 x 130W amplifiers, auxiliary input jack for MP3 players, USB port and 12 speakers. It is one of the finest car entertainment systems in the world.

The top sound system in the Volvo S60 is one of the first car models in the world to use Audyssey Laboratories MultEQ technology, the standard for room equalization in the home and professional theatre markets. MultEQ removes distortion caused by the car cabin's acoustics, enabling crisp, clear sound with improved soundstage for everyone in the car.

Rear headphone sockets are also available.

Bluetooth compatibility plus advanced satellite navigation

Bluetooth connectivity is available. This advanced wireless system enables your mobile phone to be connected to the car's loudspeaker system. This allows for perfect sound and minimizes the interference often experienced when a mobile is used while driving. It is also one of the only ways of using a mobile telephone legally whilst driving a car.

Volvo's satellite navigation system (RTI) has a super-fast processor which means alternative routes are plotted quickly. There is highly detailed information, including local speed limits when a national border is crossed. This new sat-nav system features RDS-TMC (traffic message channel) that displays up-to-date information on traffic problems.

Option Packs

Some of the more popular options are grouped into packs, offering better value for money. These packs include:

- Winter pack, which includes heated front seats and headlamp cleaning system; Active Bending headlamps are also offered if not already fitted.
- Driver Support pack, including Pedestrian Detection with ACC (Automatic Cruise Control), Queue Assist and Collision Warning with Full Auto Brake, BLIS (Blind Spot Information System) and LDW (lane departure warning) with DAC (Driver Alert Control)
- Security Pack, including PCC (Personal Car Communicator) with Keyless Drive, laminated windows (including rain repellent front side windows) and private locking

Warranty

The S60 is backed by a three-year/60,000-mile warranty. There's a three-year, unlimited-mileage warranty on the paintwork and 12 years guarantee against rust perforation. All Volvos have free recovery Volvo Assistance cover for one year, including breakdown assistance anywhere in Europe.

SECURITY

- Optional Personal Car Communicator (PCC) enhances security
- Home Safe and Approach Lighting
- Remote control central locking and alarm
- Volvo On Call rings for help automatically
- Laminated side (water repellent) windows available
- Optional 'security pack' bundles PCC, laminated side windows and private locking

No car company has a better reputation for safety than Volvo. But increasingly safety also involves personal security. The Volvo S60 is stacked with security features to give owners extra peace of mind.

Side laminated glass

To make break-ins more difficult, the Volvo S60 can be specified with laminated glass in the side windows. The glass includes rain repellence for improved visibility in poor weather.

Personal Car Communicator

Although it looks remarkably like a regular remote control, the PCC can do a lot more than just activate the locks and alarm. A simple push of a button can, within a few seconds, tell the car owner if:

- the car is locked or unlocked
- the alarm has been triggered
- the alarm has been triggered and someone is inside the car (registered by a highly sensitive heartbeat sensor)

The information is available and up-to-date as long as the distance between the PCC and the car is 100 metres or less. In addition, the most recent data is logged so the owner can at any time and any place check whether the car was locked when it was parked.

Volvo On Call

Advanced telematics are used to call for help during an emergency. The system uses the integrated GSM telephone and GPS satellite navigation to automatically call the emergency services when an airbag or seatbelt pre-tensioner is triggered during an accident.

If the car breaks down or you need help, pressing the Volvo On Call button will put you straight through to a Volvo On Call operator who can offer roadside assistance.

Home Safe and Approach lighting

By pressing a button on the remote controller when approaching the car, the driver can turn on the inside lights and the side marker lights. On leaving the car, pulling the headlamp stalk activates the dipped beam headlamps for 30, 60 or 90 seconds (programmable), lighting the path to the door.

Deadlocks, immobiliser and alarm

Standard features include a remote-control key fob that activates an alarm and strong deadlocks. Even if a thief does break into the car, for instance through breaking the glass, the deadlocks make it impossible to open the doors from the inside. The key fob also activates an electronic immobiliser that makes starting the car impossible without the correct key.

Remote control locking

When locked by remote control, not only are the doors deadlocked but the power windows and sunroof (if fitted) are also automatically shut.

ENVIRONMENT

- Highly fuel efficient engines
- All engines meet latest Euro 5 regulations
- Upcoming new 1.6 DRIVe engine delivers 65.7mpg and under 115g/km CO₂ (preliminary figures). On sale in 2011
- D3 diesel engine returns 53.3mpg (manual, EU combined cycle) while CO₂ emissions are 139g/km
- Optional Clean Zone Interior Package (CZIP) gives very clean air inside the car and reduces risk of allergy
- Interior Air Quality System (AQS) with pollen filter monitors air coming into cabin and will close air vents if pollution levels are high
- Interior trim materials all allergen-free
- All new Volvos are 85 % recyclable and 95 % recoverable
- Volvo produces an annual Corporate Sustainability report, which is available at www.volvocars.com/citizenship

Volvo's environmental commitment extends beyond reducing fuel consumption and CO₂ tailpipe emissions. Rather, they concentrate on a holistic approach to reduce the total environmental impact of cars, including production and disposal.

In 1982 the company took the first step by using residual heat from the nearby refineries to heat the factory in Torslanda, Sweden. In 1988 Volvo started using natural gas, which was the main fuel for heating its European factories (Sweden and Belgium) and, from 1 January 2008, Volvo's European manufacturing units including the Ghent, Belgium factory where the S60 is made, now only use green electricity - hydropower. This is Volvo's latest step in making its production climate neutral and future plans are likely to extend to other energy sources such as biogas and wind-power.

Volvo's record of environmental innovation is also second-to-none. In 1976, it was the first car maker to introduce three way catalytic converters with Lambda sensors. Nowadays all petrol powered cars use this technology to reduce tailpipe toxins.

Last year, Volvo successfully campaigned against the Alternative Fuel Exemption in the London Congestion Charge, pointing out that any Exemption should be technology-neutral and not specifically benefitting hybrid cars as it did previously. Under revised plans, Volvo's campaign means that any car that emits under 100g/km of CO₂ will be exempt.

In more recent times, in July 2010, Volvo launched an Emission Equality campaign to raise the public's awareness of the emissions from exhausts, other than CO₂, to help improve the quality of

the air that everybody breathes. Volvo Car UK launched a three-point plan calling on Government to implement an environmental label, similar to that already used to show CO₂ emissions on cars and white goods, to visually show a combination of NO_x, hydrocarbons and particulates from exhausts. This would ensure that during the purchasing process, a consumer could have as much information about the other exhaust emissions as they do for CO₂.

Volvo also launched an iPhone and PC app so that, in the interim before the label becomes mandatory, customers could understand the information in the showroom. Finally, a Think Tank has been launched to keep the debate alive and to keep the pressure on the government to mandate the availability of the information.

Clean, efficient engines

The engines in the new Volvo S60 are all very economical, given the sporty nature of the car. A particulate filter, which traps 95 per cent of soot particles, requires no servicing and is fitted as standard in both diesel engines. All engines meet the latest Euro 5 regulations.

Volvo's DRIVe range, available from the C30 to the S80, produces exceptionally low CO₂ figures. In the upcoming S60 DRIVe, average consumption is 65.7mpg and CO₂ emissions will be below 115 g/km (preliminary figures). In the C30, the DRIVe version returns 74.3mpg and 99 g/km of CO₂.

Clean cabin environment

Volvo S60 customers can rest assured they will be breathing the cleanest air possible. Volvo's Air Quality System monitors the cabin, minimizing odours and pollutants entering from outside. The air-conditioning system always ensures that the air is cleaner inside the car than outside. A cabin air filter prevents dust, pollen and exhaust gas particles from entering.

Furthermore, Volvo's Clean Zone Interior Package (CZIP) features an automatic air-purging system. When the car is unlocked by the remote control, the passenger compartment is automatically ventilated for about one minute if the outside air temperature is above 10 degrees Celsius. Carefully selected trim materials, which minimize emissions of harmful substances, further help to provide cabin air of a cleanliness approved by the Swedish Asthma and Allergy Association.

Volvo Cars is also the only manufacturer in the car industry with a complete model range that features textiles that are so clean and non-toxic that they are certified according to the high Oeko-Tex standard. All parts containing nickel are tested to ensure nickel leakage is kept to a minimum. In addition, all leather used in Volvo car interiors has been treated in a chromium-free tanning process, using either natural or synthetic tanning materials

Corporate Citizenship

Volvo's annual Corporate Sustainability reports, along with information on all Volvo Car's environmental activities, are available at www.volvocars.com/citizenship.

Ends

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Descriptions and facts in this press material relate to Volvo Car UK's car range. Described features might be optional. All information is correct at time of going to press and may be altered without prior notification.

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