Mercedes-Benz

Press Information

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The new Mercedes-Benz S-Class

Automotive luxury experienced in a completely new way

Contents

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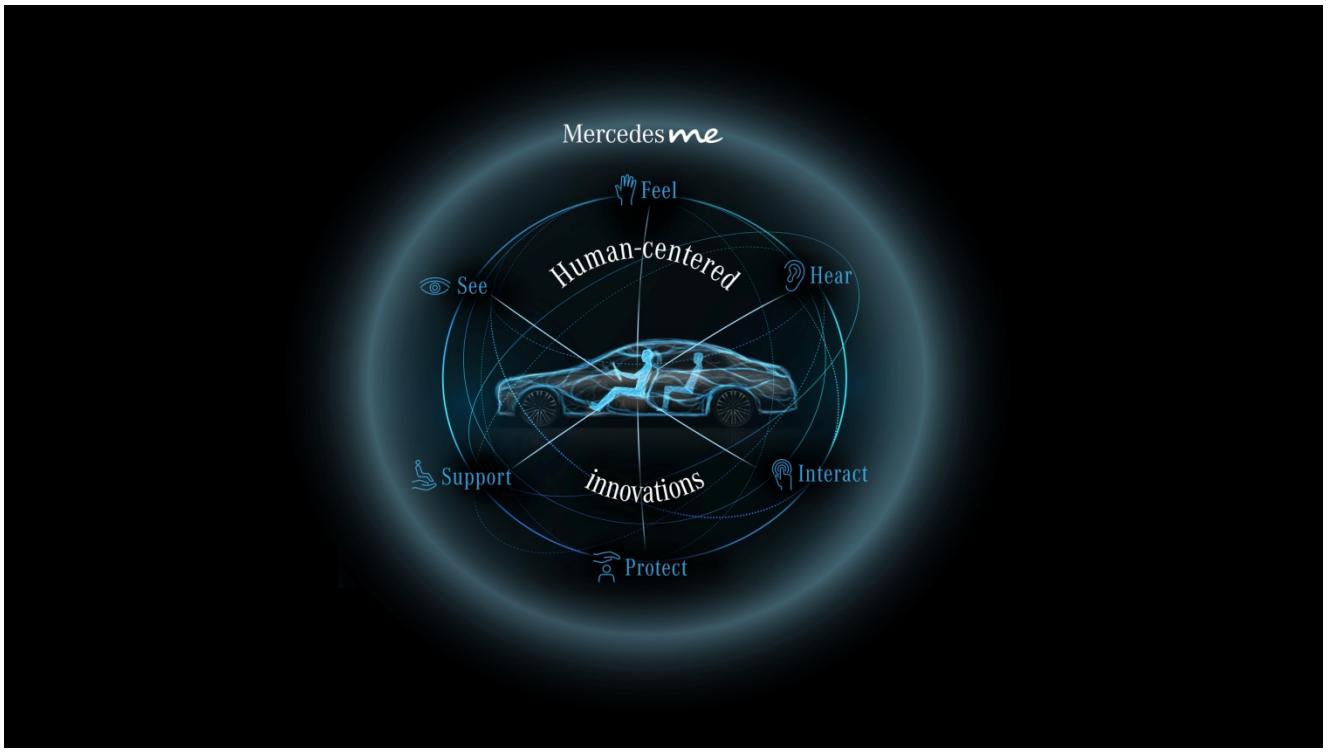
The descriptions and information in this press kit apply to the international model range of Mercedes-Benz. They may vary from country to country. The product features and equipment described may be optional equipment. The description of the features gives no indication of availability time. More information about the vehicles on offer, including the WLTP figures, can be found for each country at www.mercedes-benz.com

Added value for customers: the ten most important innovations

The S-Class stands for the fascination of Mercedes-Benz: legendary and traditional engineering expertise defines the luxury segment in the automobile industry. The new S-Class can be experienced with all the senses – seeing, feeling, hearing and smelling – while offering numerous innovations in the areas of driver assistance, protection and interaction. Mercedes-Benz is shaping the next generation of individual mobility for our times with innovations that place the focus on people. The new S-Class uses digitisation for a car that responds empathetically to the needs and wishes of its driver and passengers. Here is an overview as a mindmap:



The ten most important new features:

The second generation of **MBUX (Mercedes-Benz User Experience)** débuts in the new S-Class. Another milestone as the interface between the driver, passengers and vehicle: there are up to five screens on board, some with OLED technology. At the touch of a button, the new 3D driver display for the first time allows spatial perception of the scene with a real 3D effect thanks to eye-tracking. A similarly impressive feature is the very large head-up display with augmented reality content. When navigating, for example, animated turn-off arrows ("fishbones") are virtually and precisely projected onto the road lane.

Using cameras in the overhead control panel and learning algorithms, **MBUX Interior Assist** recognises and anticipates the wishes and intentions of the occupants. It does this by interpreting head direction, hand movements and body language, and responds with corresponding vehicle functions. For example, if the driver looks over his/her shoulder towards the rear window, Interior Assist automatically opens the sunblind.

The **active ambient lighting** (optional extra) supplements ambient lighting (standard equipment) with an additional layer of light. With around 250 LEDs it is integrated into the driving assistance systems, and is able to reinforce their warnings visually. In addition, feedback is possible when operating the climate control system or the 'Hey Mercedes' voice assistant, for instance.

The latest generation of the **Driving Assistance Package** has new and numerous improved functions. One example is the intelligent compliance with speed limits. The new assistance display in the driver display clearly shows the operating principle of the driving assistance systems as a full-screen view.

During severe frontal collisions, the **rear airbag** (optional extra for the S-Class with long wheelbase) can considerably reduce the loads acting on the head and neck area of the seat-belt-wearing occupants in the outer rear seats. The frontal airbag for the rear seat deploys particularly gently thanks to its innovative construction using a tubular structure.

Thanks to **rear-axle steering** (optional), the S-Class is as manoeuvrable as a compact car in the city. The steering angle at the rear axle is up to ten degrees. The turning circle is reduced by up to two metres.

More than 50 electronic components in the new S-Class can be updated with new software **over-the-air (OTA)**. These include the entire MBUX infotainment system, the driver display, the driving assistance systems and the MULTIBEAM LED and DIGITAL LIGHT lighting systems. This technology saves the customer time, as he/she does not need to visit a workshop for this purpose. Furthermore, the vehicle remains up to date throughout its lifecycle and is equipped for new features. The explicit consent of the user is always a precondition for OTA updates.

When a side impact with another vehicle threatens, the vehicle body can be raised by the E-ACTIVE BODY CONTROL suspension (optional) within a few tenths of a second. This is a new function of **PRE-SAFE® Impulse Side:** It can reduce the loads acting on the occupants because it directs the impact forces towards particularly resistant structures in the lower area of the vehicle.

It is expected that from the second half of 2021 the S-Class will be able to drive in conditionally automated mode with the new **DRIVE PILOT** (optional extra), in situations where traffic density is high or in tailbacks, on suitable motorway sections in Germany. By taking pressure off the driver, this allows them to undertake secondary activities such as browsing on the internet or dealing with emails in the In-Car Office, and so win extra time.

The revolutionary headlamp technology **DIGITAL LIGHT** (optional extra) allows completely new functions, e.g. the projection of marking aids or warning symbols onto the road ahead. In each headlamp, DIGITAL LIGHT has a light module with three extremely powerful LEDs with light that is refracted and directed by 1.3 million micro-mirrors. The resolution is therefore more than 2.6 million pixels per vehicle.

Interesting facts & figures

Sometimes numbers say more than a thousand words.

The turning circle is reduced by up to 2 metres with rear-axle steering compared to a model without it. The maximum steering angle is 10°.

27 languages are supported by "Hey Mercedes" with Natural Language Understanding (NLU).

31 loudspeakers and eight exciters are included in the Burmester® high-end 4D surround sound system.

Comfort on the front passenger seat is assisted by up to 19 motors (8 for adjustments, 4 for massage and 5 for ventilation, one for the lumbar support and one to move the monitor on the reverse).

10 different massage programmes are available in the new S-Class.

The plug-in hybrid variant of the S-Class will have an electric range of up to 100 kilometres.

The display area of the augmented reality head-up display corresponds to a monitor with a diagonal of 77 inches.

The boot capacity has increased by 20 litres to up to 550 litres compared to the previous model.

With a C_d figure from 0.22,[1] the S-Class is one of the world's most aerodynamic cars. Its drag coefficient is therefore lower than before, despite a larger frontal area 200 sq. cm.

Compared to the preceding model, elbow-room for the driver has increased by 38 millimetres and by up to 23 millimetres for rear passengers. Headroom in the rear has increased by up to 16 millimetres.

The resolution of DIGITAL LIGHT per vehicle is over 2.6 million pixels.

The computing power of MBUX (Mercedes-Benz User Experience) has increased by 50 percent compared to the system in the previous model. The memory bandwidth is 41,790 MB/s.

When a side impact threatens, the vehicle body can be raised by up to 8 centimetres by the E-ACTIVE BODY CONTROL suspension (optional) within a few tenths of a second. This is a new function of PRE-SAFE® Impulse Side:

[1] Best performance in SPORT+ driving mode

17 step motors control the temperature and air distribution in the THERMOTRONIC system. The 4-zone climate control THERMOTRONIC Rear even has 20 step motors. These electric motors operate the air flaps.

In the Active Ambient Lighting system, there is an LED in an optical fibre every 1.6 centimetres. There are around 250 in all.

The new OLED central display measures 239.06 mm x 218.8 mm, and has an active screen diagonal of 12.8 inches. The screen area is 64 percent larger than in the preceding model. The driver display measures 291.6 mm x 109.4 mm and has a diagonal of 12.3 inches.

The tubular structure of the innovative rear airbag is around 16 litres, while the total volume of the deployed bag is up to 70 litres.

The control units of E-ACTIVE BODY CONTROL analyse the driving situation and adjust the suspension 1000 times per second.

The designation "S-Class" was officially introduced with the 116 series in 1972.

More than 98 kg of components made from resource-conserving materials are used in the S-Class. The number of components containing recyclates is now 120 – more than twice as many as in the preceding model. Another 40 kg or so are made from renewable raw materials.

223 is the internal designation of the new model series.

The new tool used to micro-perforate the seats operates with 16,000 needles.

The loyalty rate for the S-Class is especially high. Some 80 percent of S-Class customers in Western Europe go on to choose another vehicle from Mercedes-Benz. In the US, more than 70 percent do so.

More than one third of all saloons of the last generation of the S-Class (model series 222; début 2013) went to China. S-Class customers in China are the youngest with an average age of 40 years. Around the world the S-Class Saloon is predominantly sold in the long wheelbase version: around 9 out of 10 customers opt for the long version of the S-Class Saloon. All in all, since the launch of the generation that is now in its runout phase, more than 500,000 S-Class Saloons have been sold.

Automotive luxury experienced in a completely new way

"The S-Class is the world's best-selling luxury saloon. With the latest generation we want to offer our customers innovation, safety, comfort and quality as never before," says Ola Källenius, Chairman of Daimler AG and Mercedes-Benz AG. "The new S-Class underpins our claim to produce the best automobile in the world", states Markus Schäfer, Member of the Board of Management of Daimler AG and Mercedes-Benz AG; responsible for Daimler Group Research and Mercedes-Benz Cars COO. "This is where covetable luxury meets the greatest possible safety and highest level of comfort." The new S-Class can be ordered in Germany from mid-September 2020, and will be in the dealerships in December 2020.

Modern luxury attains the next level in the interior of the S-Class. The designers have created a feel-good ambience with lounge character marked by elegance, high quality and lightness. The dashboard with its new architecture, modern surface design and ergonomic display arrangement is a particular highlight. But the feel-good aspect goes even deeper: With high ride quality and low noise levels as well as an extensive range of ENERGIZING Comfort programmes, the S-Class looks after the well-being of its passengers. They also stay fit thanks to the effective air filtering system, which signals its newly gained capability with the new name ENERGIZING Air Control.

The new Mercedes-Benz S-Class has become more intelligent in many areas, and the driving experience is at the next level. Digital innovations such as in MBUX (Mercedes-Benz User Experience) are joined by innovations that increase driving enjoyment while making driving even safer: among them are rear-axle steering with a large steering angle and safety innovations such as the rear airbag. As a new function of PRE-SAFE® Impulse Side, the active E-ACTIVE BODY CONTROL suspension can raise the vehicle body (on both sides) just before an impending side impact. Following systematic further development, the driving assistance systems are a further step towards autonomous driving. Thanks to improved environmental sensors, for example, the parking systems give the driver even better support when manoeuvring at low speed. The integration into MBUX means that the level of visualisation has now entered a whole new dimension.

For over 100 years: the luxury class as the embodiment of the Mercedes-Benz brand

The S-Class is the centrepiece of the brand, and stands for the fascination of Mercedes-Benz: legendary engineering expertise and a heritage of craftsmanship meet progressive digital innovation. The S-Class combines artificial intelligence with the experience gained from 135 years of automobile engineering. Around 70 years ago, Mercedes-Benz laid the foundations for this model series with the model 220. Since its market launch in 1951, more than 4 million S-Class Saloons have been delivered to customers around the world. The designation "S-Class" was officially introduced with the 116 series in 1972. In the last 10 years the S-Class Saloon has been particularly popular in China, the USA, South Korea and Germany. All in all, since the launch of the generation that is now in its runout phase, more than 500,000 S-Class Saloons have been sold.

The loyalty rate for this model series is especially high. For example, around 80% of customers in Western Europe who previously drove an S-Class once again opted for a Mercedes-Benz model. In the US, more than 70 percent do so. Around the world the S-Class Saloon is predominantly sold in the long wheelbase version: Around 9 out of 10 customers opt for the long version of the S-Class Saloon.

MBUX: a new dimension in personalisation and interaction

No other innovation in recent years has so radically changed the operation of a Mercedes-Benz as MBUX (Mercedes-Benz User Experience). The second generation of this learn-capable system now débuts in the new S-Class. The vehicle interior is even more digital and intelligent, as both the hardware and software have made great strides: brilliant displays on up to five large screens, in part with OLED technology, make the control of vehicle and comfort functions even easier. The possibilities for personalisation and intuitive operation have become far more extensive. This certainly applies in the rear, but also to the driver: For example, the new 3D driver display allows a spatial view at the touch of a button for the first time. A real three-dimensional effect is achieved without having to wear 3D glasses.

Two different head-up displays (HUDs) are available on request. The larger HUD provides augmented reality (AR) content. When navigating, for example, animated turn-off arrows ("fishbones") are virtually and precisely projected onto the road lane. For the assistance functions, information from e.g. Active Distance Assist is shown. The image appears virtually at a distance of 10 metres. the display area corresponds to a monitor with a 77-inch diagonal.

The voice assistant "Hey Mercedes" is even more learn- and dialogue-capable by activation of online services in the Mercedes me App. Moreover, certain actions can be performed even without the activation keyword "Hey Mercedes". These include accepting a telephone call. "Hey Mercedes" now also explains vehicle functions and answers general knowledge questions. In the S-Class the voice assistant can also be controlled from the rear.

Using cameras in the overhead control panel and learning algorithms, MBUX Interior Assist recognises and anticipates the wishes and intentions of the occupants. It does this by interpreting head direction, hand movements and body language, and responds with corresponding vehicle functions. As well as enhancing operating convenience, MBUX Interior Assist improves safety. Even before the journey begins, it notifies the driver if the camera has detected a child seat on the front passenger seat but seat belt is not fastened, for example.

With the MBUX Smart Home function, the S-Class now also becomes a control centre for the home, because the homes of many people are increasingly intelligent: mobile intelligence ensures maximum operating convenience from afar. WLAN and sensors make the home capable of communication: temperature and lighting, roller blinds and electrical appliances can be remotely monitored and controlled. Motion detectors and window contacts inform the user of welcome or unwelcome visitors.

Dimensional concept and interior design: generous ambience with a lounge-like nature

The S-Class has always been a place for comfortable travel and relaxed working. With the new generation, the interior has fully evolved into a "third place", a refuge between the home and workplace. Nearly all comfort-related dimensions of both variants, the S-Class with short and long wheelbase, have been improved in the front as well as on the rear seats. The sense of space is accordingly generous.

Here are the most important dimensions:

S-Class with …	… short wheelbase	Preceding model	Diff.	… long wheelbase	Preceding model	Diff.
Exterior dimensions (mm)						
Length	5179	5125	+54	5289	5255	+34
Width	1954/1921[1]	1899	+55/+22[1]	1954/1921[1]	1899	+55/+22[1]
Width incl. exterior mirrors	2109	2130	-21	2109	2130	-21
Height	1503	1493	+10	1503	1491	+12
Wheelbase	3106	3035	+71	3216	3165	+51
Track, front	1660	1624	+36	1660	1624	+36
Track, rear	1688	1637	+51	1688	1637	+51
Interior dimensions (mm)						
Max. headroom, front	1070	1069	+1	1070	1069	+1
Headroom, rear[2]	974/1003	958/995	+16/+8	974/1003	958/995	+16/+8
Legroom, front	1051	1051	0	1051	1051	0
Legroom, rear	1004	963	+41	1115	1091	+24
Elbow room, front	1592	1554	+38	1592	1554	+38
Elbow room, rear	1583	1560	+23	1572	1561	+11
Shoulder room, front	1516	1516	0	1516	1516	0
Shoulder room, rear	1469	1499	-30	1469	1501	-32
Boot capacity[3] VDA (l)	550	530	+20	550	530	+20

The desired harmony between digital and analogue luxury results in a revolutionary interior design, including associations with interior architecture and yacht design elements. The sculptured look of the dashboard, centre console and armrests appears to float above an expansive interior landscape. The systematic reduction in the number of controls underscores the minimalist appearance of the interior. A fine divide between the upper section of the dashboard and the large trim element structures the area and creates horizontal breadth.

Alongside up to five screens, the highlights include the large areas of trim in the dashboard and in the rear (in the Comfort Seat variant). These flow around the passengers and are a systematic further development of the wrap-around effect. One particularly attractive version of the trim is an open-pored wood veneer shot through with inlays of real aluminium that follow the contours. New design elements include the flat, four-square centre vents with horizontal nacelles. Two slim, vertical side vents on each side round off the ends of the dashboard.

The driver display and media display offer a comprehensive aesthetic experience The appearance of the screens can be individualised with a choice of four display styles (Discreet, Sporty, Exclusive, Classic) and three modes (Navigation, Assistance, Service)

Seats: Plenty of high-tech for outstanding long-distance comfort

The seats literally invite the occupants to sit down and relax. The flowing, three-dimensional layer design theme gives an impression of lightness. Different finishes give the seats different characters. For example, the flowing longitudinal piping of Lugano leather lends them a noble, avantgarde look, while the progressive diamond pattern of nappa leather and Exclusive nappa leather is more classical and expressive.

Up to 19 motors in the front seats make for comfortable seating – a number that indicates the complexity of the technology installed in the seats. Yet comfort is not enough: the seats also play a major part where safety is concerned.

[1] With grip door handles/with flush door handles
[2] With/without panoramic glass roof
[3] The boot capacity is reduced by optional equipment (e.g. refrigerator box, reclining seat) and in the plug-in hybrid.

And of course when it comes to luxurious wellbeing: all the seats available for the S-Class carry the seal of approval by the Healthy Seating campaign[1].

Ten different massage programmes are available in the new S-Class. These use the vibration motors, and can enhance the effect of a relaxing massage with warmth on the hot-stone principle. To this end, the seat heating is combined with the inflatable air chambers in the active multicontour seats. The air chambers are now closer to the seat surface, and are therefore even easier to control and feel.

Five different rear seat variants make it possible to configure the rear of the S-Class as a working or rest area. One new feature is the heatable additional cushion for the head restraint, which is available for the two electrically adjustable rear seats. The adjustment range and angle of the front passenger seat in the chauffeur configuration and the reclining seat behind it have been improved as well.

The ENERGIZING COMFORT programmes: Comfortable travel while staying fit

At the touch of a button or by voice command, the holistic "Fit & Healthy" approach of ENERGIZING COMFORT provides a tangible experience of the different comfort systems in the S-Class, and features programmes that bundle them into worlds of experience. At the same time, the system creates a suitable atmosphere in the interior – for example, invigorating in case of monotonous stretches of road or relaxing in case of an elevated stress level. The ENERGIZING COACH even suggests an appropriate vitalisation or wellness programme based on vehicle and trip data. It also factors the information about sleep quality and stress level into its intelligent algorithm if the driver has a suitable wearable.

Mercedes-Benz has fundamentally improved ENERGIZING comfort control in the new S-Class. Innovations such as a massage based on vibrating motors in the seat cushion and resonance transmission by the Burmester® high-end 4D surround sound system are integrated. This makes bass tones feelable. Direct reproduction of the sound resonance in the seats adds another level to the three-dimensional listening experience – 4D sound inspired by the acoustic massage. The perceived intensity of the sound can be individually adjusted for each seat. The music becomes even more emotional thanks to this feelable component. Two exciters are integrated into the backrest of each seat for this purpose.

Automated driving and driving assistance systems: even more support for the driver

The home office will soon be mobile – including for people behind the wheel. At least if they drive a vehicle bearing the three-pointed star: for Mercedes-Benz wants to bring about the technical realisation and safe operation of an S-Class driving in conditionally automated mode and to meet the exacting legal requirements for what is known as a Level 3 system[2]. It is expected that from the second half of 2021 the S-Class will be able to drive in conditionally automated mode with the new DRIVE PILOT, in situations where traffic density is high or in tailbacks, on suitable motorway sections in Germany. By taking pressure off the driver, this allows them to undertake secondary activities[3] such as browsing on the internet or dealing with emails in the In-Car Office, and so win extra time.

In the new S-Class, Mercedes-Benz comes another big step closer to its vision of accident-free driving. The driver is supported by numerous new or extended driving assistance systems. He/she thereby has a reduced workload in day-to-day situations, and is able to drive comfortably and safely. When danger threatens, the assistance systems are able to

[1] https://www.agr-ev.de/en/about-us/agr
[2] SAE Level 3: the automated driving function takes over certain driving tasks. However, a driver is still required. The driver must be ready to take control of the vehicle at all times when prompted to intervene by the vehicle.
[3] The legally permissible secondary activities of the driver depend on the relevant national traffic regulations.

respond to impending collisions as the situation demands. The operating principle of the systems is made visible by a new display concept in the driver display.

Thanks to improved environmental sensors, the parking systems give the driver even better support when manoeuvring at low speed. Operation is faster and more intuitive thanks to integration into MBUX. The optional rear-axle steering is integrated into the parking assistants, with the calculation of trajectories adapted accordingly. Emergency braking functions serve to protect other road users,too.

The driver can park and unpark the car via smartphone with remote parking assist. Operation has been simplified considerably. If specified with preinstallation for the INTELLIGENT PARK PILOT, the S-Class is prepared for Automated Valet Parking (AVP, SAE Level 4). In conjunction with the necessary optional equipment and the corresponding Connect service (depending on country), the new S-Class has the onboard technology to enter and leave multi-storey car parks equipped with an AVP infrastructure in highly automated mode and without a driver, provided that national legislation permits such operation.

Suspension systems: more manoeuvrable and dynamic with rear axle steering

Innovative suspension systems ensure an impressive travel experience in the new S-Class. Rear-axle steering (optional) with a steering angle of up to 10° improves manoeuvrability in urban areas to the level of a compact car. The turning circle is reduced by up to two metres.

The optional, fully active E-ACTIVE BODY CONTROL suspension on a 48 V basis offers a unique synthesis of comfort and agility, plus additional protection in the event of a lateral collision. The AIRMATIC air suspension with continuously adjustable damping ADS+ is standard equipment. Close networking between all the suspension and control systems ensures maximum stability and safety. Mercedes-Benz has now added a new function of PRE-SAFE® Impulse Side to its measures in the pre-accident phase: When a side impact threatens, the vehicle body can be raised by up to 80 millimetres by the E-ACTIVE BODY CONTROL suspension within a few tenths of a second. This reduces the loads on the door structures, as the door sill can absorb more of the energy thanks to its higher position. As a result, deformation of the passenger cell and the loads acting on the occupants can be reduced. Radar sensors are used to recognise a potential side crash.

Exterior design: perfect proportions for a classical appearance

With a short front overhang, a long wheelbase and a balanced rear overhang, the S-Class is designed as a classical saloon with perfect proportions. The wide track and flush-mounted wheels with modern designs give the vehicle a muscular look. The so-called character lines have been greatly reduced along the sides. Cleverly contoured surfaces with a sculptured look create special light effects. The front section impresses with its high-status radiator grille.

The headlamps characterise the front aspect of the car. They have the three-point daytime driving light signature that is typical of the S-Class, but this is flatter and somewhat smaller overall. The flush-mounted door handles (optional) are a completely new development. They are electrically extended when the driver approaches, or the outer surface of the door handle is stroked. Keyless access is provided by KEYLESS-GO.

The dynamic appearance of the car is continued at the rear. Thanks to precisely designed, highly detailed interior features and certain animated functions, the rear lights contribute to the impression of high quality. They make the new S-Class unmistakable in both their day and night design.

The lights: with innovative digital technology both inside and out

The optional DIGITAL LIGHT system enters series production for the first time at Mercedes-Benz. This makes completely new assistance functions possible[1]:

- Warning of recognised roadworks by projecting an excavator symbol onto the road surface
- Aiming a spotlight at pedestrians detected at the roadside as a warning
- Traffic lights, stop signs or no-entry signs are pointed out by projecting a warning symbol onto the road surface
- Assistance on narrow road lanes (roadworks) by projecting guidelines onto the road surface.

In each headlamp, DIGITAL LIGHT has a light module with three extremely powerful LEDs with light that is refracted and directed by 1.3 million micro-mirrors. The resolution is therefore more than 2.6 million pixels per vehicle. This allows highly precise light distribution. It makes Highbeam Assist over 100 times more precise then 84-pixel light when excluding oncoming traffic or road signs from the light beam. Light/shadow graduations and the light distribution of all the other adaptive light functions are also realised with considerably more precision, optimising illumination by e.g. fog light, motorway light or city light.

Thanks to LED technology, the new S-Class has also taken a leap forward in its interior lighting: Mercedes-Benz has now realised interactive interior lighting for the first time. The active ambient lighting (optional) supplements ambient lighting (standard equipment) with an additional layer of light. It is integrated into the driving assistance systems, and is able to reinforce alerts visually. This also makes corresponding feedback possible for the comfort systems. This applies to the climate control system or the 'Hey Mercedes' voice assistant.

Aerodynamics: extensive airflow simulations in the early development phase

With a C_d figure from 0.22,[2] the S-Class is one of the world's most aerodynamic cars, and especially so in the luxury saloon segment . Although the frontal area (A) of the new S-Class has increased slightly to 2.5 sq. m., the drag coefficient has been reduced even further compared to the preceding model. The product of C_d and A is 0.56 sq. m., which is 200 sq. cm less than for the previous model after its last facelift. Aerodynamic measures affecting the body, underbody and detachable parts allow a good showing in the wind tunnel and in real operation. Extensive airflow simulations were already carried out using high-performance computer clusters during an early development phase.

The S-Class has also achieved further improvements in aeroacoustics. The previous generation already excelled with a very high level of interior noise comfort. The new model is even quieter. The high rigidity of the bodyshell provides the basis for outstanding noise and vibration comfort, and this is enhanced with fine-tuning. For example, the apertures for the cable grommets in the firewall have double seals. To achieve an engine sound that is perceived as refined and unobtrusive in the interior, the firewall insulation has been extended into the side areas of the A-pillars and the floor area. Mercedes-Benz is also using acoustic foam in certain bodyshell sections for the first time.

[1] Owing to road traffic regulations, the availability and functions of these new assistance functions may be restricted on a market-specific basis.
[2] Best performance in SPORT+ driving mode

Powertrain: more electrification, more efficiency

Six-cylinder in-line petrol and diesel engines in various output classes are the first engine variants for the new S-Class. A V8 engine with an integrated starter-generator (ISG) and 48-volt onboard electrical system will be available soon after. A plug-in hybrid with an all-electric range of around 100 kilometres will follow in 2021.

The model range at the launch of the S-Class[3]

		S 450 4MATIC	**S 500 4MATIC**	**S 350 d**	**S 350 d 4MATIC**	**S 400 d 4MATIC**
Transmission	automatic	9G-TRONIC				
Engine (series, no. of cylinders, arrangement)		M 256, 6 in-line		OM 656, 6 in-line		
Displacement	cc	2999	2999	2925	2925	2925
Output	kW/hp	270/367	320/435	210/286	210/286	243/330
at	rpm	5500-6100	5900-6100	3400-4600	3400-4600	3600-4200
Add. output with EQ Boost	kW/hp	16/22	16/22	-	-	-
Peak torque	Nm	500	520	600	600	700
at	rpm	1600-4500	1800-5.500	1200-3200	1200-3200	1200-3200
Add. torque with EQ Boost	Nm	250	250	-	-	-
Combined fuel consumption[1] NEDC	l/100 km	8.4-7.8 (8.3-7.8)	8.4-7.8 (8.4-7.8)	6.7-6.2 (6.7-6.2)	6,9-6,4 (6,8-6,3)	7.0-6.5 6.9-6.4)
Combined CO_2 emissions[1] NEDC	g/km	191-178 (191-178)	192-179 (192-178)	176-163 (176-163)	183-168 (180-166)	186-171 (183-169)
Acceleration 0-100 km/h	s	5.1	4.9	6.4	6.2	5.4
Top speed	km/h	250	250	250	250	250

And here are the consumption values according to the WLTP[2 3]

		S 450 4MATIC	S 500 4MATIC	S 350 d	S 350 d 4MATIC	S 400 d 4MATIC
Combined fuel consumption[4] WLTP	l/100 km	9.5-7.8 (9.4-7.8)	9.5-8.0 (9.4-8.0)	7.7-6.4 (7.7-6.4)	8.0-6.6 (7.9-6.5)	8.0-6.7 (7.9-6.7)
Combined CO_2 emissions[4] WLTP	g/km	215-178 (213-177)	216-181 (214-181)	204-169 (201-168)	211-172 (209-171)	211-175 (209-175)

Vehicle body and accident protection: new frontal airbags for rear passengers

Intelligent bodyshell design and innovations in restraint systems confirm the leading role of the S-Class when it comes to passive safety. The new aluminium hybrid bodyshell with an aluminium content exceeding 50 percent meets numerous requirements: A high level of crash safety, lower weight and a highly rigid bodyshell ensure outstanding handling characteristics accompanied by excellent noise and vibration comfort.

[1] The stated figures are the measured "NEDC CO_2 figures" in accordance with Article 2 No. 1 Implementing Regulation (EU) 2017/1153. The fuel consumption figures were calculated based on these figures. A higher figure may apply as the basis for calculating the motor vehicle tax. Further information about the vehicles offered, including the WLTP figures, can be found for each country at www.mercedes-benz.com

[2] The following WLTP details on the stated vehicles are based on the consumption and CO_2 figures valid in the German market and are to be understood as indicative information. Depending on the chosen equipment, the specific vehicle can lie between the "WLTP Minimum CO_2/Consumption Value" and the "WLTP Maximum CO_2/Consumption Value". A higher figure may apply as the basis for calculating the motor vehicle tax.

[3] Values for the saloon with long wheelbase (V 223). Values for the model with short wheelbase (W 223), in brackets if different

[4] The stated figures were determined in accordance with the prescribed measuring method. They are "WLTP CO_2 figures" as per Article 2 No. 3 Implementing Regulation (EU) 2017/1153. The fuel consumption figures were calculated based on these figures.

In 2019, in the Experimental Safety Vehicle ESF 2019, Mercedes-Benz presented the ideas the company's safety specialists are working on. Among the more than 20 innovations were near-series developments such as the rear airbag, which now becomes available as optional equipment in the S-Class. The frontal airbag for the rear seat deploys particularly gently thanks to its innovative construction using a tubular structure. During severe frontal collisions, the rear airbag can considerably reduce the loads acting on the heads and necks of seat belt wearing occupants on the outer rear seats.

During a severe side impact, depending on the direction of impact, impact severity and front seat occupancy, the new centre airbag positions itself between the driver and front passenger seat, reducing the risk of their heads making contact. It is integrated into the driver's seatback in the middle of the vehicle.

Sustainability: environmentally compatible development

More than 98 kg of components made from resource-conserving materials are used in the S-Class. The number of components containing recyclates is now 120 – more than twice as many as in the preceding model. Another 40 kg or so are made from renewable raw materials. The process of environmentally compatible development with specific targets is firmly embedded in the overall development process. Environmental aspects are already taken into account in the conceptual phase.

A new, recycled thread is now used for the floor coverings. This thread - brandname ECONYL® - consists of regenerated Nylon. It is manufactured by recovering Nylon waste destined for the landfill, for example old fish nets and fabric remnants from mills and carpets. These are collected and transformed into a new thread having the same properties as nylon from new raw materials. The recycling process used to produce the thread saves CO_2 in comparison with new production. It also enables Mercedes-Benz to keep materials in circulation.

History: setting the standard for the luxury class for many decades

The Mercedes-Benz S-Class follows a long tradition that extends back to the beginnings of the Mercedes brand in the early 20th Century. Each model has decisively influenced the automotive engineering of its era. Well before the official designation S-Class, the models in the executive and luxury class were the mainstay of the Stuttgart-based company's portfolio and have always stood for luxury, comfort, safety and lifestyle. The continuous ancestry of the S-Class begins with the model 220 (W 187) of 1951. The designation "S-Class" was officially introduced with the 116 series in 1972.

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Mercedes-Benz AG at a glance
Mercedes-Benz AG is responsible for the global business of Mercedes-Benz Cars and Mercedes-Benz Vans with over 173,000 employees worldwide. Ola Källenius is Chairman of the Board of Management of Mercedes-Benz AG. The company focuses on the development, production and sales of passenger cars, vans and services. Furthermore, with its pioneering innovations, the company aspires to be a leader in the fields of connectivity, automated driving and

alternative powertrains. The product portfolio comprises the Mercedes-Benz brand with the sub-brands Mercedes-AMG, Mercedes-Maybach and Mercedes me, as well as the smart brand and the EQ product and technology brand for electric mobility. Mercedes-Benz AG is one of the largest manufacturers of premium passenger cars. In 2019, it sold nearly 2.4 million passenger cars and more than 438,000 vans. In its two business segments, Mercedes-Benz AG is continually expanding its worldwide production network with over 40 production sites on four continents, while gearing itself to meet the requirements of electric mobility. At the same time, the company is constructing its global battery production network on three continents. Sustainable practice plays a decisive role in both business segments. To the company, sustainability means creating lasting value for all stakeholders: customers, employees, investors, business partners and society as a whole. The basis for this is Daimler's sustainable business strategy. In this, the company takes responsibility for the economic, ecological and social effects of its business activities and looks at the entire value chain.

"The S-Class is an innovation driver and guarantee of success"

"The S-Class is the world's best-selling luxury saloon. With the latest generation we want to offer our customers innovation, safety, comfort and quality as never before. The future of Daimler will continue to be fascinating, sustainably climate-neutral and not least sustainably profitable. We concentrate on producing the most desirable cars in the world. This is what we promise, and it is the best way towards more profitable growth."
Ola Källenius, Chairman of Daimler AG and Mercedes-Benz AG

"For our customers, the S-Class has always stood for the ultimate in automotive luxury. This also encompasses innovations that make their life easier and safer, while also saving time. It is precisely in these areas where the new S-Class sets standards: for safety and comfort. We are confident that our customers will be excited by the intelligent beauty, the exceptional standards of safety and the intuitive operation and handling of the new S-Class. For there is one thing that our customers in the new S-Class will experience: the feeling of coming home."
Britta Seeger, member of the Daimler AG and Mercedes-Benz AG Boards of Management for Sales

"The new S-Class underpins our claim to produce the best automobile in the world." This is where covetable luxury meets the best possible safety and highest level of comfort. Safety for vehicle occupants and all other road users has always been one of our core values – and this is exactly what the S-Class embodies like no other vehicle in the world. This includes the latest generation of driving assistance systems, which help to avoid accidents and lessen the consequences of an accident. Our new head-up display with augmented reality also helps out. It makes driving even more safe in line with the motto 'hands on the steering wheel, eyes on the road'. And I personally love the impressive graphics in the head-up display."
Markus Schäfer, member of the Daimler AG and Mercedes-Benz AG Boards of Management for Daimler Group Research and Mercedes-Benz Cars COO

"Our overriding aim is to offer our customers maximum comfort, personalisation and convenience. MBUX goes into even more detail in the S-Class, and is even more intelligent and individual than ever before. The advantage for our customers: Thanks to further improved user-friendliness, they save time and receive a high added value. This is about much more than just displays and voice control. It makes MBUX the mainstay or even the mastermind of the vehicle."
Sajjad Khan, member of the Board of Management of Mercedes-Benz AG, CASE

"The S-Class is the centrepiece of our brand, and shows what modern luxury means for Mercedes-Benz: The combination of timeless design and intelligent automotive innovations that make the lives of our customers safer and easier, and also give them more peace and time to concern themselves with the things they consider really important. Our mission is to make the luxury segment in the automobile industry tangible well beyond the individual product features."
Bettina Fetzer, Head of Marketing Mercedes-Benz AG

"The essence of luxury is our aesthetic soul "Sensual Purity". In accordance with this philosophy we created an S-Class that combined the desire for beauty and the extraordinary. With our new S-Class, we created the most progressive S-Class ever since the luxury icon of the 20s."
Gorden Wagener, Chief Design Officer of Daimler Group

"The new S-Class does full justice to its innovative tradition. The new generation will once again set the pace in the automotive industry: The S-Class offers trailblazing innovations in all areas, from safety and comfort to efficiency. One common theme is systematic digitalisation, both during the development process and in the vehicle itself. Intelligent networking of different systems gives our customers tangible added value."

Prof. Dr. Uwe Ernstberger, Head of S-Class and C-Class model series product group

"With the new S-Class, we are proudly presenting the frontal airbag for passengers in the rear. The rear airbag with an innovative, tubular structure is unique. And as a result it deploys extremely gently. Naturally the passengers should continue to fasten their seat belts. Fastening the seat belt becomes even more intuitive thanks to the new, illuminated belt buckles."

Dr. Thomas W. Hellmuth, Head of Body and Safety

"The rear-axle steering makes the S-Class as manoeuvrable as a compact car. Even for the S-Class with a long wheelbase, the turning circle is reduced to under 11 metres. And thanks to Active Parking Assist with 360° camera, the vehicle can slip into tight parking spaces while recognising whether anybody is moving within that space. And when leaving a parking space, the S-Class keeps an eye out for crossing traffic."

Jürgen Weissinger, Chief Engineer S-Class

"With the new S-Class, Mercedes-Benz is taking another major step on the way to autonomous driving: With the DRIVE PILOT, the luxury saloon will be able to drive in conditionally automated mode at up to 60 km/h where traffic density is high or in tailbacks on suitable motorway sections. This relieves driver workload and allows secondary activities such as the in-car office. This Level 3 system will be introduced first in Germany."

Dr. Michael Hafner, Head of Automated Driving

"Our S-Class customers are highly discerning. With the new S-Class, we invite them to a completely new luxury experience. It is underpinned by our design philosophy 'Sensual Purity' and by our absolute commitment to quality and attention to detail. The result is a revolutionary experience in the interior as a combination of digital and analogue luxury."

Hartmut Sinkwitz, Head of Interior Design

"Tradition meets progression – for example, with regard to what many would regard as unexpectedly large wood surfaces. Special highlights include the trim elements in open-pore walnut wood: Their yacht design is characterised by form-following inlays of real aluminium. Exquisite materials and craftsmanship are also hallmarks of the new seat generation."

Belinda Günther, Head of Colour & Trim

"Luxury today is defined by comprehensive refinement. A luxurious driving experience depends on a host of factors and must appeal to all the senses. Traditionally, this also includes almost silent travel. However, this also includes making life easier for the customer, for example because intuitive operation and comprehensive connectivity save a great deal of time."

Dirk Fetzer, Head of S-Class product management

A new dimension in personalisation and interaction

No other innovation in recent years has so radically changed the operation of a Mercedes-Benz as MBUX (Mercedes-Benz User Experience). The second generation of this learn-capable system now débuts in the new S-Class. The vehicle interior is even more digital and intelligent, as both the hardware and software have made great strides: brilliant displays on up to five large screens, in part with OLED technology, make the control of vehicle and comfort functions even easier. The possibilities for personalisation and intuitive operation have become far more extensive. This certainly applies in the rear, but also to the driver: For example, the new 3D driver display allows a spatial view at the touch of a button for the first time. A real three-dimensional effect is achieved without having to wear 3D glasses.

The voice assistant "Hey Mercedes" is available on every seat, and even more learn and dialogue capable by activation of online services in the Mercedes me App. Moreover, certain actions can be performed even without the activation keyword "Hey Mercedes". These include accepting a telephone call. "Hey Mercedes" now also explains vehicle functions, and can e.g. help when asked how to connect a smartphone by Bluetooth or where the first-aid kit can be found. Thanks to the Smart Home function, domestic equipment and household appliances can also be networked with the vehicle, and voice-controlled remotely (see separate chapter for details). "Hey Mercedes" is now also able to recognise vehicle occupants by their voices. Once the individual characteristics of the voice have been learned, this can be used to access personal data and functions by activating a profile.

Two different head-up displays (HUDs) are available on request. The larger HUD provides augmented reality (AR) content. When navigating, for example, animated turn-off arrows ("fishbones") are virtually and precisely projected onto the road lane. For the assistance functions, information from e.g. Active Distance Assist is shown. The image appears virtually at a distance of 10 metres. This long distance allows a very large image: the display area corresponds to a monitor with a 77-inch diagonal. (see Glossary for details).

However, the unique feature of MBUX is its networking with a wide range of vehicle systems and sensor data. MBUX Interior Assist is able to recognise numerous operating requests. It recognises eye-direction, hand gestures and the body language of the occupants, so as to assist with automatic vehicle functions as the situation requires (see separate chapter for details).

Up to five large screens with intuitive operation

The visual highlight in the interior is the large **central display** in portrait format. It is ergonomically well positioned, as the screen is within easy touch and vision between the driver and front passenger. The portrait format also allows longer lists to be displayed. The central display is available in two versions, the dimensions are shown in the table at the end of the chapter. The larger central display features OLED technology.

OLED stands for Organic Light Emitting Diode. Compared to LCD screens, the advantages of this technology are a better black level, even stronger contrasts and a lower energy consumption (see Glossary for details).

The user interface of the central display is divided into different areas. At the top is the entry area where the user can access the profiles by touch control. The content in the application band in the middle of the screen

can be moved by horizontal and vertical swiping, depending on the chosen homescreen. Below this is the permanently displayed area for the climate controls.

On request the **driver display** is also available with a unique innovation: at the touch of a button, it is possible to switch to a 3D mode for a spatial view. A real three-dimensional effect is achieved with the help of eye-tracking, without having to wear 3D glasses. This optional version of the driver display has two integrated cameras. This stereo camera precisely determines the eye position of the user. Mercedes-Benz has developed appropriate distance adaptation methods for this, and the system has extremely low latency, i.e. there is almost no delay. The driver can therefore move freely. The image in the driver display is continuously adjusted. Cameras and face recognition are also used for a wide range of assistance and comfort functions. These include the new biometric authentication (see section on personalisation), drowsiness detection by ATTENTION ASSIST, settings for the exterior mirrors and (expectedly from the second half of 2021, initially in Germany) also monitoring of the head and eyelids during automated driving.

The appearance of the driver display and central display screens can be individualised with a choice of four display styles (Discreet, Sporty, Exclusive, Classic) and three modes (Navigation, Assistance, Service) For details see the chapter on interior design.

As a new element in the driver display, the **ECO display** (in the Classic style) takes the form of a ball rolling on a stylised road. The ECO display playfully helps the driver to adopt an efficient driving style.

Extensive range of infotainment functions for passengers in the rear

Take a quick look at the presentation on the way to the office, and discuss minor changes with your assistant by telephone conference? Or while away the long journey to your holiday home with the latest online films, while your brother next to you listens to his favourite audiobook? Whether managers or children – in an S-Class, and especially in the main markets of China and the USA, the boss often sits in the rear. Accordingly, Mercedes-Benz has systematically focussed on the rear for the new version of its flagship model. An example: passengers in the rear have the same extensive Infotainment and comfort features as the driver and front passenger, and can also watch films or surf the internet. They have access to up to three touchscreens and a variety of intuitive control options such as the voice control assistant "Hey Mercedes" - real multi-seat entertainment.

Screen content can be quickly and easily shared with other passengers Selection and amendment of navigation destinations is possible from the rear seats. **MBUX high-end rear entertainment** has two 11.6-inch displays with touch controls on the rear of the front seat backrests. The MBUX rear tablet is also optionally available. As a fully-fledged tablet, this can also be used outside the vehicle and (Android) apps can be installed. In the S-Class, the MBUX rear tablet is attached to a docking station located in the folding centre armrest or the business console, depending on the equipment level. This convenient remote control enables all the functions of the rear entertainment to be controlled from any seating position. As well as Mercedes-Benz Bluetooth headphones, a personal smartphone can be connected to the multi-seat entertainment by Wifi or HDMI.

Here are all five screens at a glance:

	Driver display		**Central display**		**Rear displays**	**MBUX rear tablet**
	Standard	Optional	Standard	Optional	Optional	Optional
Screen diagonal (inches)	12.3		11.9	12.8	11.6	7.0
Resolution (pixels)	2400 x 900		1624 x 1728	1888 x 1728	1920 x 1080	1280 x 800
Touch control	no	no	yes	yes	yes	yes
Other		3D representation, two integrated cameras for face recognition		OLED technology	additional connection of cabled headphones possible	USB charging in the docking station, WLAN and Bluetooth-capable

Music streaming: millions of songs to choose from

Mercedes-Benz has also integrated the music streaming service Spotify and TuneIn internet radio into the new S-Class. TIDAL and Amazon Music continue to be available as well. MBUX allows access to the usual songs and playlists as on a smartphone or other mobile device. Operation is intuitive, using the MBUX voice assistant "Hey Mercedes".

Personalisation is even more easy and convenient

A personal profile can be created directly in the S-Class and synchronised with the existing profile data of the Mercedes me account. By scanning a QR code with the Mercedes App, the vehicle is automatically connected to the Mercedes me account

Personal preferences such as a favourite radio station and preselected settings can be transferred to any seat via the personal Mercedes me profile. Up to seven different profiles with around 800 parameters are possible in the vehicle. The ambient lighting can be individually set by remote configuration, e.g. from home. As the profiles are now stored in the Cloud as part of Mercedes me, they can also be used in other Mercedes-Benz vehicles with the new MBUX generation.

Alongside the classic entry of a PIN, a new authentication method ensures a high level of security. Fingerprint, face and voice recognition are combined. This allows access to individual settings or verification of digital payment processes from the vehicle.

Always state of the art: over-the-air updates

More than 50 electronic components in the new S-Class can be updated with new software over-the-air (OTA), i.e. via a mobile data connection. These include the entire MBUX infotainment system, the driver display, the driving assistance systems and the MULTIBEAM LED and DIGITAL LIGHT lighting systems. This technology saves the customer time, as he/she does not need to visit a workshop for this purpose. Furthermore, the vehicle remains up to date throughout its lifecycle and is even equipped for new features that have not even been developed yet. The explicit consent of the user is always a precondition for OTA updates.

Since as early as 2016, Mercedes me connect has made it possible to update the communication module and the navigation map data over-the-air. In 2018, this was followed by the update capability for the MBUX infotainment system. In 2019 alone, Mercedes-Benz carried out almost 3.7 million free software updates around the world in this way. Since 2016 there have been 6.3 million OTA updates to navigation maps.

"Hey Mercedes, is everything ok back home?"

The homes of many people are increasingly intelligent. Under the generic term "smart home", WLAN and sensors make the home capable of communication: temperature and lighting, roller blinds and electrical appliances can be remotely monitored and controlled. Motion detectors and window contacts inform the user of welcome or unwelcome visitors. With the MBUX Smart Home function, the S-Class now also becomes a control centre for the home: mobile intelligence ensures maximum operating convenience from afar.

"Hey Mercedes, is there anybody in my home right now?" "I've had a look. The last movement detected was in the kitchen one hour ago." This is how future dialogues between the driver or passenger and the user's smart home might proceed using the MBUX (Mercedes-Benz User Experience) voice assistant. On market launch the MBUX Smart Home function will support numerous devices offered by important smart home suppliers. Right from the start, Hey Mercedes understands queries and commands in four languages (German, Chinese, American and British English). These can be made for lamps, sockets, thermostats, shutters and blinds, motion detectors and door or window contacts, as well as temperature sensors. So the system can also answer this question: "Did I remember to turn the heating down?" Depending on the response and the thermostats installed in the home, it is possible to change the setting: "Set the temperature all around the house to 18 degrees!"

Smart Home integration into MBUX can therefore help to reduce energy consumption. It also makes for comfort, because the heating can also be remotely turned up again in good time. Security and the sense of safety are increased because the motion detector can be directly interrogated. And the convenience of being able to turn off the lights after a hasty departure is not without its advantages either.

Smart Home accounts are linked to the customer's individual Mercedes me profile. Linking smart home appliances to MBUX is easy, and is initiated using a QR code in the central display of the S-Class. The QR code is scanned with a smartphone. Alternatively it can be done with the Mercedes me App. The sophisticated authentication mechanisms of the new S-Class ensure that only authorised customers obtain access to Smart Home appliances. Appliances by different providers can be connected and interrogated at the same time. A concerned "Hey Mercedes, is everything ok at home?" therefore causes all the installed equipment to be interrogated, prioritised by movement, windows/doors open, lights and heating. The answer might be: "All the windows are closed, and the light is still on in the bedroom."

Though light can of course be very desirable: "Hey Mercedes, please switch the light on in the garage. I'll be home in ten minutes." "Will do, I'm switching the light on in the garage."

Always at your service

Using cameras in the overhead control panel and learning algorithms, MBUX Interior Assist recognises numerous wishes. It does this by interpreting head direction, hand movements and body language, and responds with corresponding vehicle functions. As well as enhancing operating convenience, MBUX Interior Assist improves safety. For example, it checks whether a child seat detected on the front passenger seat is correctly attached.

MBUX Interior Assistant monitors the driver and front passenger via two laser cameras in the overhead control unit. Any movements of the hands, head or upper body are interpreted in relation to the specific context or at the explicit request of the occupants. The image data from the cameras are directly converted into metadata. The data are processed within the vehicle itself, and not stored or transmitted elsewhere.

Here is an overview of the functions (some require optional equipment):

Interaction levels	**Categories**		
	Safety	Comfort	Infotainment
Intelligent: The system automatically recognises occupants and objects, and activates functions.	Even before driving off, it notifies the driver if the camera has detected a child seat on the front passenger seat but the seat belt is not fastened, for example. A corresponding notification appears in the central display. The exit warning function now activates a warning as soon as the driver or front passenger reaches for the door. This is because the MBUX Interior Assistant recognises when a hand approaches the door handle.	MBUX Interior Assist recognises the size of the driver, and can preset the seat adjustments if required. A profile must be created for this purpose.	
Reactive: The system recognises the natural body language of an occupant, and automatically carries out functions according to the situation.	MBUX Interior Assist assesses the alertness of the driver, and primes ATTENTION ASSIST to give a warning of microsleep.	If the driver reaches over to the (unoccupied) front passenger seat in the dark, a searchlight is switched on. Withdrawing the hand switches the light off again.	Moving a hand towards the touchscreen allows functions to be controlled, interactive elements to be enlarged and menus to be displayed.
		If an exterior mirror is to be adjusted, the mirror in question can be automatically selected using Interior Assist. A head movement to the right or left is sufficient for this. The relevant exterior mirror is then adjusted using the key in the door control panel.	
		If the driver looks over his/her shoulder towards the rear window, Interior Assist automatically opens the sunblind. This affords a clear view when reversing.	

Touch-free: The occupant actively requests a function with a hand movement or gesture.		If the driver or front passenger briefly moves a hand up or down below the rear-view mirror, the reading light is switched on or off.	Individual links are possible with the help of a favourites gesture. For example a navigation destination, radio station or a massage programme for a seat.
		The driver and front passenger can open the roller sunblind and sliding roof by holding their outstretched hand in front of the rear-view mirror and moving it to the rear below the overhead control panel. The first such movement opens the roller sunblind, a second the sliding roof as well. They are closed by a forward movement.	

Listens even more carefully, and understands all the passengers

The voice assistant "Hey Mercedes" is even more learn- and dialogue-capable by activation of online services in the Mercedes me App. Moreover, certain actions can be performed even without the activation keyword "Hey Mercedes". These include accepting a telephone call. "Hey Mercedes" now also explains vehicle functions. In the S-Class the voice assistant can also be controlled from the rear.

"Hey Mercedes" now supports 27 languages with natural language understanding (NLU). This makes natural interaction on a wide range of topics possible. As a new feature, a completed dialogue can be continued with further commands. Several consecutive instructions can be issued, for example activation of the seat heating and starting the route guidance in the navigation system.

The activation keyword "Hey Mercedes" is no longer necessary for certain applications. An incoming call can be taken directly with "Accept call", for example.

In the S-Class, "Hey Mercedes" can also be controlled from the rear. Several microphones help to tell the system which seat the voice is coming from. The active ambient lighting flashes at this position and identifies the current speaker.

"Hey Mercedes" now also explains vehicle functions, and can e.g. help when asked how to connect a smartphone by Bluetooth or where the first-aid kit can be found. The new Chit-Chat and knowledge domain provides the right answers to many questions, and even questions about buildings in the immediate vicinity, animal noises or general knowledge are answered.

"Hey Mercedes" is now also able to recognise vehicle occupants by their voices. Once the individual characteristics of the voice have been learned, this can be used to activate a profile. This makes personal data and functions accessible to the user. Voice recognition is in real time, using a special authentication process.

The next steps on the way to accident-free driving

In the new S-Class, Mercedes-Benz comes another big step closer to its vision of accident-free driving. The driver is supported by numerous new or extended driving assistance systems. He/she thereby has a reduced workload in day-to-day situations, and is able to drive comfortably and safely. When danger threatens, the assistance systems are able to respond to impending collisions as the situation demands. The assistants are also ready to help when parking – see chapter "The parking assistants". The operating principle of the systems is made visible by a new display concept in the driver display.

In day-to-day driving, assistance systems relieve driver stress as the situation requires, by adapting the vehicle speed, controlling distance, steering and lane-changing. This enables the driver to stay alert for longer, and reach the destination more safely and comfortably. When danger threatens, i.e. if there is a risk of an accident owing to driver inattention or distraction, driving assistance systems can respond according to the situation and mitigate the severity of possible collisions, or even avoid them.

The S-Class has a new generation of steering wheels with capacitive hands-off recognition. There is a two-zone sensor pad in the steering wheel rim. The sensors on the front and reverse sides of the rim register whether the driver's hands are on the wheel. No steering movement is now necessary to inform the driving assistance systems that the driver has control.

The new assistance display in the driver display clearly shows the operating principle of the driving assistance systems as a full-screen view. This is where the driver of an S-Class can see an abstract view of the car, driving lanes, lane markings and other road users such as cars, trucks and bikes. The system status and operation of the assistants are visualised in this depiction of the surroundings. The new, animated assistance display is based on a 3D scene generated in real time. This dynamic, high-quality representation makes the operation of the driving assistance systems transparent as a tangible augmented reality experience.

The vehicle needs eyes and ears to perform all these tasks – its sensors. The following are on board the new S-Class with the standard Driving Assistance package:

- Front multi-mode radar: 2 radar sensors with an aperture angle of 130°
- Front long-range radar: 1 radar sensor with an aperture angle of 90° and 9°
- Front stereo multi-purpose camera: 1 camera with an aperture angle of 70°
- Rear multi-mode radar: 2 radar sensors with an aperture angle of 130°
- 360° camera (close range): 4 cameras with aperture angle of 180°
- Ultrasonic (close range): 12 sensors with an aperture angle of 120°

The basic functions of the systems in the Driving Assistance package can be found here. The following are the key new features of the systems in the S-Class:

Active Distance Assist DISTRONIC

On all types of roads – motorways, country roads or in town – this intelligent system can automatically maintain a preset distance from vehicles ahead. New features:

- collision-preventing response to stationary road users at up to 130 km/h (previously 60 km/h)
- selection of DISTRONIC dynamics in MBUX, independently of DYNAMIC SELECT

Active Steering Assist

This helps the driver to follow the driving lane at speeds up to 210 km/h. New features:

- additional lane recognition by a 360° camera
- significantly improved availability and performance on bends on country roads
- improved lane centering on motorways
- situation-specific off-centred driving (e.g. forming an emergency lane, but also following the road edge on country roads with no centre marking)

Traffic Sign Assist

In addition to conventionally signposted speed limits, this recognises overhead gantries and signs at roadworks. New features:

- stop sign warning function – warning when about to pass a stop sign
- red traffic light warning function - warning when about to cross a red traffic light.

Active Lane Keeping Assist

In a speed range of 60 to 250 km/h, Active Lane Keeping Assist uses a camera to detect when road markings or road edges are crossed, helping the driver to avoid leaving the driving lane unintentionally. The system also intervenes if there is a danger of collision with recognised road users in the adjacent lane, e.g. with overtaking or oncoming vehicles. New features:

- reaction to road edges, e.g. a patch of turf
- particularly intuitive steering intervention
- adjustment of sensitivity via a menu (early, medium, late)
- the danger warning is reinforced by the active ambient lighting and the augmented reality head-up display

Active Lane Changing Assist

Active Lane Changing Assist cooperatively assists the driver of the new S-Class when moving to an adjacent lane. A lane-change to the right or left is only assisted if the sensors detect that the adjacent lane is separated from the present lane by an interrupted lane marking, and no other vehicles are recognised in the relevant danger zone. New features:

- the longer search phase (15 s instead of 10 s, depending on country) in which the lane-change can take place, and
- higher lateral dynamics (depending on country)

Active Emergency Stop Assist

Active Emergency Stop Assist brakes the vehicle to a standstill in its own lane if it recognises that the driver is no longer responding to the traffic situation for a longer period. In the new S-Class this still works if Active Distance Assist DISTRONIC with Steering Assist is not switched on. Other new features:

- belt tensioning and braking impulse as a final signal of impending braking action
- optional single lane change (at 80 km/h, no obstacles in adjacent lane)

ATTENTION ASSIST

This system included as standard is able to recognise typical signs of drowsiness and driver inattention, and displays a warning message prompting him/her to take a break. The additional microsleep warning is a new feature. This is based on monitoring of the driver's eyelid movements by a camera in the driver display (only in conjunction with certain optional equipment). The microsleep warning function is already active from a speed of 20 km/h.

Active Brake Assist with cross-traffic function

Active Brake Assist uses the onboard sensors to register whether there is a risk of collision with vehicles travelling ahead, crossing or oncoming. The system can give the driver a visual and acoustic warning if a collision appears imminent. If the driver's braking response is too weak, the system can also assist by increasing the brake pressure as the situation demands, and also initiate autonomous emergency braking if the driver fails to respond. New features:

- the cornering function (e.g. crossing pedestrians when turning off)
- extension of the cross-traffic function to long-distance routes (up to 120 km/h instead of 72 km/h)
- warning and braking if there is oncoming traffic

Active Blind Spot Assist and exit warning function

Active Blind Spot Assist can give a visual warning - and if the indicators are operated also an audible warning - of potential lateral collisions in a speed range from around 10 to 200 km/h. If the driver ignores the warnings and still initiates a lane-change, the system can take corrective action by one-sided braking intervention at the last moment if the speed exceeds 30 km/h. When the vehicle is stationary, the exit warning function can warn against exiting because a vehicle (also bicycles) is passing within the critical area. This function is available when the vehicle is stationary and for up to 3 minutes after the ignition has been switched off. New features:

- reinforcement of the warning by the active ambient lighting (also the exit warning)
- thanks to the cameras of MBUX Interior Assist, a danger warning can already be given if the driver or front passenger merely move a hand towards the door handle.

Evasive Steering Assist

Evasive Steering Assist can assist the driver when seeking to avoid another road user recognised by the system in a critical situation. In the new S-Class, the system not only recognises stationary and crossing pedestrians, but also pedestrians and vehicles, including cyclists, travelling longitudinally. The speed range has been increased to 108 km/h (instead of 72 km/h), and assistance is also given on long-distance routes.

PRE-SAFE® Impulse Side

Together with the familiar PRE-SAFE® protection concepts for frontal and rear collisions, PRE-SAFE® Impulse Side forms a kind of virtual crumple zone that extends all around the vehicle.

As only a limited crumple zone is available in the case of a side impact, and even before the crash, PRE-SAFE® Impulse Side can move the affected driver or front passenger away from the acute danger zone as soon as the system detects that a side collision is immediately imminent. For this purpose, air chambers in the side bolsters of the front seat backrest are inflated in fractions of a second. In addition, when a side impact with another vehicle threatens, the vehicle body can be raised by the E-ACTIVE BODY CONTROL suspension (optional) within a few tenths of a second. This directs the impact forces towards particularly resistant structures in the lower area of the vehicle

Animated ambient lighting with intelligent comfort and safety functions

Thanks to LED technology, the new S-Class has also taken a leap forward in its interior lighting: Mercedes-Benz has now realised interactive interior lighting for the first time. The active ambient lighting (optional) supplements ambient lighting (standard equipment) with an additional layer of light. It is integrated into the driving assistance systems, and is able to reinforce alerts visually. This also makes corresponding feedback possible for the comfort systems. This applies to the climate control system or the 'Hey Mercedes' voice assistant.

The number of LEDs has increased from the previous 40 to around 250 (247 in the W 223, 263 in the V 223). The optical fibres of the active ambient lighting are concealed behind a black panel facing, and are not visible when switched off. An LED is positioned inside every 1.6 centimetres. A strip of light appears when the active ambient lighting is switched on.

The individual LEDs are actuated by CAN-BUS in real time. This allows flowing light effects, a soft transition within the light band and now also colour transitions as well as individual colours. When entering the vehicle, the ambient light band is animated in finely granular form as a welcome feature.

The result is not only a unique appearance by day or night. There are also new, intelligent functions. Integrated into the driving assistance systems, active ambient lighting can visually reinforce warnings. For example, Active Blind Spot Assist warns of an impending collision with a red light animation. Also with the exit warning function of Active Blind Spot Assist, a red visual warning is given in the area of the door where the risk of colliding with traffic approaching from behind, including cyclists, has been identified if exiting the vehicle.

Corresponding feedback is also possible when operating comfort systems. When the temperature is set to cooler or warmer in individual zones, a visible impulse is triggered. When the voice assist "Hey Mercedes" is active, the corresponding seating position is animated when voice input is expected. Furthermore, the ambient lighting and active ambient lighting are integrated into ENERGIZING COMFORT (optional equipment, see relevant chapter). Depending on the mode, the interior is bathed in corresponding colour scenarios.

Easy entry into confined parking spaces and narrow entrances

Thanks to improved environmental sensors, the parking systems give the driver even better support when manoeuvring at low speed. Operation is faster and more intuitive thanks to integration into MBUX. The optional rear-axle steering is integrated into the parking assistants, with the calculation of trajectories adapted accordingly. Emergency braking functions primarily serve to protect other road users. The driver can park and unpark the car via smartphone with remote parking assist. Operation has been simplified considerably. If specified with preinstallation for the INTELLIGENT PARK PILOT, the S-Class is prepared for Automated Valet Parking (AVP, SAE Level 4). In conjunction with the necessary optional equipment and the corresponding Connect service (depending on country), the new S-Class has the onboard technology to enter and leave multi-storey car parks equipped with an AVP infrastructure in highly automated mode and without a driver, provided that national legislation permits such operation.

As standard, the S-Class is equipped with Active Parking Assist with a reversing camera, and on request this can be combined with a 360° camera. In the S-Class, all the information from all sensors and cameras is fusioned. This enables more parking spaces to be recognised and offered. Parking spaces defined by lines (not by vehicles) can also be used for automated parking for the first time.

Here are the differences between the two parking packages in detail:

	Active Parking Assist in the …	
	… Parking package with reversing camera (standard)	**… Parking package with 360° camera (optional equipment)**
Sensors	• 12 ultrasonic sensors at the front and rear • Reversing camera in the handle of the boot lid	
		Three further cameras (in the exterior mirrors and at the front)
Parking and unparking[1]	• Forwards and backwards in end-on parking spaces • Reverse parking and forward unparking in parallel parking spaces • At the left and right side of the road • Recognition of spaces defined by lines (and not by fixed obstacles) • Automatic control of acceleration, steering, braking, gear changes, indicators • Drive Away Assist: speed limitation if there is a risk of collision after gear-changing	
Collision protection (audible and visual warnings, poss. braking intervention)	• Passive side protection • Rear Cross Traffic Alert • AEB Rear (Autonomous Emergency Braking) – braking for pedestrians when reversing • All-round protection for pedestrians (if Active Parking Assist is active)	
Visualisation in the driver display	• Active search for parking spaces and • indication of recognised parking spaces (small arrow on the P symbol)	
Visualisation in the central display	• Recognised parking spaces in the immediate vicinity • Quick-Park function: Driving past and pressing an MBUX key is enough to start the parking procedure • Parking options (selection by touch control) • Side protection • New 3D display • Full-HD camera image • Live image with dynamic guidelines • During slow manoeuvring, the camera pivots to the direction of travel	

[1] Assisted unparking only if assisted parking was previously used

		• The four individual camera images are combined into a three-dimensional image of the vehicle's surroundings. • Seven different views and zooming are possible • Automatic camera (changes the perspective according to situation) • Model vehicle is rendered in real time o Shows status such as indicating or braking o Visualises obstructions in the field of vision, e.g. open doors

Parking package with remote parking functions: use a smartphone to park and unpark conveniently

Remote Parking Assist allows the driver to control a parking procedure by smartphone and the Remote Parking app in Mercedes me connect, while remaining outside but in close proximity to the vehicle. This is more comfortable when entering and exiting the vehicle in tight parking spaces, and avoids damage when opening the doors. To use the system, the S-Class must feature "Preinstallation for Remote Parking Assist" and the service must be activated in Mercedes me.

Remote Parking Assist parks the vehicle on request if the driver has selected a corresponding parking scenario via the central display in the S-Class or using the app on the smartphone. The S-Class is also able to park and unpark itself in a straight line for the last few metres, e.g. in garage entrances or end-on spaces. The driver-monitored parking procedure continues automated as long as the driver presses the touch surface on the smartphone while tilting it by 90°. If the control surface is no longer pressed or the smartphone is no longer tilted, the vehicle is automatically braked to a stop.

It is not only this which has considerably simplified operation compared to the previous Remote Parking generation. Compatibility with different phones has also been increased. While the vehicle and smartphone previously communicated via Bluetooth, a WiFi connection in the 2.4 GHz band is now also available. Initially linking the vehicle and smartphone has also been improved. A QR code can now be used for faster, more convenient authorisation.

When remote parking, the driver continues to have full responsibility for the vehicle and its control during the entire parking procedure. He/she can interrupt or cancel the parking procedure with the smartphone or the vehicle key at any time, and take back control.

INTELLIGENT PARKING PILOT: highly automated driverless parking in suitable multi-storey car parks

Mercedes-Benz goes another step further when it comes to parking: If specified with preinstallation for the INTELLIGENT PARKING PILOT, the S-Class is prepared for highly automated driverless parking (Automated Valet Parking, AVP, SAE Level 4). In conjunction with the necessary optional equipment and the corresponding Connect service (depending on country), the new S-Class has the onboard technology to enter and leave multi-storey car parks equipped with an AVP infrastructure in highly automated mode and without a driver, provided that national legislation permits such operation.

The vision: The driver securely parks the vehicle in a designated drop-off area of the multi-storey car park, and after all passengers have left he starts the parking procedure using the smartphone app. The sensor system in the car park checks whether a suitable space is available. If so, the AVP infrastructure confirms the handover of the vehicle for the driver in the app, and he/she can leave the S-Class and depart. The vehicle is then started automatically, and automatically drives to its parking space with the help of the infrastructure installed in the car park. On returning, the driver can let the S-Class drive to a designated pick-up area by smartphone command.

Conditionally automated driving: the S-Class leads the field

The home office will soon be mobile – including for people behind the wheel. At least if they drive a vehicle bearing the three-pointed star: for Mercedes-Benz is determined to enable, in technical terms, the safe operation of an S-Class driving in conditionally automated mode and to meet the exacting legal requirements for what is known as a Level 3 system[1]. It is expected that from the second half of 2021 the S-Class will be able to drive in conditionally automated mode with the new DRIVE PILOT, in situations where traffic density is high or in tailbacks, on suitable motorway sections in Germany. By taking pressure off the driver, this allows them to undertake secondary activities[2] such as browsing on the internet or dealing with emails in the In-Car Office, and so win extra time. Mercedes-Benz goes another step further when it comes to parking: with the appropriate pre-installation for the INTELLIGENT PARKING PILOT, the S-Class is ready for driverless highly automated parking (Automated Valet Parking; Level 4[3]). For more details see the corresponding chapter. This plan sees Mercedes-Benz taking the crucial step towards conditionally and highly automated driving (SAE Level 3 and Level 4), thereby for the first time offering its customers the possibility in a series production vehicle of handing over the task of driving to the vehicle.

In August 2013, Mercedes-Benz already impressively demonstrated that autonomous or automated driving is not some Utopia, but fundamentally technically possible. At that time, the Mercedes-Benz S 500 INTELLIGENT DRIVE based on the previous S-Class and equipped with near-series technology covered the historic, approx. 100-kilometre Bertha Benz route from Mannheim to Pforzheim completely autonomously. With the DRIVE PILOT, conditionally automated driving at Mercedes-Benz is expected to enter series production from the second half of 2021.

On suitable motorway sections and where traffic density is high, the DRIVE PILOT can offer to take over the driving, initially up to the legally permitted speed of 60 km/h. The controls needed for this are located in the steering wheel rim, on the left and right above the thumb recesses. When the driver activates the DRIVE PILOT, the system controls the speed and distance, and serenely guides the vehicle within its lane. The route profile, events occurring on the route and traffic signs are all assessed and taken into consideration accordingly. The DRIVE PILOT can also recognise unexpected traffic situations, and deal with them autonomously by evasive action within its lane or braking action.

Paradigm change: the vehicle takes control

For the first time, the vehicle takes control while the DRIVE PILOT is active in the Mercedes-Benz S-Class. This is a paradigm change. It is Mercedes-Benz's view that the safe operation of a system of this nature can only be realised with the help of an extended sensor set. This also includes LiDAR ("Light Detection and Ranging": optical measurement of distance and speed), highly precise positioning and an HD map (digital map in high-definition quality). This ensures that the system can confidently hand over safely to the driver even in difficult situations.

While using the DRIVE PILOT, the driver can turn away from what is happening on the road and turn to certain secondary activities, be that communicating with colleagues via In-Car Office, browsing on the internet, or enjoying a relaxing seat

[1] SAE Level 3: the automated driving function takes over certain driving tasks. However, a driver is still required. The driver must be ready to take control of the vehicle at all times when prompted to intervene by the vehicle.
[2] The legally permissible secondary activities of the driver depend on the relevant national traffic regulations.
[3] SAE Level 4: Under certain circumstances (e.g. selected roads, not in any weather) the vehicle can manage all traffic situations by itself. No driver is required to be in the vehicle.

massage. This is because in DRIVE PILOT mode, functions can be enabled that are otherwise blocked when driving. However, the driver must always be ready to retake control and immediately resume driving as necessary when the system prompts them to do so, or if it is obvious that the conditions for correct use of the DRIVE PILOT no longer apply.

Conditionally automated driving on suitable motorway sections where traffic density is high

When the vehicle approaches the end of a route section that is suitable for the DRIVE PILOT, for example a tunnel, or if other conditions change, perhaps the weather or the traffic situation (for example when a tailback begins to flow freely), the driver is prompted in good time to retake control. Fundamentally the driver must remain ready to take control and be able to continue driving the vehicle manually within ten seconds – sleeping, looking to the rear for extended periods or even leaving the driver's seat are therefore not possible. To ensure that the driver is able to take control, the cameras of the driver display and MBUX Interior Assist monitor movements of the head and eyelids.

If the driver fails to take back control even after increasingly urgent prompting, e.g. owing to a severe health problem, the DRIVE PILOT brakes the vehicle to a standstill in a controlled manner and with suitable deceleration. At the same time the hazard warning system and, once the vehicle has come to a standstill, the Mercedes-Benz emergency call system are activated and the doors and windows are unlocked, to make access to the interior easier for any first responders. Naturally the driver can also deactivate the DRIVE PILOT at any time without any prompting by the system. This is done via the steering wheel buttons, or by manually intervening in the vehicle's control functions.

With a LiDAR sensor and redundant systems

The DRIVE PILOT is based on the environmental sensors of the Driving Assistance package, and has additional sensors which Mercedes-Benz considers essential for safe conditionally automated driving. These include LiDAR, an additional camera in the rear windscreen and microphones, which are particularly useful for recognising the flashing blue lights and special signals of emergency vehicles. As well as the sensor data, the DRIVE PILOT receives information about the road geometry, route profile, traffic signs and unusual traffic events (e.g. accidents or roadworks) from a digital HD map. This is made available by a back-end connection. The vehicle's location is determined using a highly precise positioning system that goes well beyond the usual GPS systems. The S-Class with the optional DRIVE PILOT also has redundant steering and braking systems and a redundant onboard electrical system, so that it remains manoeuvrable even if one of these systems fails and the safe handover to the driver can be ensured.

A powerful central control unit provides the necessary sophisticated software functions for conditionally automated driving. The image processing, for example, uses future-oriented technologies from the world of artificial intelligence. As part of the sophisticated safety architecture, all algorithms are calculated twice.

The system is constantly improving

The top speed of a system with conditional automation in Germany is restricted by law to 60 km/h. However, the DRIVE PILOT is ready to permit higher speeds or other use cases via over-the-air updates once the legislative framework provides for this. The general introduction of the DRIVE PILOT in other European countries, in the USA and China will follow gradually as the legal situation in each country provides for a surrendering of the driving task.

Legal framework in Germany

In order to be able to allow the customer for the first time to carry out secondary activities during the journey, it is necessary for the Europe-wide harmonised technical approval requirements to be met. However, it also requires national road traffic regulations that allow the driver to use the SAE Level 3 system as intended, including by relinquishing the task of driving. The DRIVE PILOT will initially be offered in Germany because, by opening up its road traffic legislation to Level 3 systems in 2017, Germany was one of the first countries to provide a legal basis for their use. The approval procedure for Europe, which is also necessary for use of the DRIVE PILOT in Germany, is scheduled to be completed towards the middle of next year.

The different levels of automated driving

Following the SAE J3016 standard, the German Association of the Automotive Industry (VDA) defines six different levels of automated driving.

- Level 0: no automation. The driver performs all driving tasks.
- Level 1: assisted - driving with assistance systems. The driver always has full control of the vehicle, but can call on support from driving assistance systems for longitudinal or lateral guidance, e.g. from an adaptive cruise control system.
- Level 2: semi-automated. The driver always has full control of the vehicle, but can call on support from driving assistance systems for longitudinal and lateral guidance or when parking.
- Level 3: conditionally automated. The driving system with conditional automation takes over dynamic driving tasks when certain parameters apply. A driver who is ready to take control at any time is however still necessary. The driver must take control (with a delay of a few seconds) at all times when prompted to do so by the system.
- Level 4: highly automated. Under certain circumstances (e.g. selected roads, not in any weather) the vehicle can manage all traffic situations by itself. Depending on the use case, a driver is no longer required (e.g. automated valet parking, people shuttle)
- Level 5: driverless. The vehicle can perform all driving functions by itself in all circumstances.

Light and comfortable travel

Innovative suspension systems ensure an impressive travel experience in the new S-Class. Rear-axle steering with a steering angle of up to 10° improves manoeuvrability in urban areas. The optional, fully active E-ACTIVE BODY CONTROL suspension on a 48 V basis offers a unique synthesis of comfort and agility, plus additional protection in the event of a lateral collision. The AIRMATIC air suspension with continuously adjustable damping ADS+ is standard equipment. Close networking between all the suspension and control systems ensures maximum stability and safety. Redundant steering and braking systems are ready for conditionally automated driving acc. to SAE Level 3.

The aim of the developers was to exceed the high level of suspension and ride comfort of the preceding series, while achieving a very high level of vehicle dynamics. E-ACTIVE BODY CONTROL (see separate chapter) replaces the previous MAGIC BODY CONTROL.

At the front the new S-Class has the well-proven four-link suspension. With the exception of the wheel bearings, all the wheel location components are of forged aluminium. The multi-link independent rear suspension has been completely redeveloped to accommodate rear-axle steering. To this end, the kinematics and elastokinematics were adapted, and the track rod at the lower steering arm level was moved from the front to the rear. The rear axle carrier is of welded sheet aluminium, and weighs no more than before thanks to computer-assisted structural improvements and despite greater strength. A newly developed metal/plastic hybrid cross-bar is bolted into this open-fronted section, and has significant weight advantages over the cast aluminium cross-bar of the preceding model. The suspension subframe carriers and the elastomer bearings of the rear axle struts were redeveloped in extensive simulations and driving trials, so as to improve them with respect to NVH and handling characteristics.

Constant level

The standard-fit AIRMATIC air suspension responds particularly sensitively. It combines air suspension bellows with adaptive ADS+ dampers whose characteristics can be fully automatically varied at each individual wheel, in both the compression and rebound stages. While driving, a sophisticated sensor system and algorithms set the dampers according to the quality of the road to ensure that, for example, driving over a bump with just one wheel is not transmitted to the entire axle and the interior. At the front axle the springs and dampers are housed in one suspension strut. This level control is part of AIRMATIC. It keeps the ground clearance constant irrespective of the vehicle load, but also makes changes. By way of example, in COMFORT mode the vehicle body is lowered by 10 mm at high speeds above 120 km/h and another 10 mm at over 160 km/h to reduce aerodynamic drag and increase driving stability. In SPORT driving mode the body is always 10 mm lower, and in SPORT+ 17 mm. At up to 60 km/h, the body can be raised by 30 mm at the touch of a button.

As manoeuvrable as a compact car: both axles can do the steering

The aim of the engineers at Mercedes-Benz was to make the new S-Class as manoeuvrable as a compact car. The impressive driving function has been realised using rear-axle steering that allows large steering angles of up to 10° and is integrated into the dynamic control systems of the steering, brakes and suspension (more about the rear-axle steering in the next chapter). The S-Class has an electro-mechanical direct steering system at the front. The suspension settings of the DYNAMIC SELECT driving modes allow individual adaptation of the assistance characteristics. Whatever the

vehicle weight, tyre size and friction, an innovative control concept ensures consistent and comfortable steering feedback. The steering is also the central actuator for implementing the movement trajectory from numerous driving assistance functions and handling safety systems. In models equipped with the optional rear-axle steering, the front axle has a steering variant with an approx. 15% more direct steering ratio which requires considerably less steering movement in conjunction with the rear-axle steering.

DYNAMIC SELECT: The S-Class drives as the driver wants it to

The driver can individually modify the characteristics of the powertrain, ESP®, suspension and steering. The selection is made using a control at the lower end of the central display. The default setting is COMFORT mode. Different characteristics are firmly assigned to each system. The driver has the choice of selecting fixed driving modes or individually combining sub-modes. The selection is acknowledged by acoustic and visual feedback. The desired driving mode is shown as the status and depicted in the central display.

The individual modes:

Programme	Character
ECO	particularly fuel-efficient driving
COMFORT	comfortable and fuel-efficient driving
SPORT	sporty driving
SPORT+	very sporty driving
INDIVIDUAL	individual settings

The CURVE mode is also available in combination with E-ACTIVE BODY CONTROL. Plug-in hybrid models have the BATTERY LEVEL and ELECTRIC driving modes.

Electronic assistance: ESP® dynamic cornering assistance and Steering Assist

The steering assistant STEER CONTROL responds with commensurate steering force at the dynamic limits to support the driver in stabilising the vehicle. To do this, the electronics determine the direction in which the driver must steer to defuse a potentially critical situation, and ensure a corresponding steering movement to indicate the steering direction that will enable the vehicle to be stabilised. For example, ESP® dynamic cornering assistance brakes the inner rear wheel if the electronics detect understeer. Both high handling safety and high driving dynamics are the result.

In combination with the DRIVE PILOT: steering for conditionally automated driving

It is expected that from the second half of 2021, the S-Class will be able to drive in conditionally automated mode at up to 60 km/h with the new DRIVE PILOT where traffic density is high or in tailbacks on suitable motorway sections. The technology for this includes fail-safe steering which executes the relevant actuation and steering commands of the intelligent track guidance system with the greatest precision. Embedded in a twin-channel architecture, this steering relies on a multiple back-up energy supply via independent bus-systems with the vehicle components involved. The front and rear axle have twice the number of rpm sensors.

All the major electronic and electro-mechanical components, assemblies and sensors are redundant in nature. In the event of a channel failure, the redundant component continues the function. The electric motor consists of four sub-motors, so that at least 50% of the maximum output is available at any time. This ensures that during conditionally automated driving, the desired trajectory can be followed by the front axle steering in any situation.

An electric brake booster is used for models with additional equipment for conditionally automated driving, or e.g. the optional Remote Parking Assist or the INTELLIGENT PARK PILOT. To reinforce the driver's braking intention, this does not use vacuum pressure but an electric motor with a reduction gear. During conditionally automated driving or parking manoeuvres, the electric brake booster acts as a redundant pressure generator for the braking system and can bring the vehicle to a safe stop even if the hydraulic unit fails.

More manoeuvrable and dynamic thanks to steerable rear wheels

Thanks to rear-axle steering (optional), the S-Class feels as manoeuvrable as a compact car in the city. The steering angle at the rear axle is up to ten degrees. The turning circle is reduced by up to two metres.

The interaction between the front-axle and rear-axle steering is configured to ensure agile responsiveness in urban and country traffic together with a very high level of stability. This results in e.g. small side-slip angles and a high level of yaw suppression. At high speeds the focus is more on stability, though without compromising precision and responsiveness. This added value is achieved by integrated actuation of the steering and brakes (ESP®), and considerably improves handling safety as a result.

Customers have a choice of two variants of the optional rear-axle steering: 4.5° and 10° rear-axle steering. In the 10° variant the wheel size is limited to 255/40 R 20, allowing a larger wheel angle. These are the other differences:

		Without rear-axle steering	**With rear-axle steering**	
Max. steering angle at the rear axle (°)		0	4.5	10
Turning circle (m) S-Class with short wheelbase (W 223)	Rear-wheel drive	12.2	11.4	10.5
	4MATIC	12.5	11.6	10.7
Turning circle (m) S-Class with long wheelbase (V 223)	Rear-wheel drive	12.5	11.7	10.8
	4MATIC	12.8	11.9	10.9

S-Class models with rear-axle steering have an approx. 15 percent more direct steering ratio at the front axle. This means that the driver needs to turn the steering wheel by much less. The respective rear-axle angles and trajectories are shown in the driving mode menu in the central display.

The operating principle of rear-axle steering in detail: An electric motor drives a spindle at the rear axle via a drive belt. This makes axial adjustments to the spindle. Depending on the speed and the steering angle, the rear wheels are turned in the same or the opposite direction as the front wheels (same-direction or counter-direction steering). In simplified terms, this produces more agility and a smaller turning circle by counter-steering and more stability with same-direction steering. In the S-Class, the full steering angle of ten degrees is especially used during parking manoeuvres. The environmental data of the vehicle sensors (radar, camera, ultrasonic) are used to adapt the maximum angle to the relevant situation. The system switches from counter-direction to same-direction steering at more than 60 km/h.

Only floating is better

Even better ride comfort and agility, as well as innovative functions such as raising the vehicle body in a lateral crash, are provided by the new developed E-ACTIVE BODY CONTROL active suspension, which is combined with the standard AIRMATIC air suspension. This regulates the damping and spring forces individually at each wheel, and not only counters body roll, but also pitch and lift. Together with ROAD SURFACE SCAN and the CURVE function, E-ACTIVE BODY CONTROL allows an extraordinarily high level of comfort and underpins the claim of Mercedes-Benz to produce the world's most intelligent suspension.

Active suspension systems have a long tradition at Mercedes-Benz. More than 40 years ago, research was already being conducted on spring and damper systems that would allow the power at each wheel to be individually controlled. The objective: to improve both ride comfort and vehicle dynamics. In 1999 ABC (Active Body Control) first entered series production in the S-Class Coupé. In subsequent years ABC was continuously developed further, with the ROAD SURFACE SCAN function added in 2013 to produce the first predictive suspension that already responds to surface undulations before they are reached.

E-ACTIVE BODY CONTROL continues this tradition in a unique way. Developed by Mercedes-Benz, it operates on 48 volts and is available in the S-Class as an optional extra. The system is based on the full AIRMATIC air suspension system, and therefore offers all-round level control which keeps the vehicle level constant irrespective of the load. The level can also be raised or lowered as required, to increase ground clearance.

Furthermore, the air suspension with active hydraulic damping generates dynamic forces that overlay the air suspension forces and actively support and dampen the vehicle body, e.g. during linear and lateral acceleration or when driving on uneven roads. The body no longer squats or pitches during braking and acceleration, and on poor road surfaces the system is even able to recuperate energy, roughly halving the energy requirement compared with the preceding system in the S-Class.

The active suspension also allows a very wide spread of handling characteristics that can be set with the driving mode – from the comfort of a luxury saloon to the agility of a sports car. It is also closely networked with the rear-axle steering and the other suspension and control systems, and achieves a new level of stability and safety as a result. With five multi-core processors, more than 20 sensors and use of the stereo camera, E-ACTIVE BODY CONTROL responds predictively to any driving situation and ensures a completely new driving experience. The control units analyse the driving situation 1000 times per second, and adapt the suspension accordingly. ROAD SURFACE SCAN is a unique function: The stereo multi-purpose camera continuously registers the road surface ahead. The suspension struts are then activated so as to substantially reduce the body movements when driving over surface undulations, as the suspension responds even before the uneven stretch is reached.

The curve inclination function likewise improves ride comfort: in CURVE driving mode, the vehicle actively leans into bends by up to 3° in three stages, like a motorcycle. This reduces the lateral forces acting on the occupants. Cornering is therefore made much more pleasant, especially for the front and rear passengers.

The control function of E-ACTIVE BODY CONTROL depends upon:

- the driving style, e.g. dynamic
- the road surface, e.g. surface undulations
- the vehicle load
- the selected driving mode: sporty (SPORT), comfortable (COMFORT), comfortable with dynamic curve inclination function (CURVE) or comfortable and particularly energy-efficient (ECO).

How it works: How E-ACTIVE Body Control works

E-ACTIVE Body Control adds semi-supporting hydraulics to the air suspension. The air springs bear the base load of the vehicle body and gradually regulate the level. The hydraulics generate dynamic forces that overlay the air spring forces, and actively support and dampen the vehicle body. They achieve up to 6 kN at the front wheels and 5 kN at the rear wheels. The actuating force is up to 20 kN/s, which also allows raising of the vehicle body when an impending side impact is recognised. More about this extension to PRE-SAFE® Impulse Side in the chapter "Protective measures in a side crash".

At each wheel, a damper is installed within the axle with two working chambers that have an adjustable damping valve and a hydraulic pressure reservoir. The damper is connected to an intelligent motor/pump unit in the 48 V network by hydraulic lines. Actuation of the motor/pump unit enables the hydraulic fluid to be displaced to create a difference in pressure within the damper, allowing an active force to be generated.

The motor/pump units at all four wheels are coordinated by a central control unit which also actuates the valves and the compressor for the air springs, and therefore always controls the entire suspension system.

The transition from a belt-driven hydraulic pump to an electric 48-volt pump also takes into account the increasing electrification of the powertrain: the combustion engine is idle increasingly often – or not used at all.

Modern luxury in its most desirable form

The S-Class is seen as a trendsetter in its segment. Together with its model variants, the luxury saloon is a point of reference and an example for the automobile industry. The new generation continues this tradition. The interplay between emotion and intelligence becomes tangible, and arouses desire for the brand and for the S-Class itself. Innovation in combination with the latest technology and traditional craftsmanship make the vehicle unique.

With a short front overhang, a long wheelbase and a balanced rear overhang, the S-Class is designed as a classical saloon with perfect proportions. Other unmistakable exterior features include the stretched bonnet, the upright front end with the mounted star, the long passenger cell and the flowing C-pillar with its sculptured shoulder. The claim of the S-Class to high status is indicated by the excellent prestige measurement, i.e. the distance from the front axle to the windscreen. The wide track and flush-mounted wheels with modern designs give the vehicle a muscular look.

The so-called character lines have been greatly reduced along the sides. Cleverly contoured surfaces with a sculptured look create special light effects. At the same time they embody the Mercedes-Benz design philosophy of sensual purity. Chrome elements stylishly positioned by the designers – e.g. as a decorative lower strip on the side sills – further embellish the S-Class and accentuate its length.

The front section impresses with its high-status radiator grille. The numerous sensors and cameras of the assistance systems are attractively and symmetrically integrated into the design, and deliberately accentuated as high-tech elements.

The headlamps characterise the front aspect of the car. They have the three-point daytime driving light signature that is typical of the S-Class, but this is flatter and somewhat smaller overall. The new light system DIGITAL LIGHT (see separate chapter) is available as an optional alternative to the standard MULTIBEAM LED headlamps. This headlamp has a distinctive look, and is distinguished by e.g. the blue light of its floor facing.

Flush-fitted door handles (optional) and sophisticated wheel designs (size 18 to 21 inches) accentuate the side aspect. The dynamic appearance of the car is continued at the rear. Details such as the two visible exhaust tailpipes contribute to an unmistakable appearance that is typical of a Mercedes-Benz. They are accompanied by the surprising design of the boot lid in combination with the progressive, two-section rear lights. The chrome strip at the upper edge of the rear lights accentuate the width of the rear.

Thanks to precisely designed, highly detailed interior features and certain animated functions, the rear lights contribute to the impression of high quality. They make the new S-Class unmistakable in both their day and night design.

Much ado for a low drag coefficient

With a c_d figure from 0.22,[1] the S-Class is one of the world's most aerodynamic cars, and especially so in the luxury saloon segment. Aerodynamic measures affecting the body, underbody and detachable parts allow a good showing in the wind tunnel and in real operation. Extensive airflow simulations were already carried out using high-performance computer clusters during an early development phase. A great deal of fine-tuning also went into the aeroacoustics. The previous generation of the S-Class already excelled with a very high level of interior noise comfort. The new model is even quieter.

Although the frontal area (A) of the new S-Class has increased slightly to 2.5 sq. m., the drag coefficient has been reduced even further compared to the preceding model. The product of c_d and A is 0.56 sq. m., which is 200 sq. cm less than for the previous model after its last facelift.

One major focus of the aerodynamic measures was on the airflow in and around the front bumper. The space between the front wheel arch and the bumper is used as an air chamber. There are slits in the side walls of the recesses in the outer area of the bumper. These force air into the chambers and avoid interruption of the airflow ahead of the front wheels. At the same time some of the hot exhaust air from the engine compartment is directed into the air chamber. This is assisted by more effective sealing between the engine compartment and wheel arches. Each of the inlets ahead of the front wheels has a large exhaust air aperture preceded by a 3D suction spoiler. The mixture of cold and warm air is fed through these exhaust air apertures and ventilation slits to the insides of the front wheel arches. The resulting airflow ensures the best possible airflow along the underside of the vehicle and along the sides of the front wheel arches, and this also benefits thermal management in the engine compartment. In addition, the engine compartment panelling between the front wheels has been widened to reinforce this effect. Thanks to this improved thermal management, it has become possible to extend the rear engine compartment panelling even further and further reduce aerodynamic drag in comparison with a preceding model with a comparable engine.

Detailed improvements to the underbody and mounted parts such as the exterior mirrors and wheels also contribute to the very good aerodynamic performance of the vehicle.

- The new S-Class has two-section rear light clusters. Owing to their lower height compared to the single-section version, it was necessary to dispense with spoiler lips in the lenses. This meant that particular attention was given to e.g. improving the airflow to the rear diffuser.
- S-Class models with the panoramic glass sunroof have diagonal rear struts in the underbody to rigidify the bodyshell. To improve aerodynamic drag, these have been removed from the diffuser airflow and relocated above the exhaust system.
- The position and airflow angles of the aerodynamically shaped cladding on the rear spring control arms and the fuel tank guard were reconfigured with further CFD-DOE improvements (see next section) and individual calculations, and later fine-tuned in the wind tunnel.
- The exterior mirrors feature so-called aerostripes. These fine edges on the insides of the mirrors create turbulence and improve the airflow. The aerostripes also benefit the aeroacoustics.

[1] Best performance in SPORT+ driving mode

- Other measures include aero-wheels in almost every size, a cooling airflow control system behind the radiator grille and in the bumper, and improved sealing of the cooling airflow.

The three-dimensional airflow pattern around the vehicle was already calculated in high-performance simulation clusters using CFD (Computational Fluid Dynamics) in an early development phase. Shortly after this project started, during the dimensional drawing phase, several extensive DOE (Design of Experiments) studies were carried out on the basis of the preceding model, with up to 250 calculations per body area. In this process the aerodynamic engineers specify the parameters for certain components, e.g. the possible height of the boot lid.

Several hundred simulations were carried out over several days, fully covering the scope of the prescribed parameters. These simulations can be used to calculate a global or local optimum or, far more importantly in this phase, establish the influence of the individual parameters on the drag coefficient. Using the DOE method, specific aerodynamic requirements were reported to and discussed with personnel working on the dimensional concept and design in a very early phase.

In recent years such automated calculation processes including DOE have been intensively developed further by Mercedes-Benz aerodynamic engineers. As a result, digital development with DOE not only saves time, but is also cost-efficient: unlike for the preceding model, which required up to six hardware models, the new S-Class required only two 1:1 design models for wind tunnel improvements thanks to digital frontloading, i.e. advance selection of variants.

Aeroacoustics and NVH: even quieter interior than the previous model

The aim of sound insulation was to further improve the discreet noise level in the interior. The high rigidity of the bodyshell provides the basis for outstanding noise and vibration comfort, and this is enhanced with fine-tuning. For example, the apertures for the cable grommets in the firewall have double seals. To achieve an engine sound that is perceived as refined and unobtrusive in the interior, the firewall insulation has been extended into the side areas of the A-pillars and the floor area.

Mercedes-Benz is also using acoustic foam in certain bodyshell sections for the first time in series production. In this process a special foam is packed into the bodyshell while these areas are still accessible. These foam sections then expand in the oven during cathodic dip painting (CDP). This process has considerably improved sound insulation in the body structure – e.g. sound transmission through the C-pillar.

The S-Class was developed in the in-house aeroacoustic wind tunnel, which went into operation in 2013. To reduce wind noise, the bodyshell and sealing concept were improved as well as optimising the vehicle shape. Some of the aeroacoustic measures in detail:

- The exterior mirrors feature so-called aerostripes. These fine edges on the insides of the mirrors create turbulence and ensure that the airflow is better able to follow the mirror contours, while reducing cutoff noise. The interior features were also fine-tuned: during the development phase, computer tomography was used for the mirror triangle. In this way the installed position of rails and multi-foam seals was verified.
- The new, flush-fitted door handles (optional) are better sealed on the inside than conventional designs.
- The seals in the window areas were improved, and the gap reduced.
- Extensive airflow measures for the panoramic sliding sunroof ensure a high level of noise comfort.

The S-Class has green-tinted thermal insulation glass as standard. The windscreen is made of laminated safety glass with an integral acoustic membrane, while the side windows and rear window are of single-pane safety glass. Laminated safety glass all-round is available as an option. This insulates against heat and noise, and reflects infrared radiation.

You see that you see nothing

The flush-mounted door handles (optional) are a completely new development. They are electrically extended when the driver approaches, or the outer surface of the door handle is stroked. Keyless access is provided by KEYLESS-GO.

The door handles are retracted when not in use and when travelling, and are flush with the door. If the door is to be opened, the handle is extended to its operating position in a parallel movement. Compared to pivoting door handles, a handle extending in parallel offers a much larger area of purchase and can be gripped with the whole hand.

When developing this visually impressive handle, great attention was paid to close tolerances and little free-play. The control electronics dispense with classic end position switches and extend the handles with a wide load tolerance, and as a visually and acoustically attractive movement. The door handle makes an impression of high quality and solidity.

Additional operating convenience is provided by KEYLESS-GO functions integrated into the flush-fitting door handle. For example, the door handles are already extended as soon as a person with the key approaches the vehicle. Other operations of KEYLESS-GO are via capacitive sensor arrays on the handle for the main functions: unlocking the vehicle, locking and poss. comfort closing, and requesting a retracted door handle. To open the door it is sufficient to pull the handle slightly, which opens the door lock with electric motor assistance.

With the flush-fitted door handles, the central locking system and KEYLESS-GO blend into a single operation whenever the vehicle is accessed. The door handles are extended in special situations, e.g. after an accident or for a remote parking procedure.

Digital-analogue revolution in the interior

Modern luxury attains the next level in the interior of the S-Class. The designers have created a feel-good ambience with lounge character marked by elegance, high quality and lightness. The dashboard with its new architecture, modern surface design and ergonomic display arrangement is a particular highlight. The aim and ambition of the Mercedes-Benz interior designers was to harmonise digital and analogue luxury in the vehicle interior.

The S-Class has always been a place for comfortable travel and relaxed working. With the new generation, the interior has fully evolved into a "third place", a refuge between home and workplace. Nearly all comfort-related dimensions of both variants, the S-Class with short and long wheelbase, have been improved in the front as well as on the rear seats. The sense of space is accordingly generous.

The desired harmony between digital and analogue luxury results in a revolutionary interior design, including associations with interior architecture and yacht design elements. The sculptured look of the dashboard, centre console and armrests appears to float above an expansive interior landscape. The systematic reduction in the number of controls underscores the minimalist appearance of the interior. A fine divide between the upper section of the dashboard and the large trim element structures the area and creates horizontal breadth. This interface is also where the active ambient lighting (see separate chapter) is located.

In addition to the up to five screens, highlights include the large trim elements in the dashboard and in the rear (with the First Class rear suite). These flow around the passengers and are a systematic further development of the wrap-around effect. One particularly attractive version of the trim is an open-pored wood veneer shot through with inlays of real aluminium that follow the contours. The "Novum" trim variant consists of a mixed metallic weave which accentuates the elegant, sporty styling.

New design elements include the flat, four-square centre vents with horizontal nacelles. Two slim, vertical side vents on each side round off the ends of the dashboard. The air volume is controlled by keys with LED displays. The avantgarde geometry of the vents and their decorative nature accentuate the modern look.

The seats (see separate chapter for features and configuration) invite the occupants to sit down and relax. The flowing, three-dimensional layer design theme gives an impression of lightness. Different finishes give the seats different characters. For example, the flowing longitudinal piping of Lugano leather lends them a noble, avantgarde look, while the progressive diamond pattern of nappa leather and Exclusive nappa leather is more classical and expressive.

Mercedes-Benz introduced electric seat adjustment in 1980. Since then, many vehicle generations have featured the brand's hallmark seat adjustment switch in the form of a stylised seat in the door. This control has been completely redesigned for the new S-Class. Visible joints have been reduced by combining the trim with the seat controls. The geometry and surround lighting of the control panel make the seat adjustment control appear to float in the door panel.

The newly developed pressure sensors for seat adjustment open up new design possibilities. Thanks to the practically fixed control buttons, minimal gaps between the individual controls can be realised. This also means that very small apertures in the black panel trim are possible. This allows a slim, filigree, floating design of the control buttons. The pressure sensors also allow a continuous coupling of operating pressure and speed.

Choice of four display styles and three modes

The driver display and media display offer a comprehensive aesthetic experience The appearance of the screens can be individualised with a choice of four display styles (Discreet, Sporty, Exclusive, Classic) and three modes (Navigation, Assistance, Service) Examples of new features:

- In "Discreet", seven different colour schemes are available for the instrumentation, and the 64 colours of the ambient lighting are grouped accordingly.
- "Sporty" is dominated by the colour red, with dynamic presentation of the central rev counter.
- The new display scheme "Exclusive" in an attractive white mother-of-pearl look is reserved for the S-Class. In night mode and when passing through tunnels, the system automatically switches to a darker display.
- In "Assistance" mode, important events, the infrastructure and other road users (cars, motorcycles, trucks) are shown.
- The augmented reality head-up display (see separate chapter) is absolutely new, and projects important information into the real environment.

Light, recycled or renewable

More than 98 kg of components made from resource-conserving materials are used in the S-Class. The number of components containing recyclates is now 120 – more than twice as many as in the preceding model. Another 40 kg or so are made from renewable raw materials. The process of environmentally compatible development with specific targets is firmly embedded in the overall development process. Environmental aspects are already taken into account in the conceptual phase.

Recycling plastic waste and using recycled plastics conserves primary raw materials, while saving energy and CO_2 emissions compared to products based on crude oil. The challenge lies in developing plastic recyclates that meet all current technical requirements with respect to safety, quality and functionality.

This has now become possible for the cable ducts that route the electrical lines through the vehicle. This meant testing of various materials made from recycled plastics. One aspect of this testing and development was also testing and perfecting the recyclates with respect to emissions into the interior and odours. The new cable ducts add another 3 kg to the total weight of resource-conserving materials.

Lightweight construction with a natural fibre microsandwich

Lower weight not only reduces the amount of material used, but also the energy needed to move the vehicle. A microsandwich material was developed for the interior of the S-Class, and in most components this is reinforced with natural fibres. It not only weighs 40 percent less than a comparable, conventional component, but its thermal formability also allows use in complex applications and its strength improves crash behaviour compared to previously used materials. In the S-Class, the microsandwich is used in the map pockets in the door panels, in the seat backrest linings and for the parcel shelf. The use of this natural fibre based microsandwich and the resulting weight reduction lead to a lower primary energy requirement from production and use right up to the disposal phase.

Carpeting of recycled Nylon threads

A new, recycled thread is now used for the floor coverings. This thread - brandname ECONYL® - consists of regenerated Nylon. It is manufactured by recovering Nylon waste destined for the landfill, for example old fish nets and fabric remnants from mills and carpets. These are collected and transformed into a new thread having the same properties as nylon from new raw materials. The recycling process used to produce the thread saves CO_2 in comparison with new production. It also enables Mercedes-Benz to keep materials in circulation.

High-tech for maximum comfort

Up to 19 motors in the front seats make for comfortable seating – a number that indicates the complexity of the technology installed in the seats. However, the seats not only play a major part for comfort, but also where safety is concerned. And of course when it comes to luxurious wellbeing: all the seats available for the S-Class carry the seal of approval by the Healthy Seating campaign[1].

The wealth of technology is accommodated in a new design whose weight has not increased despite the new content. The backrest is now isolated from the seat surface, which has advantages in terms of transmitted vibrations and crash behaviour. The seat cushion takes the form of a steel-sprung half shell of sheet steel with foam upholstery and a seat cover. The mouldings for attachment to the seat adjustment system are integrated into the half shells. The springs are pretensioned when the seat depth is enlarged. Seat adjustment therefore adapts the spring characteristics for larger and heavier occupants. An innovative microsandwich material is used in the seatback lining. More information: "Under the microscope: resource-conserving materials".

ENERGIZING seat kinetics is available in the S-Class for the first time. Small changes in the angles of the seat surface and backrest tension and relax the muscles, benefiting the circulation. The list of drive motors and actuators in each seat for the following functions gives an impression of the complexity of the seat as a high-tech component:

- Longitudinal adjustment
- Height adjustment
- Inclination adjustment
- Seat cushion depth adjustment
- Backrest angle
- Head restraint height adjustment
- Head restraint angle
- Heel support (only front passenger seat)
- Rear Seat Entertainment/displays for passengers in the rear. On the front passenger side, the inclination is automatically adjusted to the angle of the backrest to keep the same angle of vision. Naturally the rear passengers can also adjust the monitors individually. At the driver's seat the monitor is always adjusted by hand.
- 4 vibration motors for massage
- 5 fan motors
- a motor for the lumbar support pump in the basic seats. The pump for the inflatable side bolsters of the multicontour seat is centrally installed in the boot.

But that's not all: the seats also play an increasingly major part where safety is concerned. Up to four airbags (sidebag as a combined thorax-pelvis bag, the new rear airbag and, in the driver's seat, also the centre airbag and the air chamber of PRE-SAFE® Impulse Side) have to be accommodated. More about this in the chapters "The rear airbag" and "Protective measures in a side crash".

[1] https://www.agr-ev.de/en/about-us/agr

Other new features in the seat if the Burmester® high-end 4D surround sound system is installed are two so-called exciters (resonance transmitters) in the backrests. These convert bass tones into vibrations, making music an even more intensive experience. Ear-level speakers integrated into the head restraints improve communication. For example, the driver can hear instructions from the navigation system without disturbing the other occupants. More about this in the chapter "The sound systems"

Ten different massage programmes are available in the new S-Class. Two new programmes specially designed for the S-Class use vibration motors. The effect of the relaxing massage along the lines of a hot stone massage is increased thanks to the warmth. To this end, the seat heating is combined with the inflatable air chambers in the active multicontour seats. The air chambers are now closer to the seat surface, and are therefore even easier to control and feel. The massage programmes take between eight and eighteen minutes. Their intensity can be chosen in two stages.

- Hot Relaxing back massage
- Hot Relaxing shoulder massage
- Activating massage
- Classic massage
- Mobilizing massage
- Wave massage
- Active Workout backrest
- Active Workout cushion
- Depth massage
- Depth workout.

More concentration when working, greater relaxation

Five different rear seat variants make it possible to configure the rear of the S-Class as a working or rest area. One new feature is the heatable additional cushion for the head restraint, which is available for the two electrically adjustable rear seats. The adjustment range and angle of the front passenger seat in the chauffeur configuration and the reclining seat behind it have been improved as well.

An overview of the five rear seat variants:

S-Class with …		**… short wheelbase**	**… long wheelbase**
Static bench seat	Three-seater bench seat with centre armrest	S	S
Comfort seats with 19 to 37 degrees backrest angle	Three-seater with electrically adjustable single seats and folding centre armrest	O	O
	Two-seater with electrically adjustable single outer seats and Business centre console (First-Class rear)	-	O
Executive seat (reclining seat) with 19 to (on front passenger side) 43.5° backrest angle	Three-seater with electrically adjustable single outer seats and folding centre armrest	-	O
	Two-seater with electrically adjustable single outer seats and Business centre console (First-Class rear)	-	O

S = Standard, O = Optional, - = not available

An adjustable and **heatable additional cushion on the head restraints** is a new feature for the outer single seats. This uses an integrated heating membrane to give pleasant warmth in the occupant's head and neck area. The heating function is activated via the seat heating. The power is conveniently and safely supplied via the push buttons of the removable cushion. The additional cushion is included in the Rear Seat Comfort package.

With the **Chauffeur package** (available for the S-Class with long wheelbase), the driver and front passenger can electrically move the front passenger seat to a chauffeur position. The adjustment range and angles of the front passenger seat and the reclining seat behind it have been improved in various respects: Thanks to a modified head restraint, the front passenger backrest can be folded further forward by 26°, the larger heel support has 10 millimetres more travel and, as in a train, can also be folded down as a footrest. The adjustment range of the calf rest on the Executive seat has been extended by around 50 mm compared to the previous version.

The active multicontour seats, additional warming cushions and the 8-way luxury head restraints go together to form the **Rear Seat Comfort package**. If single active multicontour seats are ordered, the side bolsters of the backrest and the contour in the lumbar area can be adjusted to suit the individual body shape of the occupant. A massage function is also available. The massage programmes for the rear seats include: Classic Massage, Workout back and Wave massage. The massages are also available as part of ENERGIZING comfort.

If the **First-Class Rear** (rear centre console) is specified, the front console is visually continued on the propshaft tunnel. Two thermo-cupholders are integrated to warm or cool drinks as required. New features include a tray for the MBUX rear tablet, a black-panel surface ahead of the armrest and four USB-2 connections. The stowage tray below the armrest holds a wireless charging system for mobile phones and the receiver for car/business telephony. Similarly to an aircraft seat, the centre console optionally comes with two tables which can be easily folded in or out with one hand.

The Executive seats in the rear feature the seat cushion airbag. The airbag is located under the seat cushion upholstery, but on top of the plastic seat shell, which is moved by the seat mechanisms. This means that the airbag is always in the right position relative to the occupant. In an accident, with the occupant in a reclined position on a flat seat cushion, without additional measures there would be a danger of the pelvic area sliding beneath the belt strap (submarining). This can be prevented by the cushionbag, as it raises the front section of the seat cushion upholstery. The airbag is only activated if the seat is in the reclined position during a crash. It is not activated in the upright position, as there is then no danger of submarining.

If the **Burmester® high-end 4D surround sound system** is specified, two exciters are also integrated into each outer rear seat. With the optional **seat climatisation** there are four radial fans in the cushion and two in the backrest of each seat. The air taken in through the perforated seat cover flows through the seat structure and is vented downwards and to the rear. This surrounds the occupants with a pleasant flow of air. In conjunction with electrically adjustable rear seats, as part of the Warmth Comfort package, surface heating for the armrests with three-stage adjustment is also available in the rear.

Multi-dimensional musical enjoyment

There is a choice of three sound systems in the new S-Class. The two Burmester® systems provide multi-dimensional surround sound. 3D Surround Sound is created with the help of special Burmester® algorithms and two loudspeakers integrated into the headlining. Active actuation of each speaker by digital technologies produces an exceptionally expressive and natural sound. The Burmester® high-end 4D surround sound system adds another dimension to the three-dimensional listening experience – 4D sound. This uses exciters to transfer resonance to the seats. In combination with the two Burmester® sound systems the S-Class has in-car communication. This comfort function assists communication between the occupants during a journey.

Here is an overview of the three sound systems:

	Standard sound system	**Burmester® 3D surround sound system**	**Burmester® high-end 4D surround sound system**
Total number of speakers	9	15	31
Of which ... woofers/mid range/tweeters ... 3D speakers ... centrefill speakers ... surround speakers ... ... ear-level speakers for driver/front passenger seats ... Subwoofer (number/litres)	1/4/4	2/4/4 2 1 2	6/4/7 6 1 2 4 1/18,5
Sound amplifiers	1	1	2
Exciters	-	-	8
Total output (watts)	125	710	1750

31 speakers and eight exciters are included in the Burmester® high-end 430 D surround sound system. Two exciters are integrated into the backrest of each seat. Direct reproduction of the sound resonance in the seats adds another level to the three-dimensional listening experience – 4D sound. The perceived intensity of the sound can be individually adjusted for each seat. The music becomes even more emotional thanks to this feelable component. In addition to playing music, the 4D sound is used for an even more emotional function of ENERGIZING COMFORT (see corresponding chapter).

Speakers integrated into the front seats at ear level make an even further improved surround sound experience possible for all occupants. With the new drivertainment function, information from the infotainment system, e.g. navigation instructions and telephony, can be specifically directed to the driver's seat. With sound personalisation, the user can easily adapt the sound system to suit personal listening preferences. The result is saved to a personal sound set and stored in the user profile.

Two amplifiers with a total output of 1750 watts power 37 separately processed output channels. Hybrid amplifier technology with digital signal processing, analogue filters and separate power supply ensure precise and highly dynamic sound reproduction. Alongside the acoustic attributes, features such as the extending tweeters in the mirror triangle or the lighting are another highlight of the high-end sound system.

The S-Class has the in-car communication function in combination with the two Burmester® sound systems. This function makes communication between the occupants more comfortable by amplifying speech and transmitting it from the speakers. In the new S-Class Saloon, amplified speech is supported in two directions, from the driver/front passenger to the rear passengers and vice versa.

The intelligent signal processing separates voice signals from surrounding noises. The voice signals are amplified, the surrounding noises suppressed. This voice amplification takes the interior noise level into account, and dynamically adapts the amplification of the voice signals.

Whether warm or cold: just feeling good

The climate control system is a completely new development. Improvements have been made to the acoustic properties, air quality in the interior and ease of operation and control in particular. Both the maximised cooling output and the heat output are highlights. For maximum comfort on cold days, all models with petrol engines have a 48 V PTC (Positive Temperature Coefficient) booster heater as standard. This heats the interior especially rapidly, and a warm outlet air temperature can be felt at once. THERMOTRONIC with two climate zones is standard equipment, with 4-zone THERMOTRONIC in the rear as optional equipment.

The two climate control systems share a number of other functions. For example:

- 7 personal climate profiles can be stored, plus a guest profile.
- Automatic switching to air recirculation when approaching a tunnel, and when the air quality sensor detects poor outside air quality. At the same time all windows and the sunroof are closed – then returned to their previous positions when switching back to fresh air. They are also closed if the air recirculation switch is pressed for longer than two seconds.
- Residual engine heat utilisation
- 2 solar sensors (in the rain sensor and on the parcel shelf)
- The window misting sensor in the stem of the rear-view mirror measures the window temperature and the interior humidity level. The humidity level of the intake air is also assessed. This enables the energy requirement of the compressor to be reduced in cool temperatures with dry ambient air. Energy is saved, and too dry interior air is avoided.
- 5 sensors for the outlet air temperature (THERMOTRONIC Rear: 4 plus 2 heat exchanger sensors)
- 2 interior temperature sensors
- 17 step adjustment motors to control the temperature and airflows (THERMOTRONIC Rear: 20)
- With ENERGIZING AIR CONTROL, Mercedes-Benz offers its customers a high-quality filter system that removes particles and pollutants from the air. This uses an innovative particle filter with activated charcoal to reduce fine dust, pollen and odours.
- Electric refrigerant compressor (in combination with petrol engines)

AIR-BALANCE package: active fragrancing and ionisation

The preceding series was the pioneer, and active fragrancing has now become a popular feature for the high-end Mercedes-Benz model series. As part of the AIR-BALANCE package, the intensity of the fragrancing can be set in three stages. Two special fragrances were created for the new S-Class: BAMBOO MOOD is an unobtrusive, light fragrance full of power and energy. Bamboo is rounded off with a hint of fresh water. COTTON MOOD is an atmospheric fragrance conveying purity and freshness. A touch of ozone conveys this first impression. A hint of green and jasmine accentuate this calming effect. Amber and musk form the basis for this fragrance.

An ioniser is integrated into the side vent in the dashboard. This ionises the air in the duct with a high voltage.

Comfortable travel while staying fit

At the touch of a button or by voice command, the holistic "Fit & Healthy" approach of ENERGIZING COMFORT provides a tangible experience of the in part significantly advanced comfort systems in the S-Class, and features programmes that bundle them into worlds of experience. At the same time, the system creates a suitable atmosphere in the interior – for example, invigorating in case of fatigue or relaxing in case of an elevated stress level. The ENERGIZING COACH even suggests an appropriate fitness or wellness programme based on vehicle and trip data. It also factors the information about sleep quality and stress level into its intelligent algorithm if the driver has a suitable wearable.

Mercedes-Benz has fundamentally improved ENERGIZING comfort control in the new S-Class. Innovations such as in-depth massage (see chapter on seats) and resonance transmission by the Burmester® high-end 4D surround sound system are integrated. This makes bass tones feelable. Direct reproduction of the sound resonance in the seats adds another level to the three-dimensional listening experience – 4D sound inspired by the acoustic massage. The perceived intensity of the sound can be individually adjusted for each seat. The music becomes even more emotional thanks to this feelable component. Two exciters are integrated into the backrest of each seat for this purpose.

Further major improvements to ENERGIZING COMFORT:

- The character of the programmes has been made more specific.
- Some comfort systems are exclusively used by ENERGIZING comfort control. One example is a special massage procedure in the Vitality programme.
- The sequence of individual functions within a programme is more flexible.
- Visualisation benefits from active ambient lighting and large screens with high-resolution animations.
- Shared experience: other occupants can participate in an active programme (Join mode), or suggest that others run this programme for themselves (Share mode).
- The voice assistant "Hey Mercedes" is integrated. A statement such as "I am stressed", for example, automatically triggers the 'Joy' programme with regenerative character. If the driver says "I'm tired", he/she is prompted to take a break and ENERGIZING COMFORT starts the Vitality programme.
- Each programme has its own sound background composed in 7.1 surround sound by a sound agency.
- Mercedes-Benz has developed a special ENERGIZING Comfort range in China for Chinese S-Class customers.

Two ENERGIZING packages are available for the S-Class. The package contents:

- The ENERGIZING package Front has ENERGIZING COMFORT, ENERGIZING COACH, AIR-BALANCE package, ambient lighting, Warmth Comfort package, front seat climatisation and Active Multicontour Seat package in the front.
- The ENERGIZING package Rear extends the ENERGIZING comfort control to the rear seats. It includes seat climatisation in the rear and the Seat Comfort package Rear. This package requires the optional electrically adjustable rear seats and MBUX high-end rear entertainment.

In plug-in hybrids the Power Nap programme is available, a useful feature e.g. when taking a break at a service station or to charge the battery.

Here is an overview of the individual ENERGIZING COMFORT programmes:

Programme	Purpose/Character	Main components	Sub-components
Freshness	Refreshment on hot days or after physical effort	Climate pulse (short blast of cool air), seat ventilation, deep wave massage (enlivening and stimulating vibrations in the seat cushion)	Green-blue light, animation, sound, fragrancing & ionisation, 4D sound setting (off)
Warmth	Warmth and cosiness on cold days	Seat, surface and steering wheel heating, heated neck cushion in the rear	Orange-red light, animation, discreet sound, fragrancing & ionisation, massage, 4D sound setting
Vitality	Activation on long car journeys	Stimulating sound and activating light, exclusive stimulating massage	Animation, seat ventilation, fragrancing & ionisation, ENERGIZING seat kinetics, 4D sound setting
Joy	Creation of a positive mood, regeneration if stress level is high	Mobilising massage, 4D sound with regenerating effect of low frequencies	Positive sound, warm light, animation, fragrancing & ionisation
Comfort	Spa-character for relaxation and wellbeing	Hot-stone massage (alternate shoulder and lower back massage)	Violet light, animation, relaxing sound, fragrancing & ionisation, 4D sound
Training	Three times ten sequences for: Muscle activation, muscle relaxation, alertness	Explanatory video, voice instructions	Ambient lighting
ENERGIZING tips	General notes on wellbeing	Voice information about five body areas	

ENERGIZING COACH: individual fitness recommendations

The ENERGIZING COACH is based on an intelligent algorithm. It recommends the Freshness, Warmth, Vitality or Joy programme depending on the situation and individual. If the Mercedes-Benz vivoactive® 3 smartwatch, the Mercedes-Benz Venu® smartwatch or another compatible Garmin® wearable is linked, personal values such as stress level or sleep quality optimise the precision of the recommendation. Via the Mercedes me App, the smartwatch sends vital data of the wearer to the ENERGIZING COACH, e.g. pulse rate, stress level and sleep quality. The recommended comfort programme can be directly started from the suggestion in the form of a notification in the MBUX system.

The aim is to ensure that the driver feels well and relaxed even during demanding or monotonous journeys. In addition, the pulse rate recorded by the integrated Garmin® wearable is shown in the central display.

ENERGIZING seat kinetics: good for the back

ENERGIZING seat kinetics support orthopedically beneficial changes in the seating posture by means of minute changes to the inclination of the seat cushions and backrest. The system is available for the front seats in conjunction with all-electric seat adjustment with memory function.

ENERGIZING seat kinetics uses the electric seat adjustment. If the driver selects this programme, the inclination of the seat cushions and backrests is continuously adjusted minutely using the seat settings selected by the driver and the front passenger as the starting point. The changes are only minimal - a few degrees or millimetres.

ENERGIZING seat kinetics can improve spinal health, because the natural strain and relief of muscles, joints and discs can lead to muscle relaxation and an improved supply of nutrients to the joints and discs.

ENERGIZING seat kinetics is based on a patented algorithm. The programme can be conveniently selected with visual support via MBUX or the voice assistant "Hey Mercedes".

Bright, variable and innovative

The previously optional MULTIBEAM LED is now the standard headlamp for the S-Class. As well as variable control of low and high beam, it also features Adaptive Highbeam Assist Plus. The optional DIGITAL LIGHT system enters series production for the first time at Mercedes-Benz. This allows completely new functions, e.g. the projection of guidelines or warning symbols onto the road ahead.

In the MULTIBEAM LED headlamp, a light module with 84 LEDs arranged in three lines creates a grid in the form of a matrix. With this arrangement, not only the light distribution of the high beam but also that of the low beam is freely configurable and technically precise. MULTIBEAM LED therefore allows different light functions to actuate independently.

DIGITAL LIGHT: high-resolution light projection with new functions

In each headlamp, DIGITAL LIGHT has a light module with three extremely powerful LEDs whose light is refracted and directed by 1.3 million micro-mirrors. The resolution is therefore more than 2.6 million pixels per vehicle. The micro-mirrors occupy the same area as a thumbnail. A control unit with a powerful graphic processor uses an HDMI-like connection to generate a continuous video stream to the mirrors. DIGITAL LIGHT therefore uses the technology of video projectors. This innovative headlamp in the S-Class can be recognised by its concave lens, the lettering and shining blue floor facing.

The beam divided into 1.3 million pixels makes absolutely precise light distribution possible. It makes Highbeam Assist over 100 times more precise then 84-pixel light when excluding oncoming traffic or road signs from the light beam. Light/shadow graduations and the light distribution of all the other adaptive light functions are also realised with considerably more precision, optimising illumination by e.g. fog light, motorway light or city light.

The new assistance functions are also revolutionary, however[1]:

- Warning of recognised roadworks by projecting an excavator symbol onto the road surface
- Aiming a spotlight at pedestrians detected at the roadside as a warning
- Traffic lights, stop signs or no-entry signs are pointed out by projecting a warning symbol onto the road surface
- Assistance on narrow road lanes (roadworks) by projecting guidelines onto the road surface

The topographic light is another new function. This takes hills into account on the basis of navigation maps, especially crests and depressions: when cresting a hill, for example, the headlamp does not shine upwards but is pivoted down parallel to the road surface. In depressions the light beam is raised to maintain the desired range.

DIGITAL LIGHT welcomes and says farewell to the driver with a special light show.

[1] Owing to road traffic regulations, the availability and functions of these new assistance functions may be restricted on a market-specific basis.

Stable, light and safe

Intelligent bodyshell design and innovations in restraint systems confirm the leading role of the S-Class when it comes to passive safety. The new aluminium hybrid bodyshell with an aluminium content exceeding 50 percent meets numerous requirements: A high level of crash safety, up to 60 kg less weight and a highly rigid bodyshell ensure outstanding handling characteristics accompanied by excellent noise and vibration comfort.

The bodyshell of the new S-Class was designed with a particular focus on lightweight construction. The newly developed aluminium/steel hybrid bodyshell increases the aluminium content to more than 50 percent by weight. The high proportion of aluminium is achieved by using cast and extruded structural components. This form of lightweight design and construction requires highly complex joining techniques. It demonstrates the know-how of Mercedes-Benz in the luxury saloon segment, as well as the quality arising from close, barely perceptible body joints and the highly precise fit of the design surfaces.

The extensive package of lightweight construction measures includes rigid extruded aluminium sections for the side members in the front, rear and sides. Specially developed, highly integrated diecast aluminium components are used at important nodal points in the structure.

The extremely stable side wall structure comprises the pillars, the side roof frame and the side members. The material mix of aluminium and high-strength steel alloys helps to reconcile the conflicting aims of lightweight design and crash resistance. The inner shells are partly made up of several components, with particularly large areas for the nodal points between the pillars, roof frame and side members according to the potential loads.

One-piece aluminium side wall panels are a highly effective lightweight construction feature. Particular importance was given to achieving close joints and high-quality radiuses. The body panels of the roof, bonnet, wings, boot lid and doors are also of sheet aluminium.

Passenger cell: protected by ultra high-strength and press-hardened steel

The Mercedes-Benz safety cell is the centrepiece of the safety system. It has a structure of hot-formed high-strength steel cross-members in the areas of the firewall and rear end. At the sides this is complemented with extremely rigid side sills of extruded aluminium sections, which are larger than in the preceding model, with four internal chambers.

The floor structure likewise has ultra high-strength and press-hardened steel alloys combined to form a highly functional platform. The loads arising in all impact scenarios are conducted into the main floor. The robust centre tunnel and the lateral side members provide the basis for this. These assemblies are connected using further cross-members and diagonal struts. The design of this support structure makes the use of lighter floor panels possible. These make a major contribution to weight efficiency. The load resistance of the tunnel, which is especially important for frontal impacts, is achieved using connected sections of high-strength steel. The wall thicknesses vary according to expected loads.

Front: Protection of other road users

The front structure consists of an annular upper structure, the side members and the integral carrier. Additional polymer connecting elements between the crash levels ensure particularly effective energy absorption in the early phase of a crash. The integral carrier supports the engine, steering and lower suspension arms, and uses a special crash support system to direct longitudinal forces into the floor structure during a frontal collision. In the case of semi-overlapping collisions, the cross-connections in the front section are able to activate the side unaffected by the impact, e.g. the right side of the structure in case of a semi-overlapping collision on the left, and vice versa.

In cases of heavier deformation, the wheels are supported against the rigid side wall and the wheel impact element positioned ahead of it. The geometry and strength of the side sills are configured accordingly. Above the pedal floor panel the firewall is reinforced by an exterior cross-member of high-strength steel, which is supported by the A-pillars.

As well as occupant protection, compatibility with other road users was an important development objective. For this purpose, as an addition to the previous concept, the front flexural member is designed to provide an even more stable and broad impact surface for the other vehicle in an accident, for example.

Rear section: two zones with different purposes

The safety level of the rear structure is mainly achieved by a division into two crash zones. The zone housing the fuel tank components is kept almost deformation-free by cast aluminium sections. The purpose of the crumple zone behind this is mainly to dissipate impact energy with the help of extruded aluminium structures. In the case of a semi-overlapping collision, the rear flexural member directs the loads into the side unaffected by the impact, so that both side member paths can be activated.

Restraint systems: innovations for passengers in the rear

Especially in the S-Class, particular attention has always been paid to safety in the rear. In this respect, Mercedes-Benz has long devoted itself to extending the airbag and belt systems. Large windowbags cover the side windows like a curtain. These can be triggered according to the type of impact, e.g. a severe lateral collision or a rollover. The outer seat belts are equipped with belt tensioners and belt force limiters as standard, helping to reduce the loads acting on the occupants. Rear sidebags are optionally available, as is the beltbag: as an inflatable belt strap it distributes the loads acting on the upper body over a wider area.

The rear airbag is an innovation by Mercedes-Benz: this additional airbag can further improve the safely level of passengers in the rear during a severe frontal collision (see "Under the microscope"). However it still remains important for the occupants to wear seat belts. In the rear this is made more intuitive by the optional, illuminated designer belt buckles.

Frontal airbags for both rear occupants for the first time

Last year, in the Experimental Safety Vehicle ESF, Mercedes-Benz presented the ideas the company's safety specialists are working on. Among the more than 20 innovations were near-series developments such as the rear airbag, which now becomes available as optional equipment in the S-Class with long wheelbase. The frontal airbag for the rear seat deploys particularly gently thanks to its innovative construction using a tubular structure. During severe frontal collisions, the rear airbag can considerably reduce the loads acting on the heads and necks of occupants on the outer rear seats.

The rear airbag uses an innovative concept to inflate and position the air cushion. To this end, is has a special tubular structure which is rapidly inflated by compressed gas from a cold gas generator. The space between is filled with ambient air. Patented valves ensure that the air is retained when the occupant is immersed in the airbag, creating the protective effect. The tubular structure itself has a content of approx. 16 litres. The effective volume of the space in between is up to 70 litres. The airbag volume is configured so that a rear occupant wearing a seat belt can be protected before contacting the front seats.

Designing a rear airbag for a frontal collision requires a different concept from a conventional driver or front passenger airbag. This is because the spatial parameters are different, occupant behaviour varies widely and the airbag must be accommodated in the adjustable backrest of the front seat. In addition, children and adults sit very differently in the rear of a vehicle.

Particular attention was therefore given to gentle deployment of the airbag in case people or objects are in the deployment zone. The special design of this new airbag decisively contributes to compliance with the in-house requirements of Mercedes-Benz, some of which were derived from tests on front passenger airbags. The inflating tubes give way when contacting obstructions, e.g. a child seat in the rearfacing position. The force is directed mainly past the obstacle as of a certain counterforce rather than against it.

The airbag enhances the restraining effect of the belt system, and can support the head and neck to decrease the loads on them significantly. In combination with a beltbag, the inflatable seat belt and the seat cushion airbag of the Executive seat, the S-Class sets new standards for rear seat occupant safety.

Additional side impact protection

New protective features for a severe lateral impact are introduced with the new S-Class. A suspension-based function has been added to the innovative PRE-SAFE® Impulse Side: when a side impact threatens, the vehicle body can be raised by the E-ACTIVE BODY CONTROL suspension (optional) within a few tenths of a second.

PRE-SAFE® Impulse Side, an innovation in the Experimental Safety Vehicle ESF 2009, had its world production premiere in 2015. The idea: to make use of the time before the impact, the system moves the occupant away from the door panel and towards the centre of the vehicle just before an impending side collision. To do this, the system inflates the air chambers in the side bolsters of the backrest within a fraction of a second when an imminent side impact is detected. This impulse not only moves the occupant away from the danger zone, increasing the distance from the door, as the impulse is also moderately transferred to the occupant. It mitigates the forces acting on him/her during a lateral impact. This can substantially lessen the load exerted on the ribcage by the side collision, and greatly reduce the risk of injury.

Mercedes-Benz has now added a new function of PRE-SAFE® Impulse Side to its measures in the pre-accident phase: when a side impact threatens, the vehicle body can be raised by the E-ACTIVE BODY CONTROL suspension (optional) within a few tenths of a second. Radar sensors are used to recognise a potential side crash. The actuator is the E-ACTIVE BODY CONTROL suspension, which can raise the body upwards by up to 80 millimetres. This reduces the loads on the door structures, as the door sill can absorb more of the energy thanks to its higher position. As a result, deformation of the passenger cell and the loads acting on the occupants can be reduced.

During a severe side impact, the new centre airbag positions itself between the driver and front passenger seat, reducing the risk of their heads making contact It is integrated into the driver's seatback in the middle of the vehicle.

The centre airbag is triggered when a severe side collision is recognised and certain conditions are met. The main factors for deployment are the direction of impact, impact side, and front passenger seat occupancy.

Intelligent interlinking of hardware and digital solutions for protection against crime

Under the name URBAN GUARD, Mercedes-Benz is introducing a new, comprehensive product and optional equipment category for all model series. It bundles together existing and future products for the protection of the vehicle against vandalism and crime. With URBAN GUARD – an intelligent interlinking of hardware and digital solutions – Mercedes-Benz satisfies the worldwide rise in customer demand for security and property protection.

In conjunction with Mercedes me, the two packages URBAN GUARD Vehicle Protection and URBAN GUARD Vehicle Protection Plus enable all-round monitoring of the parked vehicle. **URBAN GUARD** comprises an anti-theft alarm system, tow-away protection with visual and audible warning in case of a detected change in position, an alarm siren, interior monitoring (triggered by movement in the interior) and preinstallation for theft and parking collision detection. In the case of the latter, the vehicle sensors register when the parked and locked vehicle is bumped or towed – or when someone attempts to break into the vehicle. If the service is active, the driver immediately receives detailed information via the Mercedes me App. By means of a push notification, he/she finds out how severe the parking damage is and in which area of the vehicle it occurred, for example. As soon as the vehicle is restarted, this information also appears once in the central display.

URBAN GUARD Plus is also able to locate stolen vehicles. In case of theft, this also makes it possible to recover the vehicle even if the thief has deactivated the vehicle tracking function, for example. This takes place in cooperation with the police. Parking collision recognition in the new S-Class uses camera images from the Parking package with 360° camera to visualise the vehicle's surroundings, e.g. when a collision has occurred. When a collision is detected, each camera takes three images within a few seconds. These images can be viewed in the central display. The accident can therefore be reconstructed with time and place.

Further services are planned for the URBAN GUARD Plus package. These include emergency deactivation of the electronic keys, expected to be available from mid-2021. In the event of loss or theft of the vehicle keys, this enables the customer to deactivate them via the Mercedes me App to prevent any misuse. The keys can also be reactivated via the Mercedes me App.

Individual services from the URBAN GUARD Plus package can be booked subsequently via the Mercedes me Store, e.g. assistance after vehicle theft.

Vehicles with an URBAN GUARD package bear a special label. This warns potential thieves that the vehicle is specially protected.

More electrification, more efficiency

When the new S-Class is launched, six-cylinder in-line petrol and diesel engines in various output classes will be available, with a V8 engine with integrated starter generator (ISG) and a 48-volt onboard electrical system to follow shortly afterwards. A plug-in hybrid with an all-electric range of around 100 km will follow in 2021.

With the introduction of the integrated starter-generator (ISG) in the S-Class powered by the M 256 six-cylinder in-line engine in 2017, the 48 volt onboard electrical system celebrated its world premiere. The ISG is responsible for hybrid functions such as boost or energy recovery, while allowing fuel savings that were previously reserved for high-voltage hybrid technology. The systematically electrified six-cylinder in-line engine in the new Mercedes-Benz S 500 4MATIC (combined fuel consumption: 8.4-7.8 l/100 km, combined CO_2 emissions: 192-179 g/km)[1] has an output of 320 kW/435 hp and 520 Nm of torque. EQ Boost provides a further 250 Nm of torque as well as 16 kW (22 hp) for a short period.

Intelligent, forced induction that includes an electric booster compressor, as well as the integrated starter alternator (ISG) provide outstanding power delivery without turbo lag. In addition, the engine starts extremely quickly and comfortably, making the start/stop function almost imperceptible to the driver.

In addition, systematic electrification dispenses with the need for a belt drive for ancillary components at the front of the engine, which reduces its overall length. The slim design as an in-line engine, together with the physical separation of intake/exhaust, creates space for a near-engine emission control system. The 48 V on-board electrical system serves not only high power consumers, such as the water pump and air-conditioning compressor, but also the integrated starter-generator (ISG), which also supplies energy to the battery by means of highly efficient energy recuperation.

Efficient, powerful and clean: the six-cylinder diesel

The engine line-up is rounded off by the six-cylinder diesel (OM 656). To meet current and emissions control requirements, the engine already familiar from the preceding S-Class since mid-2017 has been developed further. This is based on an integrated technological approach consisting of a stepped recess combustion process, dynamic multi-way exhaust gas recirculation and near-engine mounted exhaust aftertreatment. Thanks to the near-engine insulated configuration, the emission control system has little heat loss and ideal operating conditions. Other features of the flagship engine variant in the premium diesel family include two-stage turbocharging and CAMTRONIC variable valve control. Its design is characterised by the combination of an aluminium engine block and steel pistons, as well as the further improved NANOSLIDE® coating of the cylinder walls.

The exhaust aftertreatment has been extended. Its components include:

- a combination of three exhaust gas recirculation (EGR) paths: This consists of the high pressure EGR path, the low-pressure EGR path and variable exhaust valve control (CAMTRONIC) for the return flow of hot exhaust

[1] The stated figures relate to the S-Class with long wheelbase and are the measured "NEDC CO_2 figures" in accordance with Article 2 No. 1 Implementing Regulation (EU) 2017/1153. The fuel consumption figures were calculated based on these figures. A higher figure may apply as the basis for calculating the motor vehicle tax. Further information about the vehicles offered, including the WLTP figures, can be found for each country at www.mercedes-benz.com

gases to the combustion chamber during warm-up under low engine loads, or when the exhaust temperature is low.

- a close-coupled NOx storage catalytic converter for reducing the nitrogen oxides
- a DPF (diesel particulate filter with special coating for also reducing the nitrogen oxides)
- an SCR catalytic converter (Selective Catalytic Reduction with a metered injection of AdBlue®) and
- an additional SCR catalytic converter in the vehicle's underbody.

The model range at the launch of the S-Class[1]

		S 450 4MATIC	**S 500 4MATIC**	**S 350 d**	**S 350 d 4MATIC**	**S 400 d 4MATIC**
Transmission	automatic	9G-TRONIC				
Engine (series, no. of cylinders, arrangement)		M 256, 6 in-line		OM 656, 6 in-line		
Displacement	cc	2999	2999	2925	2925	2925
Output	kW/hp	270/367	320/435	210/286	210/286	243/330
at	rpm	5500-6100	5900-6100	3400-4600	3400-4600	3600-4200
Add. output with EQ Boost	kW/hp	16/22	16/22	-	-	-
Peak torque	Nm	500	520	600	600	700
at	rpm	1600-4500	1800-5.500	1200-3200	1200-3200	1200-3200
Add. torque with EQ Boost	Nm	250	250	-	-	-
Combined fuel consumption[2] NEDC	l/100 km	8.4-7.8 (8.3-7.8)	8.4-7.8 (8.4-7.8)	6.7-6.2 (6.7-6.2)	6,9-6,4 (6,8-6,3)	7.0-6.5 6.9-6.4)
Combined CO_2 emissions[2] NEDC	g/km	191-178 (191-178)	192-179 (192-178)	176-163 (176-163)	183-168 (180-166)	186-171 (183-169)
Acceleration 0-100 km/h	s	5.1	4.9	6.4	6.2	5.4
Top speed	km/h	250	250	250	250	250

And here are the consumption values according to the WLTP[3][4]

		S 450 4MATIC	**S 500 4MATIC**	**S 350 d**	**S 350 d 4MATIC**	**S 400 d 4MATIC**
Combined fuel consumption[5] WLTP	l/100 km	9.5-7.8 (9.4-7.8)	9.5-8.0 (9.4-8.0)	7.7-6.4 (7.7-6.4)	8.0-6.6 (7.9-6.5)	8.0-6.7 (7.9-6.7)
Combined CO_2 emissions[4] WLTP	g/km	215-178 (213-177)	216-181 (214-181)	204-169 (201-168)	211-172 (209-171)	211-175 (209-175)

Many engine variants can be combined with the 4MATIC all-wheel drive system. The front axle transmission has been further improved. It is able to transfer higher torque levels while being considerably lighter.

[1] Values for the saloon with long wheelbase (V 223). Values for the model with short wheelbase (W 223) in brackets, if different

[2] The stated figures are the measured "NEDC CO_2 figures" in accordance with Article 2 No. 1 Implementing Regulation (EU) 2017/1153. The fuel consumption figures were calculated based on these figures. A higher figure may apply as the basis for calculating the motor vehicle tax. Further information about the vehicles offered, including the WLTP figures, can be found for each country at www.mercedes-benz.com

[3] The following WLTP details on the stated vehicles are based on the consumption and CO_2 figures valid in the German market and are to be understood as indicative information. Depending on the chosen equipment, the specific vehicle can lie between the "WLTP Minimum CO_2/Consumption Value" and the "WLTP Maximum CO_2/Consumption Value". A higher figure may apply as the basis for calculating the motor vehicle tax.

[4] Values for the saloon with long wheelbase (V 223). Values for the model with short wheelbase (W 223), in brackets if different

[5] The stated figures were determined in accordance with the prescribed measuring method. They are "WLTP CO_2 figures" as per Article 2 No. 3 Implementing Regulation (EU) 2017/1153. The fuel consumption figures were calculated based on these figures.

Setting the standard in the luxury class for many decades

The Mercedes-Benz S-Class follows a long tradition that extends back to the beginnings of the Mercedes brand in the early 20th Century. With the experience gained from 135 years of automobile engineering, Mercedes-Benz produces vehicles that take care of their occupants' safety and offers a comprehensive luxury experience that leaves owners more time for the important things in life. Each model has decisively influenced the automotive engineering of its era. Well before the official designation S-Class, the models in the executive and luxury class were the mainstay of the Stuttgart-based company's portfolio and have always stood for luxury, comfort, safety and lifestyle. The continuous ancestry of the S-Class begins with the model 220 (W 187) of 1951.

The unrivalled tradition of the Mercedes-Benz S-Class has roots that extend back to the beginnings of the Mercedes brand in the early 20th century. One early and very telling example is the Mercedes-Simplex 60 HP presented in 1903. In subsequent years, the product ranges of the Mercedes and Benz brands always featured several models in the executive and luxury class. Although open touring cars were the most popular body type at this time, the more powerful models in particular were also offered as luxurious saloons.

All this changed in the mid-1920s. In a time of increasing motorisation and traffic densities which the development of the road network was unable to match, safe driving characteristics, a comfortable interior and the best possible protection from wind, rain and dust became increasingly important. Saloon cars and Pullman models gradually prevailed over the open touring models. Important executive and luxury class models during this period were the supercharged Mercedes six-cylinder 15/70/100 hp and 24/100/140 hp models which appeared at the end of 1924. In 1928, following the 1926 merger between the two previously independent companies founded by Carl Benz and Gottlieb Daimler to form Daimler-Benz AG, the model range was joined by the Model Nürburg 460 (W 08) as the first Mercedes-Benz production car with an eight-cylinder engine. With continuous further developments it remained in the model range until 1939, with the Model 500 as the last variant. From 1926 the entry-level model to the Mercedes-Benz executive class was the six-cylinder 12/55 HP, which was developed further to culminate in the Mercedes-Benz Mannheim 370 (W 10) introduced in 1931. 1933 saw the introduction of the Mercedes-Benz 290 (W 18) as a completely new design which was replaced by the Model 320 (W 142) in 1937.

When the model range was expanded with the Model 170 S from the lineage of the E-Class, company chairman Wilhelm Haspel introduced the S as the new model designation in 1949. He declared that the letter S stood for "Super" or "Special". Since the launch of the 220 S in 1956, it has been in continuous use by Mercedes-Benz in the luxury segment. The designation "S-Class" was officially introduced with the 116 series in 1972.

From the W 187 to the "Ponton Mercedes" (1951 to 1959)

In the post-war period, the direct lineage of the S-Class began with the six-cylinder Model 220 (W 187), with which Mercedes-Benz reentered the upper-class segment in 1951. In 1954 this was followed by a completely new model with the same designation. The new Model 220, also known internally as the 220 a (W 180), was the first Mercedes-Benz six-cylinder model of monocoque construction.

Its modern, spacious "Ponton" body provided a previously unknown level of comfort. In 1956, with the introduction of the improved and more powerful Model 220 S, the letter S became a permanent fixture in the nomenclature of the Mercedes-Benz luxury class. 1958 saw the début of the 220 SE (W 128), a more powerful variant of the luxury class model by virtue of petrol injection.

From the "Tailfin" to the high-performance saloon (1959 to 1972)

The "Tailfin" models 220, 220 S and 220 SE (W 111) introduced in 1959 derived their nickname from the guide fins on the rear wings. This new generation of the luxury class was a special milestone in automotive history, as this was when the safety body with crumple zones and a rigid passenger cell conceived by Béla Barényi first entered series production. The top model in this series, the 300 SE (W 112) presented in 1961, featured an air suspension system and the automatic transmission newly developed by Mercedes-Benz as standard.

In 1963 the long-wheelbase version of this model founded a new tradition for the luxury class saloons of Mercedes-Benz: The 100-millimetre longer wheelbase gave passengers in the rear a significant increase in legroom and travelling comfort. In 1965 the saloons of the 108 and 109 series replaced the "Tailfin" models. These distinguished themselves with their elegant, timeless design and generously sized windows. As well as models with a conventional steel suspension – internally designated the 108 series – there were air-sprung variants (109 series) which were likewise available with a longer wheelbase. In 1968 the 300 SEL 6.3 was presented as a special highlight. The new top model in the series was equipped with the powerful V8 engine of the Mercedes-Benz 600 (W 100), and offered sports car-like performance together with outstanding comfort.

Automotive trendsetters: the 116 and 126 series (1972 to 1991)

The name given to the 116 series introduced in 1972 now expressed what had been the norm at Mercedes-Benz for decades: the luxury class saloons bearing the "S" in their model designations were now officially known as the S-Class. The new designation was accompanied by a wealth of innovations. The integral safety concept included e.g. the collision-protected fuel tank, a four-spoke safety steering wheel, anti-soiling side windows, large headlamps, conspicuous indicators and ribbed, dirt-repelling rear lights. In 1977, the diesel era began in the luxury class with the 300 SD, though initially only for the North American markets. At the same time, the luxury diesel was the first production car with a turbodiesel engine. From 1978 the S-Class was the world's first car to be available with the anti-lock braking system ABS, which ensures steerability even during emergency braking. A world sensation at the time, ABS is nowadays an automotive standard.

The technology transfer from the S-Class to the other Mercedes-Benz model series, and then to the models of other manufacturers until it became state of the art, was systematically continued in subsequent years. In the 126 series introduced in 1979, the airbag became a central element in automobile safety in 1981. Other attributes of this S-Class generation were the aerodynamically optimised shape and systematic weight reduction for lower pollutant emissions, partly thanks to new light-alloy V8 engines. The 126 series also made its mark in terms of design: It was the first Mercedes-Benz passenger car to dispense with traditional chrome bumpers in favour of deformable plastic bumpers that could withstand a minor parking collision without damage.

Luxury in its highest form: the 140 and 220 series (1991 to 2005)

In 1991 the 140-series S-Class was the new flagship model. Its developers concentrated on maximum comfort, for example through generous dimensions and double glazing for optimised acoustic insulation. The top 600 SE and 600 SEL models were the first Mercedes-Benz production cars to be powered by a V12 engine. The entry level in terms of power was marked by the 300 SD Turbodiesel, which now made the luxury class diesel available outside North America as well. This generation of the S-Class likewise introduced a trailblazing safety innovation in automobile engineering: ESP®, which became standard equipment in the V12 variants from 1995 and was optional equipment for the V8 models. Brake Assist BAS was added in the following year.

When the time for a model changeover came in 1998, the new 220-series S-Class was given a more understated design. The major development aims were to save weight while further improving safety and comfort. Despite dispensing with the weight-intensive double glazing, the new model generation offered even further improved comfort thanks to e.g. the new, electronically controlled AIRMATIC air suspension, the control and display system COMAND and the innovative intelligent cruise control system DISTRONIC. The active Active Body Control (ABC) suspension available from 1999 reduced body roll and achieved a previously unknown level of refinement. Customers with sporty ambitions were attracted to the S 55 AMG: an AMG model was officially shown in the S-Class price list for the first time. In autumn 2002, the S 600 as the regular top model without an AMG badge was treated to a power increase which enabled it to break the 368 kW (500 hp) barrier for the first time. At the same time a further trailblazing innovation had its debut on the 220 series: the preventive occupant protection system PRE-SAFE®. With the model facelift, Mercedes-Benz also offered the S-Class with the intelligent all-wheel drive system 4MATIC for the first time.

Trailblazing innovations: the 221 series (2005 to 2013)

The 221 model generation presented in 2005 combined an expressive exterior with a luxurious interior. The central controller of the further improved COMAND system allowed fast and intuitive control of the increasingly complex functions and menus. The pioneering technical innovations included active Night View Assist and further developments of the distance control system DISTRONIC PLUS and Brake Assist Plus, which were expanded to form PRE-SAFE® Brake with autonomous partial braking in 2006. Further assistance systems such as Blind Spot Assist, Lane Keeping Assist and Speed Limit Assist also relieved the driver's workload.

The updated generation of the 221 series appeared in 2009. The S 400 HYBRID was the first luxury-class vehicle with a hybrid drive system, and also the first standard-production passenger car with a lithium-ion battery. Introduced in 2010, the S 350 BlueTEC as a diesel variant and the S 350 and S 500 BlueEFFICIENCY with economical and powerful direct-injection petrol engines were models of efficiency. In early 2011 Mercedes-Benz introduced a highly-efficient four-cylinder engine into the S-Class for the first time with the S 250 CDI.

With networked safety systems: the 222 series (2013 to 2020)

The 222-series S-Class introduced in 2013 set new technical standards, e.g. as the first car in the world to dispense completely with light bulbs and feature only energy-saving LED technology both in the exterior and interior. Outstanding efficiency was ensured by modern powertrains, also using hybrid technology.

The S-Class became even more of a guiding star in automobile development with the Intelligent Drive system. It is under this name that Mercedes-Benz groups all of its networked safety and driving assistance systems. Intelligent Drive makes

driving even safer and more comfortable than before. These also include assistance systems that relieve driver stress and can make semi-automated driving possible.

As early as August 2013, the S 500 INTELLIGENT DRIVE research vehicle covered the historic Bertha-Benz route from Mannheim to Pforzheim to show how the future of autonomous driving might look with such networked technologies: Its systems were able to master the highly complex requirements of an autonomous journey along country roads and in urban traffic.

The next development stage of Intelligent Drive took another major step towards autonomous driving in the facelifted variant of the 222 series, which was presented in summer 2017: For example, Active Distance Assist DISTRONIC and Active Steering Assist give the driver even more convenient support when keeping a safe distance and steering. Standard equipment for the 222-series S-Class from model year 2017 included Active Brake Assist, Crosswind Assist, ATTENTION ASSIST, Traffic Sign Assist, the occupant protection system PRE-SAFE® and the new PRE-SAFE® Sound.

The major innovations in detail

3D driver display: An impression of spatial depth is created when the eyes of a viewer perceive different perspective views of an object in the display. In this innovative auto-stereoscopic display, this is achieved by the sophisticated combination of a conventional LCD display with a special pixel structure and a controllable LCD aperture grille. What is known as a barrier mask is positioned a few millimetres in front of the LCD. It is so precisely adjusted to the head position of the viewer that the left and right eye see different pixels of the LCD. This creates the desired impression of depth. A stereo camera system is integrated into the display. This is used to precisely determine the eye position of the viewer. Thanks to methods developed by Mercedes-Benz to adapt distances and a very low-latency system configuration, the driver enjoys a wide range of free movement. The image in the driver display is continuously adjusted.

4D sound system: As well as 31 speakers of which two are Frontbass versions, the Burmester® high-end 4D surround sound system has eight exciters. Two exciters are integrated into the backrest of each seat. Direct reproduction of the sound resonance in the seats adds another level to the three-dimensional listening experience – 4D sound. The perceived intensity of the sound can be individually adjusted for each seat. The music becomes even more emotional thanks to this feelable component. In addition to music reproduction, the 4D sound is also used to create an even more emotional function of ENERGIZING Comfort. Two amplifiers with a total output of 1750 watts power 37 separately processed output channels. Hybrid amplifier technology with digital signal processing, analogue filters and separate power supply ensure precise and highly dynamic sound reproduction.

Active ambient lighting: This uses fibre optics made of a transparent material. The light of the primary colours red, green and blue generated by the LEDs is reflected at the boundary between the optically more dense and the optically less dense material. In addition to a static light, the colours can alternate along the entire fibre optics in order to stage productions. The active ambient lighting is generated by a light band comprised of about 250 LEDs distributed side by side at a distance of 1.6 centimetres in the vehicle interior as an additional light plane. The optics are designed to create a continuous line of light. The networked LEDS are controlled in real time via a CAN data bus. Thanks to the actuation frequency of up to 25 Hz, the human eye is able to perceive dynamic lighting scenarios.

Augmented reality head-up display (AR-HUD): Two different head-up displays (HUDs) are available on request, one of them an innovative AR variant with a particularly large image. The aperture angle of the display is 10° horizontal and 5° vertical, and the image appears virtually at a distance of 10 metres. This display area corresponds to a monitor with a 77-inch diagonal. The AR-HUD provides a great deal of augmented reality content for driving assistance systems and navigation information. For the driver this blends into the surroundings ahead of the vehicle, and can therefore contribute to further reduced distraction. The image-forming unit (DMD, digital mirror device by Texas Instruments) consists of a high-resolution matrix of 1.3 mill. Individual mirrors and a highly efficient light source. The technology is also used by projectors in cinemas. In the S-Class it is used by Mercedes-Benz for the first time to generate images in the head-up display.

Drivertainment: Ear-level speakers integrated into the front seats make for further improved surround sound. With the new drivertainment function, information from the infotainment system, e.g. navigation instructions and telephony, can be specifically directed to the driver's seat.

E-ACTIVE BODY CONTROL: adds semi-supporting hydropneumatics to the air suspension. The air springs bear the base load of the vehicle body and gradually regulate the level. The hydraulics generate dynamic forces that overlay the air suspension forces and actively support and dampen the vehicle body, e.g. during longitudinal and lateral acceleration or when driving on uneven roads. At each wheel, a damper is installed within the axle with two working chambers that have an adjustable damping valve and a hydraulic pressure reservoir. The damper is connected to an intelligent motor/pump unit in the 48 V network by hydraulic lines. Actuation of the motor/pump unit enables the hydraulic fluid to be displaced to create a difference in pressure within the damper, allowing an active force to be generated. The motor/pump units at all four wheels are coordinated by a central control unit which also actuates the valves and the compressor for the air springs, and therefore always controls the entire suspension system.

ENERGIZING seat kinetics: ENERGIZING seat kinetics uses the electric seat adjustment. If the driver selects this programme, the inclination of the seat cushions and backrests is continuously adjusted minutely using the seat settings selected by the driver and the front passenger as the starting point. The changes are only minimal - a few degrees or millimetres. If multicontour seats are installed, the ENERGIZING seat kinetics also includes the lumbar support function. ENERGIZING seat kinetics improves spinal health, because the natural strain and relief of muscles, joints and discs can lead to muscle relaxation and an improved supply of nutrients to the joints and discs. ENERGIZING seat kinetics is based on a patented algorithm. Convenient selection of the programmes is visually supported via the central display of MBUX (Mercedes-Benz User Experience).

Rear airbag: Cylindrical, tubular structures are inflated with compressed gas and deploy a wing-shaped structure. A large, tent-like airbag deploys between the two wings, and this is inflated by the surrounding air via specially patented valves in the skin. These valves are designed to hinder the escape of air when the rear passenger is immersed in the airbag. The comparatively small volume of the tubes allows rapid deployment of a relatively large airbag volume. This takes place with comparatively low force and a low risk of injury, as the tubular wings give way to obstacles. The airbag enhances the restraining effect of the belt system, and can support the head and neck to decrease the loads on them significantly. In combination with a beltbag and the inflatable seat belt, the S-Class sets new standards for rear seat occupant safety.

Rear-axle steering: An electric motor drives a spindle at the rear axle via a drive belt. This makes axial adjustments to the spindle. Depending on the speed and the steering angle, the rear wheels are turned in the same or the opposite direction as the front wheels (same-direction or counter-direction steering). In simplified terms, this produces more agility and a smaller turning circle by counter-steering and more stability with same-direction steering. In the S-Class, the full steering angle of ten degrees is especially used during parking manoeuvres. The environmental data of the vehicle sensors (radar, camera, ultrasonic) are used for large steering angles, to adapt the maximum angle to the relevant situation. The system switches from counter-direction to same-direction steering at more than 60 km/h. The different driving modes rely on different steering strategies. The respective rear-axle angles and trajectories are shown in the driving mode menu in the central display. The 10° rear axle steering has a special snowchain mode. When activated by the driver, the steering angle at the rear axle is reduced and the steering characteristics are adapted for the special conditions of surface snow.

Sound personalisation: With this function the user can experiment and adjust the sound system to his/her personal listening preferences. The result is saved to a personal sound set and stored in the user profile.

MBUX Interior Assist: Using cameras in the overhead control panel and learning algorithms, MBUX Interior Assist recognises and anticipates the wishes and intentions of the occupants. It does this by interpreting head direction, hand movements and body language, and responds with corresponding vehicle functions. For example, if the driver looks over his/her shoulder towards the rear window, MBUX Interior Assist automatically opens the sunblind. If the driver is looking for something on the front passenger seat in the dark, it automatically switches the light on. Merely looking at one of the outside mirrors is enough to allow adjustment, without having to select it first. Natural hand movements are also recognised, and the driver or passengers can open the sliding sunroof touch-free. Preferred functions can be accessed with the help of the favourites gesture (hand with the index and middle finger spread in a V-shape). The driver and passengers can link personal favourites with the system. As well as enhancing operating convenience, MBUX Interior Assist improves safety. It checks whether a child seat on the front passenger seat is correctly attached, for example.

Centre airbag (country-dependent feature)**:** During a severe side impact, this positions itself between the driver and front passenger seat, reducing the risk of their heads making contact. It is integrated into the driver's seatback in the middle of the vehicle. The centre airbag is triggered when a severe side collision is recognised and certain conditions are met. The main factors for deployment are the direction of impact, impact side, and front passenger seat occupancy.

OLED technology: The abbreviation stands for Organic Light Emitting Diode. In contrast to LCD technology, an OLED display consists of several organic layers applied to a plastic substrate. OLED panels emit light when subjected to an electric current, and unlike an LCD they do not require external background lighting. Power is only consumed where pixels light up. Among other benefits, this ensures a better black level and even stronger contrasts. When showing typical video sequences, OLED technology has an up to 30 percent lower energy consumption than LCD technology.

PRE-SAFE® Impulse Side: In addition to the familiar functions, the body of the new S-Class can be slightly raised just before the collision when a side impact threatens. The side-mounted radar sensors are able to recognise and track a potential side crash at an early stage. The actuator is the E-ACTIVE BODY CONTROL suspension, which can raise the body upwards by up to 80 millimetres. This reduces the loads on the door structures, as the door sill can absorb more of the load thanks to its higher position. As a result, deformation of the passenger cell and the loads acting on the occupants can be reduced.

Voice assistant "Hey Mercedes": Conventional voice control systems in cars call for certain fixed commands from their users. Because it understands natural language, "Hey Mercedes" listens to almost every word and understands practically any sentence relating to the infotainment sector and vehicle operation in 27 languages. Indirect speech is also recognised, for instance if the user says "I am cold" instead of the clear command "Temperature in footwell 24 degrees" in order to operate the climate control for the footwell. The voice control is also capable of learning. On the one hand it tunes into the user and their voice and also understands non-native speakers better; on the other hand the software models on the server learn new buzzwords or changing use of language with time. The system also no longer answers stereotypically, but varies in the dialogue output too. The fundamental way the language assistant operates: the voice input is freed from background noises, compressed and transmitted. Both the head unit in the vehicle and the server evaluate the data and send a reply. The system decides which reply is the most likely, then within a few seconds the reply/reaction follows. This means that the voice assistant also answers if there is no connectivity. "Hey Mercedes" is now available to every seat occupant.