

Press Release

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Volvo Safety Stands Side-by-Side with Performance with the debut of the Evolve S40 at the 2004 Specialty Equipment Manufacturers Association Tradeshow

FOR IMMEDIATE RELEASE

Las Vegas, Nevada (November 2, 2004) - Volvo is a name not usually associated with the nation's largest automotive aftermarket tradeshow. But what Volvo is known for is safety. And the Volvo vehicles on display at this year's SEMA tradeshow are no exception. The S40 sold to and heavily modified by Evolve Cars, Inc. incorporates the latest in active and passive safety:

- Volvo Intelligent Vehicle Architecture (VIVA); a new way of thinking
- New, patented frontal structure with several crumple zones
- Four steel grades interact for optimal deformation
- Developed and tested in the world's most advanced safety center
- Frontal design with integrated protection for other road users
- 68 percent greater torsional rigidity compared to the current Volvo S40
- Unique Intelligent Driver Information System – IDIS
- High level of theft protection

The new Volvo S40 sets the standard in its class with extremely high safety levels – both protective and preventive, and represents an evolution of the, "You think and then you build" theme that began with the award winning XC90 sport-utility vehicle.

It's all part of Volvo's Intelligent Vehicle Architecture (VIVA), a unique approach to building a car that integrates everything from its crashworthiness, to its dynamic styling and exciting driving characteristics. This is possible due to several interacting units, including a very stiff body, a new frontal structure and a world-first intelligent system for driver information.

The safety systems have been developed and tested in the Volvo Cars Safety Center, the most advanced facility of its kind in the world. About forty full-scale tests have been performed to help ensure that all the on-board components interact, not to mention an untold number of computer crash simulations.

VOLVO'S INTELLIGENT VEHICLE ARCHITECTURE (VIVA)

Crumple zones that employ different grades of steel

During the development of the new Volvo S40, the goal was to achieve class-leading safety utilizing a new way of thinking about how cars deform in the event of a collision.

"Our aim of building cars that are the safest in their class applies to all models, including the new Volvo S40," says Ingrid Skogsmo, head of the Volvo Cars Safety Center.

In a collision, the preconditions for efficient deformation are critical. Since the necessary deformation is absorbed within a limited total distance, the various materials' properties must be

exploited to the maximum so as to absorb as much of the incoming energy as possible.

"A tough challenge, but one that we approached in an entirely new way," confirms Ingrid Skogsmo. "We call it Volvo's Intelligent Vehicle Architecture."

The frontal body structure of the new Volvo S40 is divided into several zones, each with a different task in the deformation process. The outer zones are responsible for most of the deformation. The closer the collision forces get to the passenger compartment, the less the materials used deform. The intention is that the passenger compartment should remain intact in most collisions.

In order to give each zone the relevant properties, different grades of steel are used in different areas. Four different steel grades are used. In addition to conventional bodywork steel, three different grades of high-strength steel are employed: High Strength Steel, Extra High Strength Steel and Ultra High Strength Steel.

What's also unique is that the all-new S40 went through a series of computer simulated frontal crash tests without the installed engine. The engines were then designed to fit within the empty space that remained after the simulated crash test. In a real collision the engine may be shunted rearward 5.9 inches before contacting the bulkhead.

This zonal system enables the collision forces to be absorbed in a highly ingenious and effective manner:

Low-speed deformation zone

The front bumper incorporates an extremely rigid crossmember of boron steel. The attachments to the longitudinal members of the body are designed in the form of 'crash boxes', which absorb the forces generated by a low-speed collision without damage to the rest of the body structure. The crash boxes can be replaced easily at reasonable cost.

High-speed deformation zone

The straight sections of the side members are made of high strength steel, a very ductile grade of material, which is optimized for high-energy absorption. This zone accounts for most of the deformation in a collision.

In addition, Volvo has opted to include upper side cross-members since they provide essential protection if the vehicle should collide, for example, with a truck platform or a loading pier.

Back-up zone

The section of cross-member that turns outward toward the A-pillar is designed to act as a barrier protecting the cabin space and as a back-up against deformation. The design also helps minimize the possibility of the front wheel from penetrating the interior, the wheel instead helping to absorb the collision forces. This section is extremely rigid and is made of extra high-strength steel.

Three-way attachment

A rigid cross-member connects the A-pillars and lower side members. On each side they form an extremely rigid three-way attachment, which helps to preserve the passenger compartment.

The new front structure is one of Volvo's many patented safety designs, and is an important part of Volvo's Intelligent Vehicle Architecture.

VIVA: Well-designed engines contribute to crash safety

Owing to efficient packaging, the engines in the new Volvo S40 are 7.8 inches slimmer than the 2.4- and 2.5-liter engines found in the S60 and V70. Since the engines are installed transversely, the reduced width creates greater space between the engine and passenger compartment. In a collision, the engine can be pushed up to 5.9 inches rearward before the crankshaft comes into contact with the cross-member near the bulkhead.

The steering column can be deformed up to 5.5 inches. When deformed, the steering column moves horizontally, to provide optimal airbag positioning.

In cars for the North American market the collapse function adapts to the use of the seat belt. More solutions in common with other Volvo models:

- Collapsible pedals
- Dual-stage airbags

- Seat belt pretensioners for the front seats and rear outer seats
- Force limiter for the front seat belts
- Belt reminder for the front seats

In versions destined for the North American market, the force limiters have been designed so that their effect is tailored to suit the seat's passengers (due to the seat's fore-aft position).

VIVA: Side Impact Protection System stiffens body

The new Volvo S40 is 1.9 inches wider than its predecessor. This creates added space for deformation in a collision. In other respects, the Volvo S40 has the same type of side impact protection as found on the S60 and S80, with SIPS (Side Impact Protection System), side-impact airbags and inflatable curtains. These curtains are designed to provide enhanced protection in rollover accidents, by deflating extra-slowly (approximately 3 seconds).

The side airbags are larger than in the previous S40 model to provide more effective protection at the hips and chest.

Several features contribute to the stiffer body and help prevent the side from deforming in a collision:

- The reinforced, transversely installed tubular beam between the A-pillars
- The diagonally installed beams of Ultra High Strength Steel in the doors
- The B-pillars, which have been significantly reinforced and are dimensioned to help provide enhanced protection

The new Volvo S40 is designed to help provide the best possible protection in a rear-end collision as well.

Volvo's system for avoiding neck injuries – WHIPS (Whiplash Protection System) – is one of the most effective on the market. In the event of a severe impact from the rear, the seat backrest and head restraint accompany the movements of the seat occupant's body.

The seats and backrests are of a particularly robust design. They are designed to withstand high loads from items such as unsecured luggage.

Protection for other road users

The design of the new Volvo S40 has a front characterized by clean, smooth surfaces and rounded corners. The curves and panels are shaped to help reduce the risk of injury to pedestrians and cyclists in the event of an accident. Furthermore, the front has an energy-absorbing structure ahead of the bumper so as to help reduce the risk of leg injuries.

The hood and front fenders are designed to absorb collision energy. This helps reduce the risk of head injuries. In addition, the compact new gasoline engines leave a generous 2.8 inches of free space between the cylinder head and hood.

Built for children too

Just like the rest of the Volvo range, the all-new Volvo S40 is developed with a keen focus on children. The body's safety structure and interior safety systems are designed and dimensioned to help protect the youngest occupants too.

Both rear outer seats can be fitted with integrated child booster cushions for children above three years of age.

Volvo recommends that all children under the age of 12 be properly restrained in the rear seats at all times.

VIVA: PREVENTIVE SAFETY

Stable driving properties

The body of the new Volvo S40 is 68 percent stiffer than that of its predecessor, thanks to advanced body design. This torsional rigidity contributes to stable, predictable and consistent handling on the road. The car's chassis design, with its broad track and long wheelbase, also has a positive effect on stability.

- The front track is 60.4 inches (2.5 inches wider than the previous S40 model).

- The rear track is 60.3 inches (2.2 inches wider)
- The wheelbase is 103.9 inches (3.0 inches longer)

The suspension is fully independent, with spring struts at the front and a multilink system at the rear. The rear suspension provides a certain degree of passive steering to counteract any tendency to skid.

The new Volvo S40 can be specified with:

- STC (Stability and Traction Control) anti-spin system.
- DSTC (Dynamic Stability and Traction Control), which corrects the car's progress and poise if there is any sign of starting to skid.

The Volvo S40 T5 is also available with all-wheel drive. Volvo's electronically controlled AWD system distributes the torque automatically to match the road and driving style, providing stable, consistent driving characteristics.

Excellent braking

The new Volvo S40 has extremely powerful ABS brakes – with electronic brake-force distribution to the rear wheels and automatic panic-braking assistance – EBA (Emergency Brake Assistance). The front wheels feature ventilated discs. The disc size is adapted to engine power.

Projector-type headlamps

The headlamps feature projector-type low beams. The concentrated beam of light is surrounded by a "halo" which helps oncoming drivers judge the distance to the car.

Bi-Xenon gas discharge lamps (GDL) for high and low beam are available as an option.

Additional side-mounted turn indicators in the door mirrors and integrated side-marker lights in the front and rear lamps make the Volvo S40 easy to see from the side too.

Ergonomic driver's environment

An ergonomically designed seating position with all the instruments and controls in just the right position makes for safer progress. In this respect, the Volvo S40 continues a renowned Volvo tradition. It has a comfortable and conveniently operated driver's seat, an adjustable steering wheel and a logically laid out instrument panel.

Steering wheel-mounted controls for the audio system, cruise control and navigation system add further to driving safety.

Intelligent Driver Information System

The new Volvo S40 introduces IDIS – the Intelligent Driver Information System.

IDIS is a feature influenced by fighter aircraft technology. The system helps the driver avoid being distracted while driving.

When the traffic requires the driver's full attention and concentration, for example when overtaking or braking, signals from the integrated GSM telephone (not available in the U.S.) and certain peripheral information are delayed until the situation is calmer. Drivers should, however, always focus their full attention and concentration whenever they are behind the wheel.

The IDIS function continuously registers the driver's activity by monitoring steering wheel movements, the accelerator pedal, turn signal function, braking and so on. This information is processed and at a given activity level, information that is not essential to safety is held back.

IDIS is standard in all versions of the new Volvo S40, irrespective of whether or not the car is fitted with an integrated phone (U.S. cars will not be offered with the integrated phone).

IDIS is factory-prepared for forthcoming on-board systems for information and communication. The more such functions the car has, the greater the benefit of IDIS.

SECURITY

Volvo's holistic view of safety encompasses not just Protective and Preventive safety, but also Personal Security. The new Volvo S40 is designed to provide effective protection for the car's

occupants and their property, both while on the move and when the car is parked.

The level of theft protection is very high, as a result of close co-operation with Thatcham, the world-leading automotive research and technology centre.

The new Volvo S40 is equipped with a number of protective functions, such as:

- Electronic immobilizer
- Electronic anti-theft “marking”
- Uniquely identified control modules
- Audio system as an integral part of the on-board electrical system

The new Volvo S40 can also be equipped with laminated door windows. Laminated glass is extremely difficult to smash and provides enhanced protection against break-ins.

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