



## Volvo Car Group

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## Press Information

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### **All-new Volvo XC90 crowns Volvo Cars' world-leading safety heritage**

In 1927 Volvo's founders Assar Gabrielsson and Gustaf Larson stated: "Cars are driven by people. Therefore the guiding principle behind everything we make at Volvo is – and must remain – safety."

Since then Volvo Cars has continuously introduced groundbreaking advanced technologies – and the latest model, the all-new XC90, is designed to be the safest Volvo ever.

"Created around people and real-life traffic and accident scenarios, it will bring us even closer to our target that by 2020 no one will be killed or seriously injured in a new Volvo," says Prof. Lotta Jakobsson, Senior Technical Specialist Safety at Volvo Cars Safety Centre.

It is the interaction between the various safety systems and functions that determines just how safe a car is. In a Volvo, safety is the result of a complete, integrated solution. This holistic view has from the very outset been a cornerstone of the Volvo Cars safety philosophy, and it remains very much a cornerstone today too.

"Our starting point concerning safety is the same today as it was 87 years ago: real life situations," says Prof. Lotta Jakobsson. "We study data. We crunch numbers. We innovate. The result is one of the safest cars ever made."

Volvo Cars' model and methodology for accident research and analysis are focusing on the entire sequence, illustrated by five phases – from non-conflict to post-crash. Here is a list over some XC90 features within each area.

## Phase 1: Normal driving

In the first phase, the foundation is laid for making driving safe and comfortable. Good visibility, good comfort, effective brakes, good steering capability, chassis and engine are examples that help the driver to have a pleasant journey. The driver and passenger in-car environment is another important factor that affects wellbeing and attentiveness. Volvo Cars has developed a range of new technologies and a new, intuitive user interface that all help the driver maintain focus on the road.

- Pilot Assist: Makes driving safer and more relaxed in monotonous stop-and-go traffic by adding steering assistance to the speed adaptation. When the semi-autonomous Pilot Assist is activated, acceleration, braking and steering are assisted in order to help the driver comfortably follow the traffic flow within the current lane.
- Driver Alert Control: Unique technology to warn tired and inattentive drivers. This system monitors the car's progress between the lane markings and notifies the driver if his or her driving pattern is erratic or slightly uncontrolled. The latest enhancement is a Rest Stop Guidance that directs the driver to the nearest place to stop for a break.
- Road Sign Information: Supports the driver by displaying road signs in the instrument display. Can be combined with the Speed Alert function, which provides the driver with a visual warning in the speedometer if the speed limit is exceeded.
- Lane Departure Warning: Alerts the driver with a warning sound if the car crosses one of the road markings without an obvious reason such as use of the turn indicator.
- Lane Keeping Aid: Helps the driver stay in the lane by applying extra steering torque if the car is about to leave the lane unintentionally.
- Distance Alert: Comfort-enhancing function that helps the driver maintain the set time gap behind the vehicle in front even when the active cruise control is not activated.
- Blind Spot Information System: Informs about vehicles in the blind spots. It also alerts the driver about vehicles that are approaching fast from behind.
- Cross Traffic Alert: Alerts the driver to crossing traffic from the sides when reversing out of a parking space.
- Active High Beam with LED headlights: Makes it possible keep the headlights on high beam continuously. It helps to prevent dazzling of the oncoming driver by shading out only as much of the beam as necessary.
- Active High Beam with halogen headlights: Helps the driver utilise high beam more efficiently. It offers automatic switching between high and low beam at the right moment.
- Active Bending Lights: Moving headlight beams that follow the curve of the road when cornering. For the best possible visibility when driving at night on winding roads.
- Cornering Lights: Lights up the area close to the car when the steering wheel is turned more than 30 degrees or the indicators are activated at speeds under 40 km/h.
- Tyre Pressure Monitoring System: A sensor and transmitter in each tyre valve monitors and sends continuous information about the tyre pressure in the tyre.
- Park Assist Pilot: Facilitates both parallel (both in and out) and bay parking by taking over and operating the steering wheel while the driver handles the gearbox and controls the car's speed.
- Park Assist Camera: An advanced function that not only gives the driver an extra eye to the rear, it also shows the intended course prior to a reversing manoeuvre.
- Visual Park Assist: Gives the driver a 360° bird's-eye view, an overview of the surrounding area, seen from a point above the car. Also gives the driver comfortable access to other different views of the surrounding area such as front view, rear view and side view.

- Parking assist system: Supports the driver during parking. The function expresses audible and visible input to help the driver to determine the distance to stationary and moving objects during parking.

## **Phase 2: Conflict**

A critical situation is imminent, e.g. the car might be about to skid. The driver may without realising it be speeding towards a vehicle, a cyclist or a pedestrian that is at a standstill. In such situations and others, preventive safety functions can step in to stabilise the car or alert the driver. In this way, the driver is given a better safety margin.

- Electronic Stability Control: A stability-enhancement system that helps reduce the risk of skidding by cutting the engine's torque when necessary and applying properly calculated braking power.
- Roll Stability Control: An active stability-enhancing system that calculates the risk of rolling over. If the system assesses the risk as high, engine torque is restricted and some braking force is applied to one or more wheels to counteract the rollover tendency.
- Collision Warning: In order to alert the driver that a crash is imminent, a red warning light is projected on the windscreen at the same time as a warning buzzer sounds. This prompts the driver to respond to the warning and in most cases avoid a collision. This function is part of the City Safety package, which is described in detail in Phase 3.
- Rear Collision Warning: Rearward facing radars detect if a rear impact is imminent and lights start flashing to warn the driver behind.
- Emergency Brake Lamps: If the driver presses hard on the brake pedal, the high-positioned brake lights starts to flash for a short while and then turns into permanent light. When the car has stopped the hazard warning lights are turned on to alert traffic behind.
- Trailer Stability Assist: Helps dampen the snaking motion that can occur when towing a trailer or caravan behind the car. Stabilization is obtained by braking one or more of the car's wheels and by decreasing engine torque.

## **Phase 3: Avoidance/Mitigation**

The accident is about to happen. If a car is approaching the car in front too fast or a cyclist or pedestrian is stepping out in the road, harsh braking could be essential. Some of Volvo's preventive safety functions can now step in and respond if the driver can no longer avoid the collision on his or her own.

However, it is important to emphasise that new preventive safety technologies do not relieve the driver of the responsibility of driving safely.

- City Safety: Umbrella name for all of Volvo Cars' auto brake functions. It detects, warns the driver and/or brakes automatically in certain situations for vehicles, cyclists and pedestrians in front of the car, both day and night. The latest world-first in the all-new XC90 is automatic braking in some situations if the driver turns in front of an oncoming car at an intersection.
- Rear Collision Warning: Rearward facing radars detect if a rear impact is imminent and safety belts are tightened in advance in order to retract the occupant in a good position. If the car is standing still, the brakes are activated to help reduce the impact on the occupants.
- Brake assist: If the driver reacts to a warning and starts braking, the system is programmed to automatically 'fill up' with more braking power if necessary.

#### **Phase 4: Crash**

When a collision is unavoidable it is important to help protect the occupants and reduce the risk of injuries. Volvo cars are designed to offer their occupants excellent collision protection. The car's advanced safety belts, belt pre-tensioners, airbags, inflatable curtains and strong safety cage with a high amount of hot-formed boron steel will help protect the occupants. All in all, these advanced safety technologies help make a Volvo one of the safest cars on the market.

- Reduction of impact speed. The collision is unavoidable – auto brake reduces the speed of impact.
- Safety cage: The body structure features a mix of different steel grades. It is made stronger by a more extensive use of hot-formed boron steel, which is the strongest type of steel presently used in the car body industry. The amount of hot-formed steel is around 40 per cent of the total body weight.
- Deformation zones: The safety cage is surrounded with advanced deformation zones designed for predetermined deformation and a high level of energy absorption.
- Lower cross-member that helps protect lower cars: The front suspension sub frame in the XC90 is supplemented with a lower cross-member positioned at the height of the crumple zones in a conventional car.
- Energy-absorbing front: The energy-absorbing front features advanced deformation zones designed for predetermined deformation and a high level of energy absorption.
- Three-point safety belt: In 1959 Volvo engineer Nils Bohlin innovated the three-point safety belt that has been a Volvo standard ever since. The safety belt is today found in all car models, regardless of manufacturer, the world over. We therefore say that there is a little bit of Volvo in every car.
- Safety belt pre-tensioners: In a collision, pyrotechnical pre-tensioners on all seven seats automatically tighten the belt across the body to reduce the occupant's movement and help provide maximum protection.
- Airbags: Volvo Cars has continuously refined the technology to improve protection in both frontal and side impacts. For instance, Volvo Cars was the first manufacturer in the world to offer a side airbag and an inflatable curtain. A knee airbag is deployed together with the driver and passenger airbags in the event of a frontal collision in order to further help protect the lower extremities.
- Side Impact Protection System: A well-balanced combination of high-strength steel of different grades in combination with side airbag and Inflatable Curtain interacts to help protect the occupants in case of a side impact.
- Safe Positioning: A world-first in the all-new XC90. In a run-off road scenario, the front safety belts are tightened electrically in advance to help retracting the occupants in position. To help prevent spine injuries, a collapsible, energy-absorbing material between the seat frame and the floor cushions the vertical forces that can occur when the car encounters a hard landing in the terrain.
- Second-generation Whiplash Protection System (WHIPS): In case of a rear-end collision the front seat backrest cushions and supports the occupant and dampens the incoming force.
- Brake pedal release: To help avoid leg injuries in a frontal collision, the pyrotechnical device moves the brake pedal down and away from the driver's foot.
- Laminated windows: Two sheets of glass with a laminated layer of plastic in-between. The laminated windscreen was a Volvo world-first already in 1944. The XC90 is also available with laminated side windows and panoramic glass roof.
- Integrated booster cushion: For the older child, the all-new XC90 features an integrated booster cushion in the centre position in the second row. This was another world first by Volvo, already in 1990.

- ISOFIX: Volvo Cars was one of the prime drivers behind the joint international project to develop the ISOFIX standard – an attachment system that makes it easier to fit a child seat correctly. The XC90 features two ISOfix seating positions as standard. In Europe they are certified according to the new standard “i-size”.

#### **Phase 5: Post-Crash**

Volvo Cars co-operate with the emergency services to optimise the rescue operation after a collision.

- Volvo On Call: After certain collisions, this in-car function automatically alerts an operator manning a round-the-clock customer service facility. The operator can immediately see the exact location of the car and can quickly direct assistance to the site and help the driver through the situation. The driver can also manually activate the service in an emergency by pressing an SOS button.
- Post impact braking: The vehicle is braked to a standstill to avoid multiple impact after a crash severe enough to activate passive restraints.

*Note: Feature names and functionality can vary from market to market.*

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#### **Volvo Car Group in 2013**

*For the 2013 financial year, Volvo Car Group recorded an operating profit of 1,919 MSEK (66 MSEK in 2012). Revenue over the period amounted to 122,245 MSEK (124,547 MSEK), while net income amounted to 960 MSEK (–542 MSEK). Global retail sales for the year amounted to 427,840 (421,951) cars, an increase of 1.4 per cent compared to 2012. The operating profit was the result of cost control and strong sales and was further tangible proof of Volvo Car Group’s progress in implementing its transformation plan. For the full year 2014, the company expects to stay in black figures and predicts to record a global sales increase of a good 5 per cent.*

#### **About Volvo Car Group**

*Volvo has been in operation since 1927. Today, Volvo Cars is one of the most well-known and respected car brands in the world with sales of 427,000 in 2013 in about 100 countries. Volvo Cars has been under the ownership of the Zhejiang Geely Holding (Geely Holding) of China since 2010. It formed part of the Swedish Volvo Group until 1999, when the company was bought by Ford Motor Company of the US. In 2010, Volvo Cars was acquired by Geely Holding.*

*As of December 2013, Volvo Cars had over 23,000 employees worldwide. Volvo Cars head office, product development, marketing and administration functions are mainly located in Gothenburg, Sweden. Volvo Cars head office for China is located in Shanghai. The company’s main car production plants are located in Gothenburg (Sweden), Ghent (Belgium) and Chengdu (China), while engines are manufactured in Skövde (Sweden) and Zhangjiakou (China)*

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**Descriptions and facts in this press material relate to Volvo Car Group’s international car range. Described features might be optional. Vehicle specifications may vary from one country to another and may be altered without prior notification.**