

The New Škoda Superb Passion in a New Dimension

With the second generation of the Škoda Superb sedan underpins its 2001 comeback to the segment of upper middle-market sedans tailored for high expectations of comfort, safety and performance. The Superb, first presented in 2008, is based on a new, modular construction kit that combines existing modules with new components and parts developed by Škoda.

1 Introduction

Škoda is one of the few car manufacturers worldwide that can make use of experience gained over more than a hundred years of developing and manufacturing cars. The new-generation Superb continues the Company's long tradition of manufacturing big limousines. Škoda was producing its first luxury limousine called Superb from 1934 to 1949, **Figure 1**.

In 2001 the company launched its flagship vehicle under the same name again. Over 130,000 models were bought since. With the second-generation Superb, Škoda Auto further enhances its image as well as proves its car development and manufacturing competences. Already the first-generation Superb was characterized by an elegant shape, firstclass quality and, in particular, generous roominess. The new Superb was meant to have these properties to an even greater extent than the first generation. That particularly applies to the comfortable interior (like the rear legroom), as well as the unchanged compact outer dimensions, Figure 2. The new Superb was also supposed to keep its excellent value for money proposition and offer customers smart details and innovative technological solutions. That is why the biggest Škoda comes with adaptive bi-xenon headlamps automatically reacting to ambient conditions and driving situations, a new-generation 7-speed

automatic transmission, a navigation system with a touch screen and a parking assistant system.

The absolute priority at the stage of developing the vehicle was the passengers' comfort. As a result, the new vehicle is fitted with comfortable seats with top-quality slide-rails on the sides and the surfaces of both the dashboard and the central console are soft. The chassis is designed to offer both comfort and precision, and extensive insulation measures have optimized the vehicle's acoustic parameters.

In addition to all that, the value of the new Superb was supposed to be enhanced by improving the boot access. The answer to this challenge is a new concept of a two-level lid (twindoor) that integrates two body versions in a single vehicle – this "twinback" vehicle combines the characteristics of a traditional "notchback" limousine with those of a family vehicle with a big boot lid.

In contrast to its predecessor, the new Superb is also available as a four-wheel drive which enhances the range of potential vehicle usages. The four-wheel drive vehicles come with the following engines:

- Gasoline

1.8 l /118 kW (manual transmission) 3.6 l/191 kW (twin-clutch, Direct Shift Gearbox, DSG)

- Diesel

2.0 l/125 kW (manual transmission)



Figure 1: Historic Škoda Superb luxury sedan of the first generation, built from 1934 to 1949.

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Figure 2: The vehicle dimensions match the spacious feeling of the new generation classic long-distance journey sedan

All gasoline engines come with the FSI technology (Fuel Stratified Injection) that helps decrease CO_2 emissions despite maintaining the vehicle's dynamic parameters, **Table**.

Most of the engines in the new Superb comply with the Euro 5 emission standard and all Diesel engines are fitted with Diesel particulate filters (DPF). The most powerful unit is the 3.6 l V6 with a twinclutch automatic transmission and a four-wheel drive. With 191 kW and the highest speed of 250 km/h, it is the most powerful and the fastest engine in Škoda Auto's history.

2 Body

To increase the rigidity of the body and decrease its weight at the same time the vehicle is fitted with a large number of high-strength heat-formed metal sheets in the floor and other impact-critical zones, **Figure 3**. It is for the first time that Škoda uses high-strength metal sheets in the side rail supports and the tunnel to provide superior leg cell protection in the event of front impact. High-speed crash tests have shown that the energy in the front part of the vehicle decreases and that the protrusions to the leg cell are reduced to a minimum. The quality of the safety cell is enhanced by using the strongest steel specifications in the A and B pillars and appropriate door structures.

As the crossbar of the front bumper is very rigid, the side rail structure remains undamaged in the event of small impact. As a result, the cost of repairs in case of small accidents is low and the accident insurance premium for the new Superb is very economic.

Table: Comparison of the smallest engine in the first and second generation Superb

	Old Superb (2,0 l /85 kW, 172 Nm)	New Superb (1,4 l /92 kW, 200 Nm)	Delta
Maximum speed	197 km/h	201 km/h	+4 km/h
Acceleration 0-100 km/h	11.6 s	10.5 s	- 1.1 s
Average consumption	8.4 l / 100 km	6.6 l / 100 km	-1.8 / 100 km
CO ₂	203 g / km	157 g / km	-46 g / km

3 Twin-function Boot Lid Twindoor

The idea of the innovative Twindoor concept was born when thinking about the target groups for the new Superb. On one hand there are limousine drivers. These customers, some of whom already drive the existing Superb, put great emphasis on the prestige associated with traditional limousines with a small boot lid. On the other hand, they see an advantage in that the interior is protected from wind and bad weather conditions even when the lid is open. However, this small lid has major drawbacks in terms of accessing the boot and loading big objects, a downside that does not go well with the image of the Škoda brand. And as the successful little sister Octavia is well received in the market thanks to its wide-open boot lid, it was decided to add the same benefit to the new Superb.

In theory, this asked for two body versions. That, however, would have been too expensive and would have forced the customers to make compromises. Hence the combination of the two concepts. Depending on what the drivers need, they open either the small boot lid or – by pushing an easy-to-use mechanism – the entire tailgate including the rear window swings open to provide optimum boot access.

3.1 The Boot Lid System

Using the boot lid design of the existing Octavia as a base, it was necessary to design a second line of hinges. The switching mechanism was to be fixed to the upper part of the lid, to the body or both parts of the lid together. One of the most important aspects right from the start was that this additional feature must not spoil the design. By placing one line of hinges for the big lid onto the upper end of the rear window and the hinges for the small lid on the lower end, it was possible to avoid additional seams in the exterior. Consequently nobody who sees the new Superb for the first time will think that the vehicle actually offers the functions of two regular limousines.

The top priority in designing the system was its robustness. It was clear that this innovation would only be successful if it was absolutely reliable under any circumstances. A special test programme was set up to monitor the sys-



Figure 3: High-strength steel sheet (purple) and hot-formed highest-strength steel sheet (red) are used in the body framework (large image: new Superb; small image: old Superb)

tem mainly in extreme temperatures, with strong body twists and other challenging situations. Having passed all these it is clear that the system will react properly and will not get damaged even if the Superb is parked at -30 °C with one wheel on a high curb, the boot overloaded and the boot lid pushed down forcefully.

Proceeding together with Edscha Bohemia, the system supplier, this patented mechanism was simplified several times during the development process. Short force transmission trajectories and small, robust levers make the new Twindoor system really rugged. The placement of the whole mechanism is smart, too – it is only visible that the boot lid is very special when the big boot lid is open and the two pits on the sides are in view. And regardless whether the big or the small lid gets closed, there is no need for concern about damaging luggage, because there are no mechanical parts or mounts protruding into the boot.

3.2 Electronic Control

The Twindoor system is controlled by what is called a Body Control Module, BCM. Applied across the Volkswagen Group, this control unit can be fitted to various vehicles. In the basic setting, the small boot lid opens by pushing a softtouch, micro-switch. As an alternative, the boot lid opens automatically after using a remote control, Figure 4. Another button in the boot lid has to be pushed to open the big lid thus activating the boot lid control motor mechanism. A short blink of the high-level third brake light is a signal that the lid motor's switching process has been completed. Now it is possible to open the big boot lid the usual way.

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4 Boot

With 565 liters, the new Superb has one of the largest boots in its class. Compared to the previous model, the luggage space has grown by 85 liters, and the volume can be increased to 1,670 liters in total by folding down the rear seats. The access is very good thanks to a really big boot lid. The length of the loading area with the rear seats folded down is an impressive 1.97 meters. A removable rear shelf that can be easily stored behind the rear seats is another smart detail of the Škoda flag-



Figure 4: Control of the Twindoor boot lid: At default setting the small lid will open once the softtouch micro switch is activated – when the remote control is used, the lid opens autonomously. To open the boot fully by pressing the middle softtouch button the second changeover button on the right in the boot lid needs to be pressed

ship. Besides its generous size, the boot includes some convenient details, such as two bag hooks and an optional double floor to create a straight loading area from the loading edge as far as the folded rear backrests.

5 Acoustics

The new Superb offers high acoustic comfort throughout the occupant compartment, Figure 5. The combination of compensating shafts in the four-cylinder engines (both gasoline and Diesel), optimised positioning of the engine unit and a rigid body ensures that the transfer of noise and vibrations to the occupant compartment (sound propagated through the respective materials) is minimised. To make the noise level in the occupant area as low as possible, the body has been fitted with a number of sealing and insulating elements whose high efficiency has been achieved by using premium absorption and insulation materials as well as components of sophisticated design. To avoid potential acoustic bridges, body cavities are fitted with expansion gaskets in the welding shop. As the body goes through the drying shop in the painting plant, the gaskets expand to fill the cavities.

The designers have also paid a lot of attention to reducing aerodynamic noise. Triple door seals and side window glass 4.85 mm thick have been used to this end. The components critical in terms of aerodynamic noise (door and window glass seals, wing mirrors, and others) are tested carefully in an aerodynamic tunnel for optimum shapes and design

6 Environmental Protection

Special attention has been paid to environmental protection in developing the new Superb, including, among others, possibilities of optimised life-end recyclability. Only high-quality materials are used that have excellent technical parameters, meet strict environmental regulations and are environmentally friendly. Recyclable materials are preferred. In cooperation with the suppliers recycled materials are used that have



Figure 5: It is a typical sedan quality that the interior noise level has again been reduced in comparison to the first generation model

parameters which are comparable to those of new materials. Manufacturing operations are compliant with relevant legislation regarding prohibited or limited use of hazardous substances (such as lead, cadmium, mercury, hexavalent chromium). Materials are marked consistently in compliance with relevant standards for easy and clear identification of material compositions. This identification makes it possible to quickly sort materials into groups and use them repeatedly. In addition to this environmental reuse concepts for selected component groups are being created. Economical use of valuable materials and minimisation of waste are achieved by optimising the respective weights and increasing the share of lightweight structural materials (non-ferrous metals, high-strength metal sheets, plastics, and others).

Detailed disassembly studies are conducted to review compliance with all legislated requirements and design adaptations of the Škoda vehicles in terms of recyclability. The Superb complies with Directive 2005/64/EC (type-approval and recyclability) and meets the material recycling quota set forth therein. All processes involving the application of the said Directive are supervised and certified by an independent accredited organisation.

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