

Driving Dynamics

Engines

- Five cylinder petrol engines unique in the premium compact class, are 200mm slimmer and 25mm shorter than those fitted to larger Volvos
- Range includes flagship 220bhp, 2.5-litre, low-pressure turbo T5
- 2.0-litre, 136bhp turbodiesel with second-generation common rail technology and 320Nm of torque from 2,000rpm
- Turbodiesel Euro IV compliant (from 2005 model year)
- 1.6 petrol and diesel engines (from Quarter 1 2005); plus 1.8 and five cylinder 2.4i petrol engines

In brief:

The all-new Volvo S40 is available with a range of high-tech engines that reflect its role as a premium alternative. Uniquely in this class, the Volvo S40 offers a choice of two transversely mounted five cylinder engines, the most potent of which – the 2.5-litre T5 – boasts a mighty 220bhp. These compact, low-friction engines combine a high level of refinement with low fuel consumption and exhaust emissions.

The five cylinder units are joined by 1.6-litre petrol and diesel engines (from Quarter 1 2005), a 125bhp 1.8-litre four cylinder petrol engine, plus a new 136bhp, 2.0-litre turbodiesel boasting second generation common rail technology and 320Nm of torque. From 2005 model year, the 2.0D will also be Euro IV compliant, as will the 1.6D, which is great news for tax-conscious company car drivers.

In full:

Engine	No of cylinders	Power	Torque	Availability
<u>Petrol:</u>				
1.6	4	100 bhp	145 Nm	Q1 2005
1.8	4	125 bhp	160 Nm	Q3 2004
2.4i	5	170 bhp	230 Nm	Q1 2004
T5	5	220 bhp	320 Nm	Q1 2004
<u>Diesel:</u>				
1.6 D	4	110 bhp	240 Nm	Q1 2005

2.0 D	4	136 bhp	320 Nm	Q1 2004
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The all-new Volvo S40 is available with a range of high-tech engines that reflect its role as a premium alternative. Uniquely in this class, the Volvo S40 can be specified with a choice of two transversely mounted five cylinder engines, providing an unrivalled combination of power and refinement. These are joined by a 1.6-litre petrol and diesel engines (from Quarter 1 2005), a 125bhp 1.8-litre four cylinder petrol engine, plus a 2.0-litre 136bhp turbodiesel which boasts second-generation common rail technology.

Accommodating the five cylinder powerplants within the Volvo S40's compact structure was no mean feat. Although the engines are based on the low-friction units found in larger Volvo saloons, they have been extensively revised and repackaged. The new generation is called RNC, with the C indicating Compact. Most of the engine's external components have been redesigned - the exhaust manifold outlets are now angled down towards the engine block, for example, and the manifolds on the T5 model are cast together with the turbo unit housing to reduce space.

These changes result in a series of engines that are 200mm slimmer and 25mm shorter than those found in larger Volvo models. They are also substantially lighter, to the benefit of both the driving dynamics and fuel consumption. Despite the changes, the technical merits of the engines are undiminished. Both five cylinder engines, the 2.4i and 2.5-litre T5, boast four-valves per cylinder and dual overhead camshafts, together with Variable Camshaft Timing (CVT), which works to maximise the torque at low engine speeds and to reduce exhaust emissions.

The five cylinder 2.4i (2435cc) engine is normally aspirated and boasts 170bhp. This peak occurs at 6000rpm, while the maximum torque of 230Nm is on offer at 4400rpm. When equipped with a manual gearbox, it takes just 8.2sec to reach 62mph from rest and the top speed is 138mph. The 2.4i consumes a gallon of unleaded petrol every 22.8, 42.8 or 33.2 miles on the urban, extra-urban and combined cycles, respectively.

The performance flagship of the all-new Volvo S40 range is the 2521cc T5. Equipped with a light-pressure turbo, it generates a potent 220bhp at 5000rpm. The peak

torque output of 320Nm is available all the way from 1500-4800, proving that top-end thrust need not be achieved at the expense of mid-range flexibility. The manual T5 rockets from 0-62mph in just 6.8sec and will reach 149mph. But despite its high-performance, it still achieves an excellent 32.5mpg for the combined cycle.

The choice of petrol engines for the new S40 also includes 1.6-litre and 1.8-litre units. Both offer good performance and economy. The 1.6 (from January 2005) offers 100bhp and 145Nm of torque, while the larger 1.8-litre offers 125bhp and 160Nm of torque.

Performance and economy are also words closely associated with the new 1.6 and 2.0-litre turbodiesel engines. Developed in conjunction with Ford Motor Company and PSA Peugeot Citroen, they feature second generation common rail technology delivering an unbeatable combination of power, refinement and frugality. The 2.0D has a maximum power output of 136bhp, peak torque of 320Nm at just 2000rpm, covers the 0-62mph increment in 9.5sec, and can go on to reach 130mph.

But while the 2.0D's acceleration is petrol-like, its economy underlines the value of diesel power. The Volvo S40 returns an outstanding average of 50.4mpg on the Combined cycle or a maximum of 62.8mpg on the extra-urban, and its carbon dioxide emissions are just 148g/km. This is not only great news for the environment; it also provides company car drivers with useful tax savings. The addition of a particulate filter for the 2005 model year will enable the engine to comply with Euro IV emissions regulations and qualify for a lowly 15% Benefit in Kind tax rating.

The smaller 1.6-litre turbodiesel (from Quarter 1 2005) also offers strong and flexible performance, with 110bhp and 240 Nm of torque.

Chassis

- **68% greater torsional rigidity than outgoing model**
- **Dynamic Stability Traction Control (DSTC) fitted as standard**
- **Sophisticated multi-link rear suspension**
- **Wheelbase increased by 78mm to 2640mm**
- **Front track increased by 63mm, rear by 57mm**

In brief:

The engineers tasked with developing the all-new Volvo S40 were asked to create a sporty car with a high level of active safety. But, by adopting a holistic approach to the chassis design, the engineers surpassed even their toughest targets.

The torsional rigidity of the new model is 68% greater than that of its predecessor, which helps maximise the performance of the new multi-link rear suspension. The front and rear tracks are also been increased to improve stability and the all-new Volvo S40's active safety is enhanced by the standard fit Dynamic Stability and Traction Control system (DSTC).

"A modern Volvo should obey the driver's slightest command – immediately and without fuss," says Peter Ewerstrand, the Volvo S40 project manager. "It should be as enjoyable to drive as it is safe. We had particularly high ambitions for the all-new Volvo S40 and we're more than pleased with the result. This is a car you'll truly look forward to driving whenever you get the chance."

In full:

The engineers brief for the all-new Volvo S40 was to develop a car that would combine an engaging, dynamic driving experience with a high level of active safety. With the development of a sophisticated new suspension system, a high level of torsional rigidity, a wide track and the latest electronic stability systems, Volvo's technicians have met their ambitious target.

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The body of the new model is 68 per cent stiffer than its predecessor thanks to advanced body design and the use of high strength materials, including Ultra High Strength Boron Steel. This high level of torsional rigidity allows the suspension to do its job properly and its provision was integral to the Volvo S40's design. It benefits not only the ride and handling characteristics of the Volvo S40, but also its crash-worthiness.

The advanced, independent suspension system employs spring struts at the front, the geometry of which has been carefully calculated to provide quick and precise steering response, enhancing the car's sports appeal. The rear suspension is a sophisticated multi-link system. This permits a small degree of passive rear wheel steering when cornering, which helps to maximise stability and control. Anti-roll bars also feature at both ends.

A further contribution to the Volvo S40's exceptional stability is provided by the wide track and long wheelbase. The front track of the new model is 63mm wider than that of the previous Volvo S40, while the rear track has grown by 57mm. This helps improve the car's balance, enabling it to cope with high cornering forces, while providing clear and consistent feedback to the driver. The wheelbase has also grown by 78mm to 2640mm and this contributes to a balanced weight distribution with a low minimal moment of inertia. In practical terms, this enhances the steering response and helps ensure that the Volvo S40 responds in a controlled, predictable manner in all circumstances, making a major contribution to active safety.

This carefully honed mechanical set-up is supported by the Dynamic Stability and Traction Control (DSTC) system, which is standard on every model. Arrays of sensors monitor the car's behaviour and if it starts to skid, DSTC will automatically brake individual wheels to help the driver regain control. The traction control element also works to alleviate the problems of wheelspin, ensuring that the all-new Volvo S40 delivers a safe, positive driving experience in all weather conditions.

Steering, brakes and transmissions

- **Electro-hydraulic power steering system delivers optimal driver feedback and response**
- **Ventilated disc brakes all-round**
- **Anti-lock brakes with Electronic Brake Force Distribution (EBD) and Emergency Brake Assist (EBA) fitted as standard**
- **Volvo S40 T5 uses six-speed manual gearbox from Volvo S60 R**
- **Adaptive auto available on all petrol-engined models**
- **Volvo S40 2.0D is fitted with six-speed manual as standard**

In brief:

The Volvo S40's electro-hydraulic power steering system has been tuned to maximise driver feedback and control, to help the driver place the car accurately on the road.

As you'd expect from Volvo, an anti-lock braking system is fitted as standard, and the ventilated disc brakes are also equipped with Electronic Brakeforce Distribution (EBD) and Emergency Brake Assist (EBA). EBD varies the braking performance between the front and rear wheels to minimise stopping distances, while EBA automatically applies maximum braking performance when an emergency stop is required.

Normally aspirated Volvo S40's are fitted with a five-speed manual gearbox, but the flagship T5 and 2.0-litre turbodiesel models boast six forward ratios. An adaptive five speed automatic transmission is available as an option on all petrol models.

In full:

The all-new Volvo S40 uses an electro-hydraulic power steering system that has been developed to optimise driver feedback and response. This helps the driver place the car accurately on the road and to assess the available grip.

Ventilated disc brakes are fitted at the front. The disc size is adapted to engine power and wheel rim size, up to a maximum diameter of 16.5in. As you'd expect

from Volvo, an anti-lock braking system is fitted as standard and this is joined by Electronic Brakeforce Distribution (EBD), which constantly distributes braking power between the front and rear wheels to ensure maximum retardation regardless of the road conditions or how the car is laden. Every Volvo S40 model is also equipped with Emergency Brake Assist (EBA). This system automatically senses when an emergency stop is required and adjusts the braking pressure so that the car comes to a halt in the shortest possible distance.

Four different transmissions are available on the Volvo S40.

The normally-aspirated petrol engines are mated to a new generation of Volvo's five-speed manual gearbox. This unit has been modified with the introduction of a triple synchromesh to provide faster, more positive changes.

The Volvo S40 T5 uses the six-speed manual gearbox that was developed for the awesome Volvo S60 R and V70 R. The ratios have been carefully matched to the engines characteristics so as to combine strong acceleration with a high top speed. The gearbox has a triple synchromesh and a reassuringly direct shift action.

All the five cylinder petrol engines can also be specified with the five-speed Geartronic transmission that is used in Volvo's larger models. The system is fully adaptive – it automatically adjusts its shift patterns according to an individual's driving style and can be shifted into 'manual' mode if required.

The Volvo S40 2.0D is also fitted with a six-speed manual, (although this is not the same unit as that fitted to the T5). The ratios have been chosen to complement the diesel's 320Nm of torque and to provide effortless pull throughout the engine range.